Colorado Highways

A magazine devoted to Good Roads

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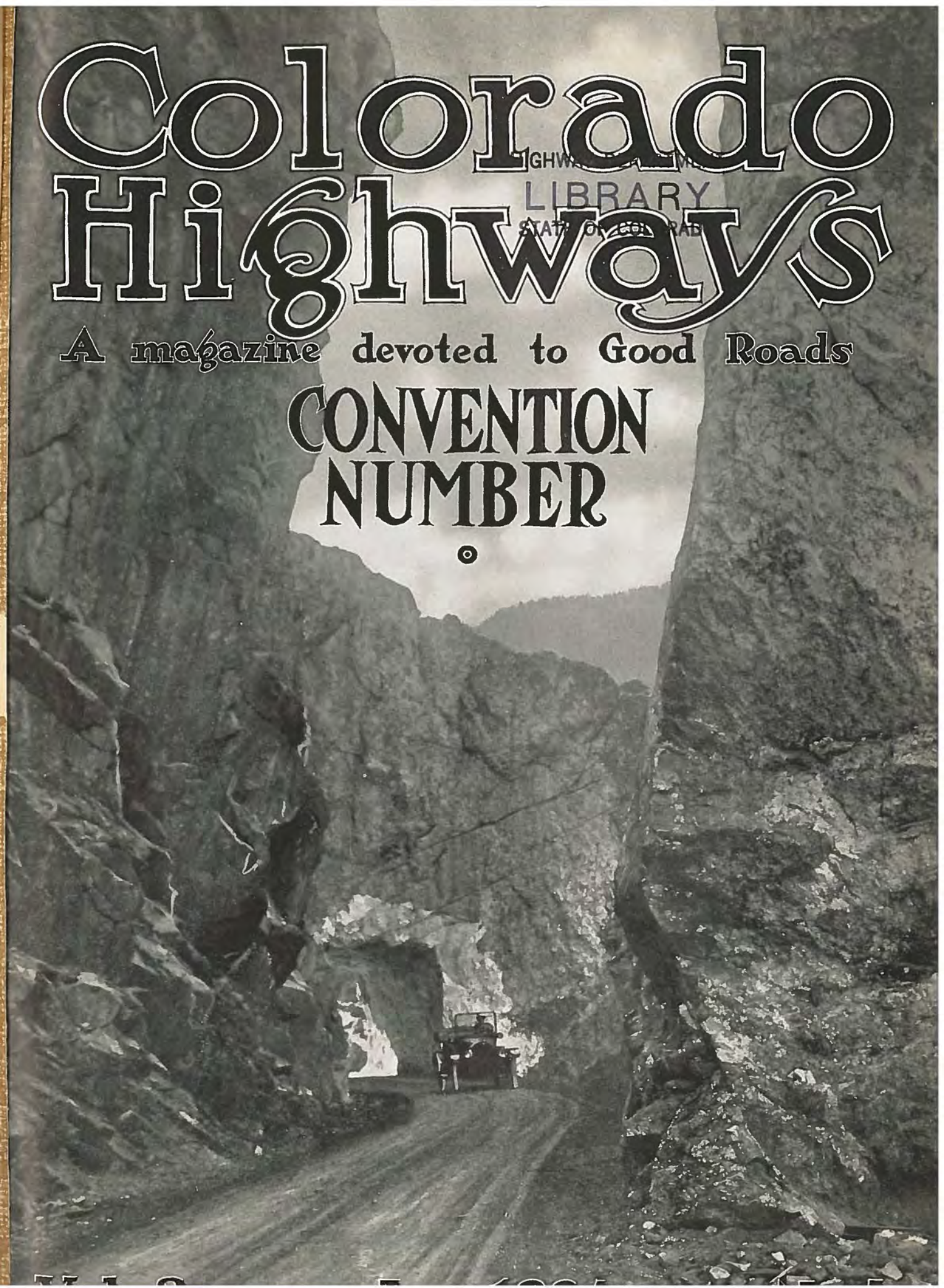

Colorado Highways

Official Publication of the
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

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OUR COVER PICTURE

Colorado Highway's frontpiece this month consists of a scene on the far-famed Rainbow Route near Salida. It shows a "cut" through solid granite and a tunnel. This piece of picturesque roadway is located on one of the best and most popular transcontinental routes in Colorado and each year is traveled by thousands of tourists from all over the world. A score of features which have made this region famous might be named and described at length. Writers of world-wide fame have dwelt upon the attractiveness of this section of the state. It furnishes a panorama of magnificent views.

Photo by Courtesy of Salida Commercial Club.

Colorado Highways
"BETTER ROADS"
VOLUME III. JANUARY, 1924. NUMBER 1.

History of Highway Department

By T. W. MONELL
Secretary Colorado State Association of County Commissioners.

WITH the Colorado State Association of County Commissioners about to convene in annual session and with highway matters to occupy a most prominent place on the program of the session, a few words about our highway department, its history and its accomplishments are not out of place, especially in view of the fact that the association of county commissioners took the initiative in road matters and is, if I may be permitted to use the expression, "the father of the State Highway Department." It was a handful of county commissioners who started the movement for better roads in this state and brought about the establishment of a State Highway Department.

When I look back eighteen years, when a few of us met to work out some plan for the construction of a system of highways which would link the various sections of the state together and bring them closer to each other, I cannot help but think that a wonderful work has been accomplished. The past was not always smooth. Oftentimes obstacles, which seemed unsurmountable, and were discouraging in the extreme, beset our path. Colorado, like other states, had its wasters and demagogues who blocked the path of progress and often threatened to undo what had been accomplished, but, fortunately, the people with common sense were in the majority. As a result we have today, I am proud to say, a highway department committed to a program of constructing a state-wide system of highways and preserving and maintaining that which the people have paid for.

I fully realize that our highway department is not perfect and that there is still room for improvement, but I, for one, feel grateful for what has been accomplished and for the fact that few ills and little waste have crept into its management during its short life.

In the following I shall give a brief review of the efforts of the people of Colorado to obtain a system of highways, which would serve all of the people and all sections.

T. W. MONELL

It was eighteen years ago when a few county commissioners and the writer met in Denver to discuss the formation of a state association of county commissioners for the purpose, among other things, of working out some plan for the use of the state's permanent improvement fund in road building. It was our idea to work out some plan which would eventually link the various counties of the state by a system of state roads.

This first meeting was preliminary. The following year the Colorado State Association of County Commissioners was formally organized. The organization meeting was held in the Denver court house. I can truthfully state that the association has been a power for good to the present day and that never has it lost interest in good roads. At all times its members have had the furtherance of the good roads movement at heart.

During the next few years the movement for a system of roads, such as was advocated by the county commissioners, gained great momentum. The Colorado Good Roads Association was formed. Slowly, but surely, the idea of the construction of a road system, built by the state and with a view of developing the state, gained headway, but, I might say here, it was not always smooth sailing.

The first fruits of our efforts came in 1913, when, under the leadership of Senator John J. Tobin and Speaker O. C. Skinner, both from Montrose county, the 19th General Assembly enacted into law a bill creating a state highway department. The bill was promptly signed by Elias M. Ammons, the governor of the state and one of the best and far-seeing chief executives the state has ever had. Determined to give the state a sound business administration, he was heart and soul in favor of the bill creating the highway department. The very personnel of the commission which he appointed is proof of his remarkable judgment.

The pioneers in the good roads movement in Colorado will recall, I am sure, with a good deal of satisfaction, the names of Thomas J. Ehrhart, John M. Kuykendall, Leonard E. Curtis, Charles R. McLain, Charles E. Herr, L. Boyd Walbridge and James E. Maloney. These are the men who composed this first real highway department. These men did not have the easiest task, especially when it is considered that an appropriation of $15,000 was all they had to work with. Tact, patience and courage were essentials in the task that confronted them. It was up to them to educate the people of the state to the new order of things in road-building, and at the same time defend what had been gained against the politicians who did not relish the idea of having a good slice of political "pork" taken away from them. The first system of state highways was planned by this board.

Up to 1914 the State Highway Department was dependent upon what appropriations the General Assembly gave them and upon the Internal Improvement Fund for monies with which to finance highway construction. In 1914 the Colorado State Association of County Commissioners took the lead in initiating a law providing for a ½ mill levy for state roads.

Even with the proceeds of this mill levy and its income from other sources the State Highway Department did not have as much money at its disposal as some states paid out in interest on highway bond issues. Nevertheless, excellent work was done by the department. I am not exaggerating, I believe, when I call the department's showing at this time "remarkable". That the department's work was appreciated, was demonstrated by the fact that the people, through their chosen representatives, the General Assembly, voted the department an additional one-half mill levy. This second levy was, in my opinion, both a blessing and a curse. While it gave the department sufficient money to carry out a comprehensive construction program, it also attracted the attention of the designing politicians to the department, politicians who looked with envy upon the large amount of money at the department's disposal.

To gain control of the department, certain politicians set out to deliberately wreck the organization created under Governor Ammons and which had functioned so splendidly. They caused the General Assembly to repeal the 1913 act and created a new department. Thomas J. Ehrhart and James E. Maloney remained as highway commissioner and chief engineer, respectively, but the personnel of the entire board was changed. Up to this time practical business sense had governed the department. Administration costs had been held below that of almost any other state department of like magnitude and, generally speaking, the people had received full value for their money.

The next few years form a chapter in the state's highway history which is not pleasant. Politics began to enter into the workings of the highway commission. Costs began to mount and slowly but surely the purpose of the original highway act—to build a system of roads connecting all the portions of the state—was being lost sight of. Federal aid, which by this time had become an important factor, exercised what I might term a demoralizing influence. The government's requirements were designed for states which had millions at their disposal for road work, and not for a sparsely settled state like Colorado, with a comparatively small valuation of taxable property.

Conditions had grown from bad to worse, when jolly old Oliver Shoup undertook to reorganize the department. At first the county commissioners viewed Governor Shoup's efforts to remodel the highway law with dismay. They fought hard his attempt to remodel the highway law, but they dropped all opposition and got behind him when they realized that the governor, following the adoption of a new law, was making an earnest effort to apply practical business methods in the management of highway affairs. His selection of members of the highway advisory board—all of them broad-minded, sound men—and his appointment of Major L. D. Blauvelt as state highway engineer, restored the people's confidence in the department.

No better proof of the confidence which the people of Colorado have in Major Blauvelt and no finer tribute to his integrity, fidelity and fitness for the responsible position which he occupies, could be had than the action of the State Association of County Commissioners in the fall of 1922, when it was proposed to initiate a $6,000,000 highway bond issue. Not until Major Blauvelt had agreed that he would remain at the head of the Highway Department did this association and other organizations interested in good roads, agree to get behind the bond issue and work for its passage.

I can state without fear of successful contradiction that the Highway Department as at present constituted is attending to its duties in a manner that is satisfactory to the people of the state. Even those who opposed the present department at the beginning will admit this. The various subdivisions of the department are obtaining splendid results, especially the maintenance division under the direct supervision of Robert H. Higgins. Roads already constructed are maintained in a manner which makes me feel certain that ultimately all dirt roads in the state will be gravel surfaced. Today the state has completed, or has arranged plans for early completion, a system of highways which will connect all sections of the state.

Fairness, I believe, has characterized the appropriations for new construction work, though we might not always agree upon a year's program. The outside counties have "cussed" my friend, "Fudge" Sommers, but I want to take advantage of this opportunity to pay a tribute to Mr. Sommers' foresight a few years ago when he obtained for the state the first lot of trucks and tractors. These, I am sure everybody will agree with me, have been of great help in Colorado. "Fudge" is just an illustration of the human trait of trying to please those whom he represents.

The advisory board is a well-balanced body of men endeavoring at all times to do what is best for all sections of the state and to carry out the principle of the first highway act: to bring all cities and towns into closer union with each other. Its members have shown good judgment in the selection of the proper type of road for each locality. They have not run wild on cement roads and constructed these only where traffic conditions demand them. Different from many other states, the roads in Colorado are adapted to the needs of the "man with the load."

That the men comprising the highway advisory board are level-headed, sound business men was again demonstrated last year when the 1924 budget was being prepared. Repeal of one-half of the one-mill levy for road purposes naturally resulted in a considerable reduction of the money at the disposal of the department. The members of the board confronted the situation as good business men meet every-day problems. Acting as spokesman for his colleagues, William Weiser, chairman of the board, in speeches delivered in various sections of the state, has frankly stated that the board would cut appropriations to meet receipts. He was bound to disappoint many people, but he and his colleagues pursued the right course.

In many states expenditures for highway purposes have become an oppressive burden upon the taxpayers. Not so in Colorado and I am sure that whenever the trucks and transportation companies who now have free use of our highways are compelled to pay for the privilege of carrying on a lucrative business over highways for the upkeep and construction of which they have paid little or nothing, the financing of our highway budgets will be made still easier.

The sunrise of happiness and prosperity shows its first ray above the peak of discouragement. The glory of the new day will dissipate the clouds of pessimism which have obscured our vision. Hats off to Major Blauvelt and his advisory board, the heads of one of the most important departments of our state government. We are proud of their record. Let us pass the roses while they are still with us and can enjoy them. We cannot make a better resolution at the beginning of the new year than to agree to show them our appreciation of their efforts by unswerving support, so long as their work is not for a section, but for all Colorado.

$3,000,000 For Federal Aid Roads

EXPENDITURE of the State Highway budget for 1924 will mark another important step toward the completion of the state's system of interstate highways as embodied in what has become known as the seven per cent system, mapped out by the State Highway Department and approved by the Secretary of Agriculture as head of the national government's road department.

The budget provides for the expenditure of an even $3,000,000 on this system of interstate highways, the state contributing one-half of this sum and the federal government the other. The state's contribution is represented by the proceeds of the second installment of the $6,000,000 bond issue authorized by vote of the people in November, 1922.

While the bulk of the 1924 construction work will be on the big interstate highways, such as the main North and South highway, the Rainbow Route, the Santa Fe Trail, the Victory Highway and others, the budget, in addition to the $3,000,000 mentioned, provides for the expenditure of $500,000 for the improvement of portions of the state highway system for which federal aid is not available.

The highway department heads and the members of the Highway Advisory Board in particular, realize that $500,000 is a wholly inadequate amount; that three or four times that amount could be spent to meet the justifiable demands of the people served by the state highways other than those in the improvement of which the federal government participates, but they were helpless in view of the fact that the general assembly had seen fit last winter to curtail the highway department's income.

Fortunately for the state the commissioners of a number of counties have begun to realize the condition created by the general assembly. They realize that the large appropriations for work on highways other than federal aid roads are a thing of the past, unless the one mill levy for road purposes should be restored, and anxious to see the roads of their counties designated as state highways, improved, they have entered into agreements with the highway department by which they pledge themselves to use the proceeds of the increased gasoline tax to meet, dollar for dollar, the appropriations which the Highway Advisory Board has made for what is known as "state" projects.

As a result of this attitude on the part of many boards of county commissioners, many state highways, which may be termed "feeders" for the big interstate system, will be greatly improved during the current year. Colorado Highways hopes to soon be able to print a list of the projects in the construction of which state and counties will co-operate on a fifty-fifty basis.

The budget was completed at an adjourned meeting of the advisory board held on December 12 and 13. It was approved by Governor William E. Sweet on December 18 in exactly the form in which it was presented to him by State Highway Engineer L. D. Blauvelt.

The outstanding feature of the budget is a continuation of the policy, adopted by Major Blauvelt and the advisory board two years ago, of concentrating the department's construction work upon improvement of the main arteries of travel. That policy is noticeable in the appropriations for the federal aid projects, as well as those projects looking toward the improvement of the "feeder" roads.

A careful study of the federal aid projects will reveal a definite plan of improving the most important and most heavily traveled stretches of road in the state. The projects are widely scattered, but all of them are on some important highway and will greatly facilitate travel from one section of the state to the other. One section of the state will benefit from the contemplated work as much as another.

The budget contains 40 Federal Aid and 93 State Projects, besides making provisions for maintenance of state highways, administration, purchase of equipment, etc. The maintenance budget carrying $811,000 alone will be found discussed in detail in another article in this issue of Colorado Highways. Altogether the budget disposes of an estimated income of $4,725,000.

In this connection mention might be made of the fact that in addition to the projects covered by the 1924 budget the highway department will complete all unfinished projects of the 1923 budget. The projects contained in the 1924 budget are in addition to all projects provided for in the past. These unfinished projects entail an expenditure of several million dollars.

Lack of space forbids the publication of the entire budget in this issue of Colorado Highways. Appended is the complete list of Federal Aid projects provided for 1924.

The Federal Aid appropriations follow:

District 2

Gravel surfacing from Gunnison toward Sapinero	$ 49,000
Completion of Uncompahgre river bridge at Delta	22,416
Grading and graveling in Mesa county	60,000
Grading and graveling between Grand Valley and DeBeque	120,000
Grading and graveling between Grand Valey and Rifle	154,000
Total	$405,416

District 3

Grading and graveling between Pagosa Springs and Bayfield	$ 35,000
Bridge over the Rio Grande at Alamosa	70,000
Grading and graveling from the summit of LaVeta Pass west	30,000
Grading and graveling west from Walsenburg	25,314
Grading and graveling west from Bayfield	40,000

(Continued on page 20)

Last word in Maintenance—stretch of road between Ordway and Olney Springs on gravel surfaced Kansas-Colorado Boulevard

Report of Maintenance Division

THE average cost of maintenance in Colorado in 1923 was $192.13, according to the annual report of Robert H. Higgins, state superintendent of maintenance.

In co-operation with the counties the state maintained a total of 8,286 miles of main highways, of which 5,253 miles were patrolled by regular crews.

In his report Supt. Higgins points out that the maintenance forces gravel surfaced 605 miles of roads, 167 miles of which was on dirt roads on which gravel was spread for the first time. On the balance, 438 miles was resurfacing with additional gravel on roads that had been graveled in previous years.

The number of miles maintained during the past twelve months showed a gain of 1,300 miles over the previous year. Of this gain 1,000 miles was added and placed under patrol crews.

Expenditures of the maintenance division during the year totaled $..... from state funds. An equal sum was expended by the sixty-three counties. The work of maintaining the state roads was carried on by county crews under the joint supervision of state and county road superintendents.

In addition to road maintenance the Highway Department carried on four major construction projects through its maintenance division. These projects were located in different parts of the state and consisted of reconstructing the road over Wolf Creek, widening of the Blue Mesa road in Gunnison county; improvements on the Gore Range road from Kremmling to Toponas, and limestone surfacing thirteen miles of the road north of Walsenburg to Apache Creek.

According to Supt. Higgins the most important development in maintenance for the year 1923 is the growing inclination on the part of many counties to use a large proportion of their maintenance money for betterments, such as gravel surfacing, new drainage structures, changes in location of highways, necessitating heavy grading, cuts and fills and entire new drainage structures along the new locations.

Most of these changes in location are being made to eliminate railroad crossings or to reduce excessive grades, or to place the road on better ground or shorten the distance, all beneficial as long as they do not interfere or stop ordinary maintenance.

In several counties the maintenance fund was exhausted by the first of August

Douglas Stewart, road supervisor of Douglas county, and Robert H. Higgins, state superintendent of highway maintenance.

or September on account of too much money expended on betterments, says Supt. Higgins. This caused a let-down on maintenance work in some of the counties on roads already completed with State and Federal money.

For this reason the counties in making requests for state aid maintenance money this year, were asked to segregate their requests into maintenance and betterments. The total county requests for 1924 reached $885,000, of which $680,000 was for maintenance and $205,000 for betterments.

This with the state's share added would have, if accepted, made a total of $1,770,000 joint maintenance fund, of which $1,360,000 would have been for maintenance and $410,000 for betterments.

The tendency on the part of the counties to spend maintenance funds for betterments can be attributed partly to the fact that the county proportion of the $5,000,000 bond issue has become exhausted and partly to the action of the last legislature in reducing the State's road income some $800,000, thereby curtailing the State Projects heretofore available to a great majority of the counties.

Supt. Higgins believes that the use of maintenance funds for betterments and improvements, unless made secondary to the upkeep and ordinary maintenance of roads already improved, will result in a lowering of the standards of maintenance.

The weather conditions prevailing from May to October were considered abnormal for Colorado, and caused innumerable washouts of small drainage structures in a considerable area of the state and the recurring cloud-bursts, mostly in the mountain districts, caused many slides, filling up ditches and culverts that required the expenditure of an unusual amount of maintenance money. While there was no general flood condition, as prevailed in 1921, still the persistent rains and cloud-bursts, all over the state this year, necessarily reduced the maintenance funds intended for ordinary patrol and maintenance work.

In spite of this condition, with the possible exception of six or seven counties, the maintenance of the State Highways was better than during the previous year. This was due to the more efficient crews employed. A large number of the counties also enlarged their maintenance equipment.

During the last year a larger number of counties maintained more or less of a patrol system on the main roads through their counties. Results to be obtained from this system of maintenance was more generally appreciated by the counties. The coming year will, it is believed, see a majority of the counties employing patrol crews.

In 1923 there was a total of 8,325 roads maintained, as compared with 7,016 in 1922, and 5,292 miles patrolled as compared with 4,224 miles the previous year.

The maintenance of Federal Aid Projects showed great improvement over the previous year, according to inspection reports received from the U. S. Bureau of Public Roads. Tarring joint and care of shoulders on concrete paving covered the major part of these reports. These inspection reports were more favorable than ever before.

The keeping down of weeds on most of the highways, however, according to Supt. Higgins, was almost a total failure, due to the fact that frequent rains and washouts consumed more money than was reasonably expected of the maintenance fund. During July and August, the weed cutting time, most of the counties endeavored to keep the road bed or wheel tracks in travelable condition, in preference to taking care of the weeds.

On the various State Projects and other construction jobs turned over to the Maintenance Division to do during the

year 1923, Supt. Higgins submitted a report as follows:

State Project No. 700, Appropriation $12,500.00.

The work consisted of widening Blue Mesa road in Gunnison county from Halfway House east to connect with Federal Aid Project No. 125 at or near east bank of Pine Creek in Gunnison county.

Work was started at the foot of the hill directly east of the Halfway House by Steam Shovel No. 2 crew, on May 21, 1923. The work on the hill was estimated to be from 60% to 75% heavy solid rock work, the length of improved road was 1¾ miles. After completion of the work on this hill, shovel was moved over to Windy Point to make a change in location at that part of the road, but realizing that the worst hazard left on the road was the Pine Creek crossing and believing we would not have enough money in the appropriation to take care of both the Windy Point and Pine Creek jobs, the shovel was moved over to Pine Creek and that work done and money having been exhausted, the shovel was taken to Cimarron on October 10, 1923, and shipped to Placerille to begin work of widening road on Norwood Hill, San Miguel county.

There was expended on this project the following:

Placing 9-15"x20' Metal Culverts	$405.60
Rock work on hill east of Halfway House	8594.40
Change of road, making fill and culvert, Pine Creek	4885.31
Total cost	$13885.31
Estimated yardage moved on hill, 50% solid rock	19,000
Average cost per yard (rock and dirt)	44c

Have no estimate of yardage for Pine Creek part of the work.

State Projects No. 504, balance 1922 appropriation	$ 7,500.00
State Projects No. 717, 1923 appropriation	17,500.00
Total appropriation	$25,000.00

This is the work of widening Wolf Creek Pass road. Beginning at the top of the Pass on May 1, 1923, with Steam Shovel No. 1 crew and working west towards the bottom of the pass, we were able to widen the road to 18 feet for a distance of 7½ miles, leaving some 4 miles to be widened during year 1924. Discontinued work on October 30, 1923, account weather conditions, storing shovel and compressor at what is known as No. 3 Camp, about four miles from bottom of west side of pass. We lost fully 30 days working time account weather conditions and shortage of men.

The 7½ miles completed this year were heavier work than the 12 miles completed last year, and the remaining four miles to do next year will be the heaviest work (more yardage to handle) than any of the work previously done.

The cost for the 7½ miles was $15,539.77, leaving an unexpended balance in Project 717 of $9,460.23, which will not be sufficient to take care of the 1924 contemplated work of widening and new bridges.

State Project No. 781, appropriation	$4,000.00
Routt County Bond Fund	4,000.00
Total	$8,000.00

This is the Gore Range road from Kremmling to Toponas. The work started this year in Grand county and was completed westerly towards Toponas for a distance of 7 miles. The state's $4,000 was necessary to complete that portion of the road in Grand county.

Work was started on May 15, 1923, and closed down on account of weather conditions October 31, 1923. There were seven miles of road completed at the following cost:

Bridges and culverts	$ 465.00
Rock work	941.20
Dirt work clearing and grading	6,773.26
Total cost	$8,179.46
Average cost per mile	1,168.49
State Project No. 730, appropriation	$25,000.00

This is the limestone surfacing job on Road No. 26 (F. A. P. No. 2) from Walsenburg north to Apache Creek. Began April 1, 1923, completed July 20th, thirteen miles surfaced. The following are detailed costs:

	Total Cost
6,000 cu. yds. limestone @ $2.20 F. O. B. quarry	$13,200.00
Railroad freight quarry to Walsenburg, 6,000 yds. @ $1.20	7,200.00
Unloading railroad cars and loading into trucks, 6,000 @ 50c	3,000.00
Hauling and spreading (paid from State funds)	5,220.19
Hauling and spreading (paid from Maintenance fund)	4,834.79
Scarifying and blading (part State fund and part Maintenance fund)	1,525.60
	$34,980.54
Average cost per mile	2,690.81

This shows a cost per yard for hauling of $1.67, which based on an average haul of 7 miles, makes cost for hauling per yard per mile, 24c.

Repairs On Vernon Canon Road.

Washouts April, May and June—Rock retaining walls and grading and filling work done by Foreman Mooney	$2,885.64
Washouts July, August and September, cribbing retaining walls, grading and filling work done by Foreman Williams	3,425.15
Putting in 2-36" culverts and building rock head walls for same and completing that part of the road connecting Federal Aid Project and State Aid Project, by Foreman Kerzear	1,486.12
Total cost of work in Vernon Canon	$7,796.91

One of the maintenance patrols employed to keep the "wrinkles" out of the detour between Wolhurst and Gann, on State Highway No. 1, during construction of the concrete roadway between these two points.

Berthoud Pass--A Trail Transformed

BY GEORGE M. MONAHAN.

A WAVE of her Fairy Godmother's wand brought jewels, clothes, footmen, horses and carriage to Cinderella, transformed her from an ordinary kitchen maiden to a much sought after, charmingly magnetic Court Lady.

A similar transformation was performed when Berthoud Pass, formerly a mountain trail, was converted into a beautiful scenic highway in a remarkably short time. The wand in this instance was the will of the people, their money, the Bureau of Public Roads, United States Forest Service, the Highway Officials of the State of Colorado, and the brains of the engineering and contracting profession, plus steam shovels, horses, plows, scrapers, and honest sweat of those employed in the herculean task of presenting this unique and model highway to the world.

As you ascend Berthoud Pass, winding its way through primeval forests, where but a few years ago the mountain lion stalked his prey, the eagle soared, and the bob cat went his way unmolested, you are brought face to face with the modern ingenuity of man. You behold a road that is a masterpiece of engineering skill, a lasting memorial to the brave hearts and staunch souls who had a part in its building.

Traversing the transcontinental divide it carries you through a country rich in the mythical lore of the Indians, through scenes of the wild rush as the gold strikes were made—it brings back reminiscent thoughts of pioneer struggles, and hardships. It opens up a vista avenue of lodge pole pines, cavernous gorges, fascinating valleys, and panoramic views incorporating a number of our more important peaks whose hoary and lightning-scarred crowns are resting places for fleecy clouds.

He who has not felt the spell of the mountains has but half lived, for nowhere in nature's crown are set more sparkling jewels of scenic grandeur and pristine magnificence.

The legend of the old road is mighty interesting—how it came to be built and how it got its name. On the point of name, no one seems to be quite sure, but it is generally agreed that the original trail was blazed by a trapper, who, following an old Indian trail, had gone across the divide over Jones' Pass which crosses the Continental Divide between Torrey's Peak and Jones' Peak. This trapper very likely went down what was later named Vasquez Creek and came back up Fraser River to its source near the saddle of what is now the top of Berthoud Pass. Here he must have struck a game trail winding down into the Clear Creek Basin on the eastern side of the divide. As was the custom when venturing into a new and heavily wooded country, he blazed his trail as he went, which procedure enabled him to return to his hunting and trapping grounds over the same route. The legend had it that he finally got the trail in such shape as to permit him to pack his outfit on a burro whenever it was necessary for him to make a trip to the lower Fraser, where he later established a trading post. From that time on he made numerous trips across this crude pass each year by pack train and established a lasting trail.

Fifteen years later gold was discovered in the Clear Creek country. Georgetown, Idaho Springs, Lawson, Silver Plume, and Empire sprang up over night. From these points more venturesome prospectors followed the rough trail over Berthoud in their search for precious metal. This activity further developed the pass from a very poor pack trail to a serviceable wagon road.

Twenty years ago the local counties did a small amount of work on the trail and a few tourists attempted to negotiate the rough road. The natural conditions of solid rock and extreme moisture caused by the melting of heavy snows made the cost of building a safe and satisfactory highway almost prohibitive. However, great credit is due for what was accomplished, although as we look back and compare the crude corduroy road with its inefficient drainage, the

Steam shovels "shake hands" after working both ends against the middle.

One of the numerous drainage structures consisting of catch basins and corrugated culverts laid below frost line.
—Photos by courtesy of Bureau of Public Roads.

present road presents an inspiring contrast.

Today motor vehicles glide along easily where the burro once struggled for a footing.

The United States Forest Service and the Colorado State Highway Department in conjunction with the county authorities, reached an agreement in the fall of 1919 whereby an appropriation of $220,000 was made available for the building of a new road over Berthoud Pass on an entirely new location, the survey for which had already been made by the Bureau of Public Roads. The agreement specified that this road should be sixteen feet in width, on straightaways with an increased width at curves, which at that time was government standard for mountain roads. The new construction work was to start at a point seven and a half miles from the town of Empire on the eastern side of the pass and extend toward the summit a distance of approximately six miles, or to a point nearly a mile from the summit. On the western slope the work was to commence a mile from the summit and extend four miles in a westerly direction.

This work would replace that portion of the old road which was narrowest and steepest. On the eastern side it connected up with the old road, but on the western side it left a disconnected section of road a mile from any place where it could possibly be joined with the old road. This, naturally, was very undesirable, but at the time it was undoubtedly the best that could be done. The Forest Service had no more money and there was none in sight available for the work. Here is where the generalship of the engineers on the job, especially that of Mr. J. W. Johnson, District Manager, and Mr. C. E. Learned, Senior Highway Engineer, of the United States Bureau of Public Roads, came into full play.

Perhaps the greatest tribute to these gentlemen, and to the many others who carried out this project, is contained in a recent announcement which states in substance that instead of nine miles of highway, as had been agreed upon under the original plan, 16.6 miles of continuous road is now built and in service over the top of the Pass and down the western approach to the twin bridges over Fraser River. These gentlemen, in other words, built 7.6 more miles of road than even they expected to build at the outset. Furthermore, the road, instead of being sixteen feet wide, has but a mile, all told, of sixteen foot highway; the rest of it is full eighteen feet in width and no part of the work has been skimped or slighted. All this was accomplished, moreover, with the original appropriation.

Wide curves with easy grade, have made Berthoud Pass popular with motorists.

When it is known that the work involved the handling by shovel of over 125,000 yards of common excavation and 154,000 yards of solid rock, some idea of the magnitude of the project may be obtained. Under specification, other than United States Bureau of Public Roads, the common excavation would have been classified as mixed, as in places it was more rock of varying dimensions than dirt, and at all times it was well mixed with rock.

Probably more TNT was used in constructing the Berthoud Pass Highway than on any other road ever built in the State of Colorado. More than 50,000 pounds of this explosive was employed.

The day labor construction of 1920, under the direct supervision of the United States Bureau of Public Roads Engineers, resulted in a large saving on the project, making it possible with the funds remaining to extend the project agreement limits to include the additional pieces of road not cared for in the original proposition.

The excavation work was begun from both sides at once. Two three-quarter yard steam shovels began operations in June, 1920, and continued in operation until the excavation was completed. To add to the difficulties of the shovels and their crews, there had been a heavy growth of timber on the line of survey and but few of the stumps were shot or grubbed. Of course, some of the worst of the common and all of the rock was treated with TNT before the shovels tackled it, but even at that it was a tough job for a shovel. The cabs on the steam shovels were entirely shot away repeatedly and a covering of corrugated metal put on in their places. So close to the machines did they blast many times that at last even the stacks were torn away and corrugated culvert pipes were used to replace them.

Permanent camps were established on each side of the Pass and the men were transported to work on trucks when the distance between the camps and the work became too great for walking. The camp equipment was thoroughly up-to-date, and everything possible was done to make the men comfortable and contented.

The common excavation moved by the steam shovel cost about $0.25 per cubic yard for two seasons' work. This price included all labor, materials, moving charges, rentals, and overhead expenses, the rock excavation costing approximately $0.70 per cubic yard. As an incentive for increased yardage, and as a means of promoting competition between the shovel crews, a yardage bonus was awarded.

The most vital feature of this splendid construction—in fact, the base, bone and sinew of every highway construction—is the exceptionally good drainage structures, which make the Pass what it is today.

On the upper stretches of the western slope, a dry rubble retaining wall serves to guard against snow and land slides. In other sections of the road, where there is danger of washouts at curves and switchbacks, a dry rubble longitudinal ditch has been constructed for the pur-

pose of conveying surface water to the catch basins. Their use was made necessary on account of the extreme cold experienced in this locality, it being nothing uncommon for the temperature to reach a minus of forty degrees. After the first snow in the early fall, there is usually considerable sunshine during the day time, or enough at least to cause the snow to melt. It is this melting which usually raises havoc with drainage structures. Considerable water will accumulate during the few hours it thaws, but freezes again in the afternoon. If culverts were not placed below the frost line the water would freeze at intake and the surplus water would run across the road, freeze, and make the road unsafe for winter driving. The catch basins are large and deep and being protected from exposure insure free passage for the water into the mouth of the culvert, which is placed on a slope sufficient to carry it clear of the road.

The corrugated metal culverts used so extensively on this road, in addition to withstanding the rigors of a freezing climate, must be ready for service with the first signs of spring so that melting snow from the hills is carried along the longitudinal rubble-lined drains to the catch basins, thence through the culvert and down the mountain side without damage to the roadway.

The engineers responsible for the building of Berthoud Pass certainly built intelligently, for as in all structures the foundation is the first essential. It is clearly apparent that although their appropriation was limited and their job a large one, they utilized their funds judiciously. Knowing there was not enough money immediately available to build the road complete, they invested the amount at hand into such vital features as proper location, drainage, and sub-grade. These constitute the foundation upon which every good road must be supported, and the only truly permanent features.

The usual exclamation of the average motorist traveling over Berthoud Pass today is—"It's a perfect boulevard." Perfect drainage is what makes this statement possible.

Four miles between Lawson and Empire are now under construction by the State on force account. The seven and a half miles of highway from Empire to the foot of the Pass cost $126,597.65. The 16½ miles across the Pass cost $220,906.64. The six-mile project on the western side, now under construction, is estimated to cost $64,743.34. The road is now improved from Empire to Fraser, a distance of thirty miles. The total estimated cost of the entire project is

Steam shovel eating away earth from mountain side to make room for one of America's finest mountain boulevards.

$505,450.00. When the work between Empire and Lawson is completed, it will give the State a boulevard from Denver to Fraser. Between Empire and Lawson there are two dangerous railroad crossings and two creek crossings that will be eliminated by the new line. To date the cost of the work done is well under the original estimated price.

In addition to its wonderful scenery, other features of the Berthoud Pass Highway that appeal to the greatest number of people are its perfect surfaces, its easy grades—maximum six per cent—the long, generous curves, its sturdy and artistic rubble walls, its guard rails, and most of all, the width which permits of easy driving without fear of accidents.

The benefits to be derived from the new Berthoud Pass Highway are manifold. The most apparent of these are advantages that the road offers to the transcontinental automobile tourist, as well as local travel. Formerly this had been the most difficult stretch that the motorist had to negotiate in passing over the divide on The Victory Highway. The summit of the Pass is slightly below timber line, 11,309 feet above sea level.

Those who have had to act as pioneers in breaking their way through a new timber or mountainous country know well how hard it is to get anywhere without constant struggles, and the task that the engineers and contractors had to accomplish in making accessible this fairyland district was assuredly a stupendous one.

This road will give pleasure to thousands of people, who will be enabled to visit the localities where beautiful scenery has been provided by nature.

Berthoud Pass has a magnificent setting with its heavy timber, shimmering waterfalls, perpetual snowbanks, the beautiful Fraser Canyon, and other natural attractions. Growing in abundance on all sides are columbines, wild roses, mountain lilies, and other native mountain flowers. In the autumn the green mantle softly changes as Jack Frost touches it here and there into not one solid color, but an ever-changing, inimitable blending of flaming scarlets, crimsons, russets, maroons, and those thousands of other tints and tones which can be found nowhere but in nature's palette. Deep purples, bright yellows, and ruddy carmines melt into shining copper and dull bronzes as the shadows of the canon or the shafts of Apollo gain the mastery.

It is not, however, the brilliancy of coloring alone that makes Berthoud Pass a delight to travelers. The rocks there are of such grotesque magnificence and grandeur, they present such a variety of picturesque forms, they offer such an abundance of caverns, buttes, and towering cliffs, that the eye, still confused by nature's warmth of coloring, can scarcely mirror the prodigality of her sculpture.

At the top of the Pass a stop should be made to take in the panoramic view of the surrounding country, and the memory of this sight will remain with one forever.

An important piece of road construction planned by the State Highway department next summer consists of grading and surfacing of a new road from Florence to Portland, Concrete and Beaver Creek, at an estimated cost of $85,000. It is said the Colorado Portland Cement Co. contemplates paving with concrete the section between Portland and Concrete. The new work will extend to the Pueblo county line and when completed will shorten the distance between Florence and Pueblo three miles.

A new connecting road between Pueblo and the Canon City highway is being built by Pueblo county along the outskirts of Irving Place and Fairmount Park. The Twenty-ninth street road which now bears all traffic to Canon City, has been a dangerous highway especially at the Santa Fe railway crossing at the Baker Steamer plant. The grade crossing is at the foot of a steep incline and has been the scene of many accidents and fatalities. The new road will pass under the railroad tracks about half a mile south of Twenty-ninth street.

Yuma County Builds Boulevards

BY J. W. MARTIN,
City Manager, Wray, Colo.

DUE to the fact, that Yuma county's soil is about one-half heavy black loam and the other half blow sand, its road problem has been a rather difficult one.

But through the wide awake attitude of state and county highway officials and the steady demands of our citizens, the problem has not been evaded or left unsolved. Truly it has been a job well done.

For this reason the writer, being very much interested in good roads and the improvement of same, finds not a small amount of pleasure in making a survey of conditions encountered and results obtained through the co-operative efforts of the commissioners of Yuma county and the Colorado Highway Department, and the splendid supervision of construction by the County Road Supervisor and the engineers of the Highway Department.

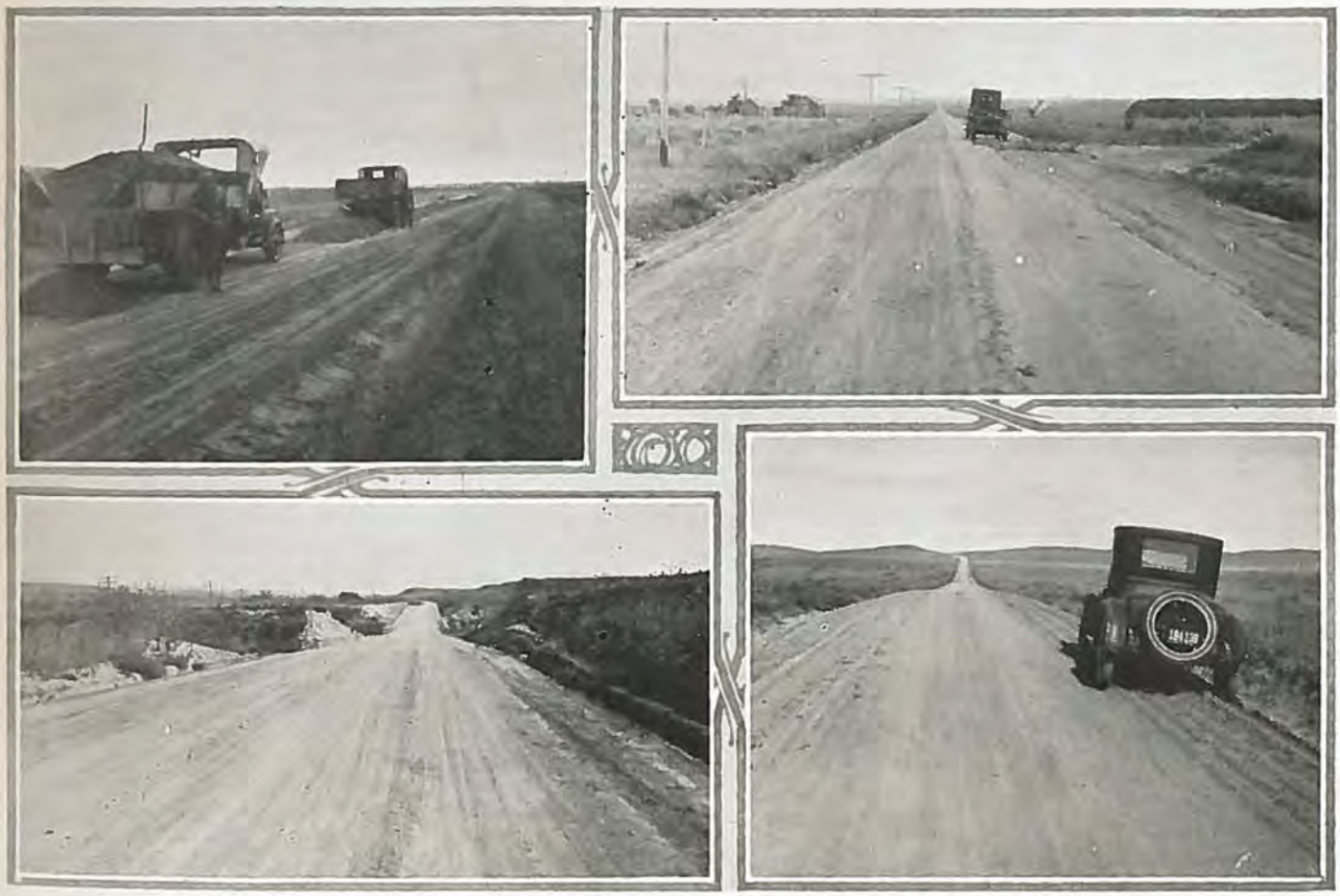
The initial experiment in standard highway construction was started in 1920, when the county and state began construction of a new road through the Arickeree Breaks under Federal Aid specifications. Work was continued until the winter of 1921. This proved rather expensive, especialy on the grades through the valley.

The next step was the construction of a piece of roadway west of Wray through nearly impassable sand hills under the Federal Aid plan, and while appreciated very much by travelers, proved to be too expensive for ever hoping to cover the entire county with standard highways, at least at such cost, for these two pieces were of the average condition.

Here again I take pleasure in commending the county commissioners, W. H. Jackson, Alex Shaw and H. F. Strangway, for their unceasing efforts in solving the highway problem. They continued to improve their methods by placing a very capable man at the head of the county road work, John Stamm, who after several months of efficient work was given a higher post in the State Highway Department. Mr. Stamm's place was filled soon after by an equally capable man, William Heindel, who like his predecessor has maintained very close co-operation with the state road officials.

When the old Highway Commission passed out of existence and was replaced by the Colorado Highway Department, and Highway Engineer L. D. Blauvelt became head of the department, Yuma county found, if possible, even more genuine co-operation existing between itself and the state.

A. B. Collins, division engineer in charge of the district in which Yuma county is located, and his staff of able engineers soon entered into the road problems confronting this county and in these few years the changes speak more impressively than volumes of writing.



Upper left—Two miles south of Vernon, county trucks used for surfacing. Upper right—State Road No. 19, twelve miles west of Wray, constructed over some of the worst ground in Yuma county. Lower left—New road east of Wray, eliminating two railroad crossings. Lower right—State Road No. 24, seven miles north of Wray, formerly a sand hill trail, impassable at times from deep sand, now a boulevard.

The next venture toward giving the residents of Yuma county and all the tourists going through this section, the fine roads all had dreamed of, was the State Projects, so designed that in this fairly level country the able men facing the problem could go ahead without contracting the work done. The result was that most efficient and economical methods were employed, until the improvement of highways under this system is now being done at a surprisingly low figure per mile.

Yuma county now has approximately 1,500 miles of improved or graded roads, 160 miles of which are surfaced with gravel, making it possible to travel almost to any point in the county by automobile.

In reality the history of Yuma county's road work and development is very much in its infancy, for prior to 1920 there was very little done in the building of the modern highway system that has now become most essential both as a means of travel through the county and a medium of marketing the produce of the farmer.

And through the successes already mentioned there lives in the mind of the public the hope of much more, and even hard surfaced, highway development.

William Lewis, resident engineer employed in this division under Mr. Collins, personally supervised the beginning of the State Project work in Yuma county, and his name is familiar to nearly every farmer along the roads he had a connection with. Although the system has been designated as the State Project System, it has not been confined to the state roads, for Yuma county's efficient road supervisor, Mr. Heindel, has been highly successful in using the same methods in his construction work on county roads.

So it is that this co-operation of the Highway Department and county commissioners has been the means of a real development of our highway system, and this has not been a development of the past in the eyes of the commissioners, for there is in their activities the unmistakable evidence of their co-operation with the state department in future projects.

This is more plainly evidenced by contact with Herman Brand, who now holds a place on the board as successor to Mr. Jackson, and even though Mr. Brand is a recent incumbent of the office, his experience of being the same office-holder some thirteen years ago, makes to him quite a contrast of the methods used during the different periods, and he prefers the latter.

Trust in the Lord, but keep your gas tank filled.

Yuma County Officials—Left to right—William Heindel, County Road Superintendent; Alex Shaw, Chairman Board of County Commissioners; Harry F. Strangways, Commissioner; H. H. Brand, Commissioner, and J. A. Fowler, County Attorney.

Warrants totalling $455,526.86, representing the county's share of the State Gasoline Tax for the year 1923, have been prepared by Auditor of State Arthur M. Stong, and will be mailed to the county treasurers sometime in January.

This is the largest amount ever distributed since the General Assembly adopted the state gasoline tax as one of the means to raise funds for highway purposes. The distribution is the first to be made since January, 1923, and its largeness is accounted for by the fact that since August, a tax of 2 cents a gallon has been collected, instead of one cent prior to that time.

The following table, arranged by Highway Districts, shows the state road mileage, together with the amount received by each county:

County	Mileage	Amt. to be paid Counties
DISTRICT NO. 1		
Denver	0	
DISTRICT NO. 2		
Delta	127	$ 6 484.92
Eagle	124	6,331.72
Garfield	139	7.097.66
Gunnison	226	11.540.08
Mesa	220	11.233.70
Montrose	252	12.867.70
Ouray	53	2,706.30
Pitkin	91	4,646.67
Rio Blanco	15(	7,659.34
San Miguel	150	7,659.34
Summit	93	4,748.79
Total for District No. 2	1.625	$82,976.22
DISTRICT NO. 3		
Alamosa	59	$ 3.012.67
Archuleta	102	5,208.35
Conejos	103	5.259.42
Costilla	112	5,718.98
Dolores	78	3,982.86
Hinsdale	62	3,165.86
Huerfano	126	6,433.85
La Plata	105	5,361.54
Las Animas	254	12,969.81
Mineral	71	3,625.42
Montezuma	124	6,331.72
Rio Grande	91	4,646.67
Saguache	173	8,833.78
San Juan	48	2,450.99
Total for District No. 3	1,508	$77,001.92
DISTRICT NO. 4		
Baca	229	$11,693.26
Bent	73	3,727.55
Chaffee	98	5,004.10
Crowley	68	3,472.23
Custer	96	4,901.98
Fremont	172	8,782.71
Kiowa	148	7,557.22
Otero	86	4,391.36
Prowers	203	10,365.65
Pueblo	199	10,161.40
Total for District No. 4	1,372	$70,057.46
DISTRICT NO. 5		
Cheyenne	131	$ 6,689.16
Douglas	155	7,914.66
Elbert	109	5,565.79
El Paso	260	13,276.20
Kit Carson	174	8,884.84
Lake	80	4,084.98
Lincoln	321	16,391.05
Park	229	11,698.27
Teller	107	5,463.67
Total for District No. 5	1,566	$79,963.62
DISTRICT NO. 6		
Boulder	120	$6,127.48
Clear Creek	95	4,850.92
Gilpin	27	1,378.68
Grand	185	9,446.52
Jackson	140	7,148.72
Jefferson	208	10,620.96
Larimer	257	13,123.01
Moffat	188	9,599.71
Routt	169	8,629.53
Total for District No. 6	1,389	$70,925.53
DISTRICT NO. 7		
Adams	105	$5,361.54
Arapahoe	94	4,799.86
Logan	158	8,067.84
Morgan	137	6,995.53
Phillips	84	4,289.23
Sedgwick	66	3,370.11
Washington	262	13,378.32
Weld	330	16,850.66
Yuma	225	11,489.02
Total for District No. 7	1,461	$ 74,602.11
Grand Total for State	8,921	$455,526.86

Curious Redstone Formations, Garden of the Gods, Colorado Springs.

Photo by Courtesy of Denver Tourist Bureau.

Highway Smileage

"I wish the street cars would put their signs on the back as well as on the front."

"What good would that do?"

"Well, a fella likes to see what he missed."

In England, Henry Royce, maker of the Rolls-Royce, has had a statue of himself erected. That may work all right in England, but over here some guy in a Ford would knock it over before night.—Nashville Banner.

Friend: "Why is it that your son rides in a car, and you always go on the street car?"

Father: "Well, he has a rich father, and I haven't."

They're making motor fuel of prickly pear juice in Africa. Will some one please tell us what soil is best adaptable to the growth of prickly pears?—American Motorist.

There is always something wrong with a man, as there is with a motor, when he knocks continually.

Probably Judge would caption this with "A Riding Habit" or "A Seized Clutch" or "The Driver Lost Control" or, yes, even "An Antifreeze Solution," or "A Pressing Emergency." Now you write some.—Canadian Motorist.

"Say, old man, is my tire flat?"

"Well, it's a little flat on the bottom, but the rest of it is all right."

The difference between an elephant and the new sport models is that the elephant carries his trunk in front.

"Notice the hangdog look on Doc. Hennessy?"

"Yes, he's terribly humiliated. Thieves stole his car—and brought it back."—Judge.

The husband, who had a great habit of teasing his wife, was out driving with her, when they met a farmer driving a span of mules. Just as they were about to pass the farmer's rig the mules turned their heads toward the auto and brayed vociferously.

Turning to his wife, the husband remarked: "Relatives of yours, I suppose?"

"Yes," said his wife, sweetly, "by marriage."—Chevrolet Review.

Wifey: "Why do you turn out for all these road hogs?"

Hubby: "Because of an epitaph I read:
'Here lies the body of William Jay
Who died maintaining the right of way.
He was right, dead right, as he sped along,
But he's just as dead as if he'd been wrong.' "—Chevrolet Review.

Every time they quarreled she threw the Ford in his teeth.—Judge.

P R O G

OFFICERS

J. W. SHY, Cheyenne Wells, President
W. H. BARTELS, Colorado Springs, First Vice-President
H. G. TIFFANY, Brighton, Second Vice-President
DR. GEO. SULLIVAN, Gunnison, Third Vice-President
T. W. MONELL, Montrose, Secretary-Treasurer

16th Annual
the Colorado S
of County C

To be held in
House of
Capitol Bui
January 21,

MONDAY

9:30 a. m., January 21, 1924

Called to order by President J. W. Shy.
Adoption of minutes of previous meeting.
Introduction of new Commissioners.
Roll Call by Counties.
Address of Welcome .....
.....Mayor B. F. Stapleton of Denver
Response. H. G. Tiffany, of Brighton, Colo.
Annual Address.....President J. W. Shy
Report of Legislative Committee.
Appointment of following Committees:
Auditing Committee.
Revision of By-Laws and Constitution.
Resolutions Committee.
Necrology Committee.
Secretary's Report.
Adjournment for Lunch.

FIRST DAY

2:00 p. m.

Meeting called to order by Pres. J. W. Shy
Unfinished business.
Question Box.
Address, W. G. HUNTLEY, Chairman of Kit Carson County Board. Subject: "Our Greatest Trouble."
Discussion led by J. A. BECKLEY, Chairman, Second District, Delta, Colo.
Address, RICHARD QUINN, Chairman, Fifth District, Cripple Creek, Colo. Subject: "Protection of Our Highways."
Discussion led by DAN STRAIGHT, Chairman, Seventh District, Greeley, Colo.
Address, GUS JOHNSON, Grand Junction, Colo. Subject: "Economical Bridge Building."
Discussion led by A. I. JOHNSON, Cheyenne Wells, Colo.
Adjournment.

SECO

TUE
9:30
Meeting called to o
Question Box.
Address—Governor
Address—Col. A.
Forest Service D
Address—Wm. We
man Advisory Bo
Address—June W
Federal Aid Dep
Adjournme
Meeting called to 0
Address—W. L. RE
ject: "Relation
County Commissi
Department."
Discussion led by
Gunnison, Colo.
Address—Major L.
State Highway
Remarks by E.
of the First Dis
Remarks by J. A.
Third District.
Remarks by G. L.
Fourth District
Remarks by C. B.
the Fifth Distri
Remarks by J. A.
the Sixth Distri
Remarks by F. H.
Seventh Distric
Address—J. E. Malo
Subject: "Is the
Over-Engineere
Address—T. R. Elk
for Highway Dep
Address—Robt. Hi
nance.
Remarks—Stanley
County, Taft, Cal
Address—Carl S.
State.
Unfinished busines
Adjo

A M M E

Convention of ate Association mmissioners

'he Hall of the epresentatives ling, Denver and 23, 1924

LEGISLATIVE COMMITTEE

JUDGE V. H. JOHNSON, Cheyenne Wells

T. A. McHARG, Boulder

JUDGE MILTON R. WELCH, Delta

THE PRESIDENT

THE SECRETARY

D DAY

DAY

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ler.

weet ....10:00 a. m.
Peck, of
artment..10:30 a. m.
er, Chair-
rd.....11:00 a. m
Johnson,
ment.....11:30 a. m.
for Lunch
der..... 1:30 p. m.
, Pueblo, Colo. Sub-
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R. GEO. SULLIVAN,

Blauvelt,
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THIRD DAY

WEDNESDAY

Meeting called to Order..... 9:30 a. m.

Address—W. H. Bartels, Colorado Springs, Colo. .....10:00 a. m.
Subject: "Economical Roads for Plains Country."

Discussion led by R. A. Chisholm, Del Norte, Colorado.

Address—T. W. Monell, Montrose, Colo. .....10:45 a. m.
Subject: "Who Owns the Highways?"

Discussion led by O. G. Smith, Pueblo, Colo.

Report of Committee on Resolutions.

Report of Necrology Committee.

Report of Auditing Committee.

Adjournment for Lunch.

1:30 p. m.

Meeting called to Order.

Address—C. J. Moynihan, Montrose, Colo.
Subject: "Our State Institutions."

Address—H. W. Moore, Denver, Colo.
Subject: "Practical Handling of Road Machinery."

Address—C. P. Link, Colorado State Tax Commission.

Address—Member of Workmen's Compensation Department. Subject: "How Industrial Insurance Functions."

Address—J. A. Crook, Denver, Colo. Subject: "Steel versus Concrete."

Address—H. P. Wilson, Denver, Colo. Subject: "Are Colorado Roads Properly Marked?"

Address—T. J. Patterson, Manager, Hardesty Mfg. Co.

Report of Committee on By-Laws and Constitution.

Election of Officers and Legislative Committee.

Fixing Time and Place of Next Meeting.

Adjournment.

Road News, Views and Gossip

Five miles of paving at an estimated cost of $175,000 will be constructed in Boulder county next summer. Three miles of this pavement will be laid from the end of the present paving south of Longmont. The other project will connect with the present contract north of Zang hill and run north through Lafayette, ending at a point one-half mile west on the Baseline road.

Plans are being prepared by the Pueblo county commissioners for the construction of two steel bridges next spring. It is estimated the two structures will cost $90,000. One will span the Arkansas river at Boone, and the other will be built across the St. Charles river in the South Vineland road. Both will be 200 feet long.

Approximately $100,000 will be spent in Gunnison county during 1924 for road betterments. Of this sum, $17,000 will be used for maintenance. A Federal aid project west of Gunnison carries an appropriation of $49,000 in the State Highway budget. This will be about five miles in length. The sum of $24,000 will be spent in extending the Cochetopa Pass road through Cochetopa canon, near Parlin.

While making up the maintenance budget for 1924, a certain board of county commissioners called upon the State Highway Advisory Board and wanted to know if they had $100,000 "laying around loose" that their county could match on a fifty-fifty basis for maintenance. Members of the highway board thanked the commissioners for the offer, but lack of funds made it impossible.

Completion of the Brookston cut-off on the Victory Highway between Steamboat Springs and Milner is provided for in the 1924 state highway budget. It is estimated the work will cost $75,000. The work will include grading and gravel surfacing.

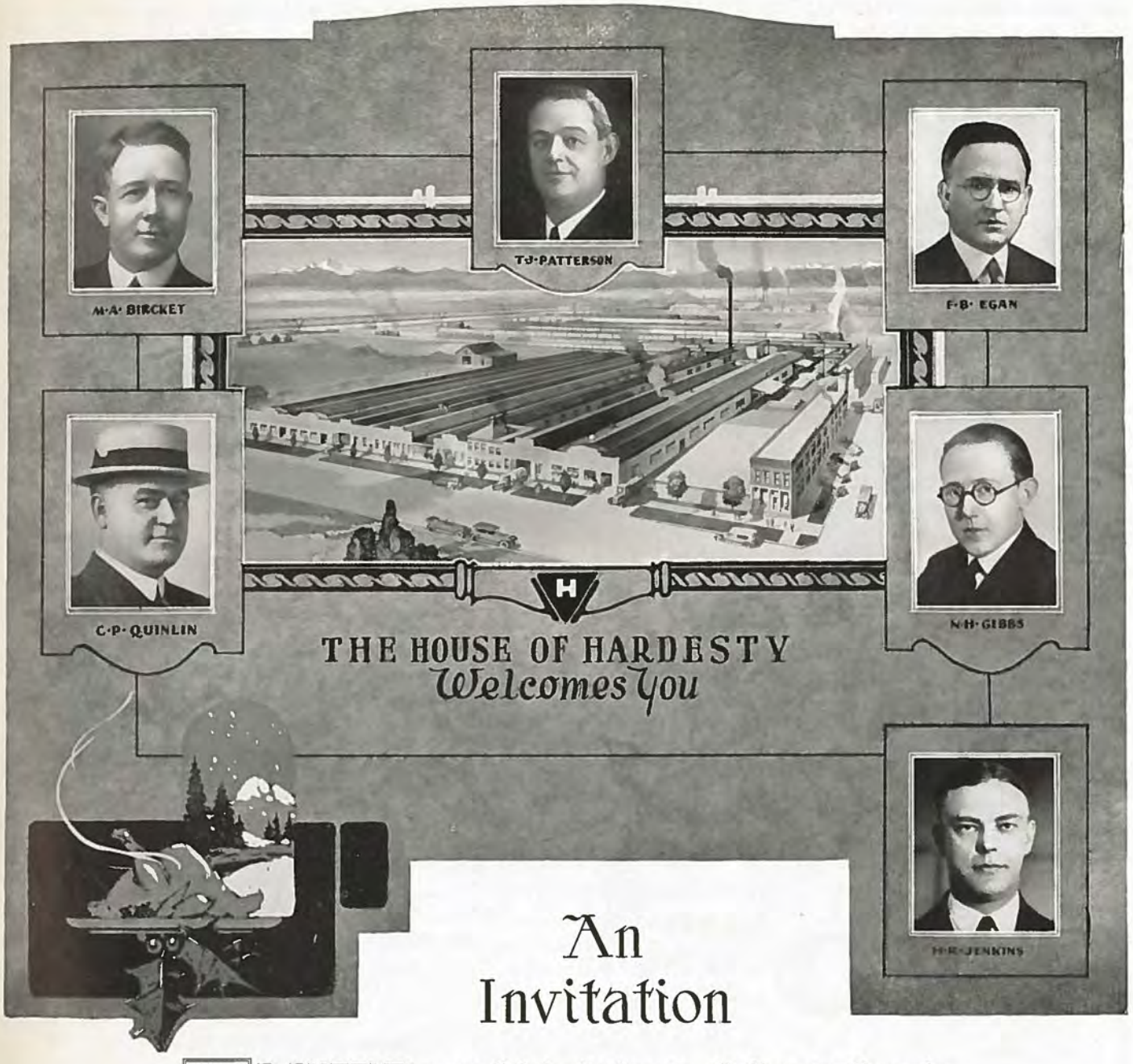
Also there is appropriated $25,000 for grading 9.3 miles through Byers canon, between Hot Sulphur Springs and Parshall. In this project the most difficult hill between Denver and Routt county will be eliminated.

Altogether $190,000 is allotted to Routt, Moffat and Grand counties for road projects, nearly all of which will be used for improvements on the Victory highway west of Berthoud Pass.

Two dangerous grade crossings will be eliminated on the southern approach to Colorado Springs under the plans for the new paving which will be constructed next summer. The sum of $200,000 has been allotted for the projects.

Work of reconstructing the old roadbed of the Cripple Creek Short Line into a highway will probably be started by W. D. Corley, Colorado Springs capitalist, early in the spring. Mr. Corley purchased the railroad at public auction last year.

Trucks and automobiles have been going over the range via Tennessee Pass all winter, and it is believed that it will be possible to keep it open most of the winter, according to Charles Baker, assistant maintenance superintendent of Glenwood Springs. However, the traffic has been very light, and unless there was a material increase, officials doubt the wisdom of spending a great amount of money in keeping the road open.



An Invitation

WE EXTEND a cordial invitation to all County Commissioners and their friends to visit our new Factory while in Denver attending the Annual Convention of the County Commissioners' Association and the Denver Stock Show.

Come any hour of the day that is convenient, for some of us will be here to show you around.

Thank you for your courtesies during the year just closed, and at the same time accept our best wishes for a Happy and Prosperous 1924.

The R. Hardesty Mfg. Company

31st and Blake Streets Denver, Colorado

MOTOR VEHICLE LICENSE COLLECTIONS TOTAL $1,124,341 in 1923

For the first time since the state of Colorado has undertaken to license automobiles, the receipts from licenses during a single year have passed the million dollar mark. In 1923, a report issued by Secretary of State Milliken, discloses the receipts of the state motor vehicle department amounted to $1,124,341.01. After the expenses of collection nave been deducted, these collections are split between the State Highway Department and the counties on a fifty-fifty basis. The state's share is used to pay the interest on the highway bond issue of $6,000,000 now being used for the construction of federal aid roads and to retire these bonds.

The total number of passenger automobiles licensed in Colorado during 1923 was 174,915. In addition the state issued licenses for 13,202 trucks and 2,465 motorcycles.

The following table, prepared by the motor vehicle department of the secretary of state's office, shows the number of the various kinds of vehicles licensed in each county and the amount of money collected in fees:

Counties	Owners	Trucks	Motor-cycles	Fees Collected
Adams	3,522	480	42	$23,573.76
Alamosa	1,237	75	11	7,377.93
Arapahoe	3,457	268	49	21,022.89
Archuleta	283	17	3	1,471.97
Baca	1,271	202	5	8,182.15
Bent	1,598	55	6	8,603.06
Boulder	7,250	366	111	45,019.44
Chaffee	1,152	46	14	6,821.66
Cheyenne	405	79	2	5,002.74
Clear Creek	300	25	5	1,925.21
Conejos	759	35	2	4,118.90
Costilla	412	21	6	2,304.47
Crowley	1,046	79	9	6,241.56
Custer	314	48	2	1,988.01
Delta	2,151	257	15	13,957.03
Denver County	52,154	3,837	1,037	363,474.98
Dolores	64	6	0	298.11
Douglas	900	53	6	5,443.35
Eagle	345	34	4	1,869.61
Elbert	1,273	57	3	7,339.51
El Paso	9,963	601	149	67,930.86
Fremont	3,722	268	47	22,436.82
Garfield	1,217	69	9	7,015.80
Gilpin	101	6	0	591.24
Grand	361	23	3	1,746.35
Gunnison	703	16	5	3,331.08
Hinsdale	62	9	3	408.68
Huerfano	2,549	122	15	14,939.34
Jackson	296	17	5	1,481.93
Jefferson	4,033	396	46	25,471.83
Kiowa	827	64	3	4,762.39
Kit Carson	1,912	247	6	13,604.13
Lake	438	4	4	2,497.16
La Plata	1,245	60	12	7,308.10
Larimer	6,802	347	129	41,757.47
Las Animas	5,414	331	75	33,123.27
Lincoln	1,629	186	5	10,328.00
Logan	3,515	266	37	21,750.76
Mesa	3,989	297	62	23,842.92
Mineral	84	8	1	443.97
Moffat	515	15	3	2,359.77
Montezuma	614	59	1	3,718.45
Montrose	1,665	153	12	10,350.77
Morgan	3,345	154	34	19,065.00
Otero	4,391	257	62	25,869.68
Ouray	261	8	5	1,482.91
Park	398	30	6	2,225.45
Phillips	1,568	213	7	10,181.05
Pitkin	169	1	4	745.05
Prowers	2,471	165	6	15,011.52
Pueblo	8,887	587	176	55,389.20
Rio Blanco	307	17	1	1,515.40
Rio Grande	1,542	238	8	11,016.88
Routt	1,020	25	8	4,990.12
Saguache	885	104	2	5,632.27
San Juan	58	8	1	375.09
San Miguel	335	21	15	1,989.28
Sedgwick	918	87	0	5,627.67
Summit	184	4	4	847.32
Teller	780	43	10	4,687.83
Washington	1,964	428	11	14,313.98
Weld	11,150	733	130	67,017.07
Yuma	2,733	475	11	19,120.81
Total States	174,915	13,202	2,465	$1,124,341.01

Vast improvements are being made on the roads in and around Estes Park by Larimer county highway crews during the winter months, in anticipation of the hordes of motorists that are expected next summer. These betterments include grading and widening of the Fall River road between Elkhorn Lodge and the National Park entrance.

At its recent meeting the Highway Advisory Board designated the White River road from the Utah line to Trappers Lake as a State Highway. It was announced that improvements would be made on the road by the state as funds become available.

$3,000,000 FOR FEDERAL AID ROADS

(Continued from page 5)

Grading and graveling from Durango south toward New Mexico line	30,000
Grading and graveling from Hoehne east on Santa Fe Trail	30,000
Concrete paving from Trinidad north to a point about 7 miles north of Trinidad	140,000
Grading and graveling between Alamosa and Monte Vista	25,000
Grading and graveling between Cortez and Mancos	25,000
Total	$450,314

District 4

Grading and graveling from Las Animas toward Hadley	$ 40,000
Completing concrete pavement from Pueblo east to Vineland.	30,000
Graveling and grading between Salida and Buena Vista	25,966
Grading and graveling from end of completed road east of Florence to county line	80,000
Bridge over Apishapa river between Fowler and Manzanola	70,000
Grading and graveling three miles east from Lamar	40,000
Grading and graveling 16 miles of road from the east line of Pueblo county to Huerfano river bridge	139,700
Total	$425,666

District 5

Concrete paving from Gann to a point about 2 miles north of Castle Rock	$ 400,000
Bridge over the Rock Island tracks at northern city limits of Colorado Springs	35,000
Concrete pavement from Colorado Springs south toward Fountain	200,140
Grading and graveling east and west from Cheyenne Wells	25,000
Total	$660,140

District 6

Grading and graveling from Steamboat Springs toward Hayden	$ 75,000
Grading in Byers Canon	25,000
Grading and Graveling Turkey Creek road from Conifer to Jefferson county line	75,000
Concrete paving from Denver city limits southwest to junction with concrete road to Morrison	60,000
Concrete paving of Federal Boulevard from city limits south toward junction with Denver city pavement	40,000
Bridge south of Craig	40,000
Completing concrete paving from Loveland to Berthoud	85,000
Concrete paving from end of present project north of Broomfield north to a point 1.2 miles west of Lafayette	75,000
Concrete paving from Longmont south toward Lafayette	120,000
Total	$595,000

District 7

Concrete paving between Gilcrest and La Salle	$ 170,000
Completing concrete paving between Fort Morgan and Brush.	100,000
Completing pavement between Atwood and Merino	70,000
Overhead railroad crossing at Nunn	30,000
Grading and graveling between Fort Morgan and Greeley	93,464
Total	$463.464

JOE RAY ELECTED PRESIDENT OF ARK. VALLEY ASSOCIATION

Pueblo, Colo., Jan. 3.—Joe F. Ray, county commissioner of Trinidad, Las Animas county, was elected president of the Arkansas Valley Association of County Commissioners for 1924 at the last meeting of 1923, held at the Pueblo county court house, December 15. Ray McGrath, commissioner of Prowers county, was elected vice-president, and J. B. Romero, county clerk of Las Animas county, was chosen secretary.

Thirty commissioners, county clerks and county attorneys attended the sessions. The state highway, distribution of funds, gasoline tax, highway bonds and other kindred road matters comprised the main part of the meeting, which was in the form of an informal round table exchange of ideas. Members of the State Highway Department who were called upon for expressions were: R. H. Higgins, superintendent of maintenance; G. L. L. Gann, member of the advisory board; Louis Swink, in charge of district maintenance, and James R. Bell, division engineer.

There must be a special Providence that watches over Jay Walkers.

Just because some fellow has a louder exhaust than yours is no sign his car can travel any faster.

$1,750,500 APPROPRIATED BY STATE AND COUNTIES FOR MAINTENANCE OF ROADS IN 1924

Below is printed the 1924 maintenance budget, totalling $1,570,500, of which one-half will be contributed by the state and the other by the counties. As in past years the work will be done by maintenance crews employed by the counties under the joint supervision of state and county road superintendents.

The budget follows:

DIVISION NO. 1

County	Miles to Maintain	Proposed to Patrol	Total
Adams	111	63	49,500
Arapahoe	85	74	42,000
Boulder	120	120	54,000
Clear Creek	88	51	15,000
Douglas	155	63	23,000
Elbert	84	54	20,000
Gilpin	27	..	10,000
Jefferson	152	81	28,000
Totals	822	506	241,500

DIVISION NO. 2.

Delta	117	76	25,000
Gunnison	226	122	34,000
Hinsdale	42	..	3,000
Mesa	220	143	48,000
Montrose	202	69	30,000
Ouray	53	53	13,000
San Miguel	150	85	33,000
Totals	1010	548	186,000

DIVISION NO. 3.

Alamosa	59	59	18,000
Archuleta	102	47	11,000
Conejos	85	38	12,000
Costilla	112	56	10,000
Dolores	78	20	8,000
La Plata	105	85	18,000
Mineral	60	39	5,500
Montezuma	124	91	14,000
Rio Grande	91	80	18,000
Saguache	173	173	19,000
San Juan	42	35	10,000
Totals	1031	723	143,500

DIVISION NO. 4.

Baca	229	125	18,000
Bent	73	57	12,000
Crowley	68	41	22,000
Custer	96	76	8,000
Fremont	140	113	33,000
Huerfano	126	67	28,000
Kiowa	148	92	10,000
Las Animas	254	123	38,000
Otero	86	86	28,000
Prowers	164	130	28,000
Pueblo	199	126	48,000
Totals	1583	1036	273,000

DIVISION NO. 5.

Chaffee	98	98	23,000
Cheyenne	131	131	20,000
El Paso	248	139	61,000
Kit Carson	174	100	23,000
Lake	70	29	14,000
Lincoln	300	80	26,000
Park	189	120	20,000
Teller	91	60	28,000
Totals	1321	657	205,000

DIVISION NO. 6.

Eagle	117	68	28,000
Garfield	139	86	18,000
Grand	185	94	29,000
Jackson	140	66	12,000
Moffat	188	138	24,000
Pitkin	91	38	15,000
Rio Blanco	150	115	14,000
Routt	169	95	28,000
Summit	67	49	16,000
Totals	1245	749	184,000

DIVISION NO. 7.

Larimer	255	193	48,000
Logan	158	92	27,000
Morgan	137	100	31,000
Phillips	84	58	15,000
Sedgwick	66	48	10,000
Washington	260	48	24,000
Weld	322	199	54,000
Yuma	225	112	40,000
Totals	1507	850	249,000
Denver Mtn. Parks, etc.	47	47	38,000
Berthoud Pass	..	..	10,000
Maintenance Admr.	..	..	30,000
State Maintenance	..	..	10,500
Grand Total	8547	5191	1,570,500

The guy that put across "To them that hath shall be given," must have referred to constables and magistrates who operate "speed traps."

KOEHRING

REG. U. S. PAT. OFF.

Three Point Suspension

NO machine of the weight of a paving mixer can travel the inequalities of subgrade, pavement or road, without enduring terrific frame stresses unless these stresses are relieved by three point suspension as is the Heavy Duty Koehring paver.

Koehring extra heavy channel steel front axles are spaced well apart and riveted to spindle axle castings that slide between two heavy guides, giving a free fifth wheel oscillation.

This Koehring construction prevents the frame strains which otherwise throw moving parts out of alignment, and are the principal, if obscure cause of breakdown and delays.

Be sure of this — that Koehring Heavy Duty construction means an enduring construction that surpasses ordinary standards of how well a machine should be built.

Write for Koehring Paver Catalog P-15

CAPACITIES

Pavers—7, 10, 14, 21, 34 cubic feet mixed concrete. Steam, gasoline or electric power. Can be mounted either on regular steel rim wheels or solid rubber tires, half length multiplane or full length multiplane. Boom and bucket or spout distribution. Derrick arrangement— double derrick on 21E and auxiliary water tank on 21E and 32E if desired. Batch meter.

Construction Mixers—10, 14, 21, 28 cubic feet mixed concrete. Steam, gasoline or electric power. Mounted on trucks or skids. Rubber tires optional.

Equipped with power charge skip. Charging chute or batch hopper.

Dandie—4 and 7 cubic feet mixed concrete. Gasoline engine on 104S and 107S.

KOEHRING COMPANY

Manufacturers of Cranes, Draglines, Shovels, Concrete Mixers

MILWAUKEE, WISCONSIN

Sales Offices, service warehouses in principal cities.

Foreign Department, Room 1370, 50 Church St., New York City;
Canada, Koehring Company of Canada, Ltd., 105 Front Street East, Toronto, Ontario;
Mexico, F. S. Lapum, Cinco De Mayo 21, Mexico, D. F.

STATE HIGHWAY DEPARTMENT
STATE OF COLORADO

COMBINED STATEMENT OF THE HIGHWAY FUND AND THE BOND FUND
FOR THE FISCAL YEAR ENDING NOVEMBER 30, 1923.

BALANCES DECEMBER 1, 1922:			
Highway Fund	$ 439,975.53		
Federal Aid Bond Fund	902,852.61		
County Bond Fund	816,305.20		
Total		$2,159,133.34	
RECEIPTS:			
One Mill Levy	$1,530,040.68		
Motor Vehicle License Fees	491,274.25		
Gasoline Tax	418,011.66		
Internal Improvement	81,000.00		
U. S. Government	1,288,288.33		
Counties, Federal Aid Projects	118,334.25		
Counties, Merchandise	108,981.30		
Counties, Transfer from Bond Fund	9,013.12		
Bulletin Subscriptions and Advertising	1,856.71		
Refunds and Junk Sale	11,637.17		
1923 Bond Sale	1,500,000.00		
Total		$5,558,437.47	
Total Balances and Receipts			$7,717,570.81
DISBURSEMENTS:			
Federal Aid Projects Preliminary	$ 69,996.29		
Federal Aid Projects, Construction	2,337,008.31		
		$2,407,004.60	
State Projects		1,262,247.63	
Maintenance		838,204.89	
Property and Equipment		126,203.82	
Administration, General Office	62,832.13		
Administration, Engineering	110,864.19		
		173,696.32	
Road Signs and Traffic Census		9,778.55	
County Bond Projects		636,310.82	
Total			$5,453,446.63
BALANCES:			
Highway Fund		$1,142,405.80	
*Federal Aid Bond Fund		998,031.24	
*County Bond Fund		123,687.14	
Total			$2,264,124.18
Total Disbursements and Balances			$7,717,570.81

* $56,307.24 transferred from County Bond Fund to Federal Aid Bond Fund as County participation in Federal Aid.

EQUIPMENT NOTES

Mr. T. J. "Pat" Patterson, Sales Manager of The R. Hardesty Manufacturing Company, and his capable aides are burning things up around Denver the past few weeks. It looks as though they were expecting a crowd of visitors. "Pat" is going around with his usual "Irish Smile" and those with whom he comes in contact are made to feel as though he is expecting some long forgotten relative or dear friend. Wonder what's up?

H. B. Carpenter, manager of the asphalt department of the Midwest Refining Co., made a trip to Trinidad last month to look over the asphalt pavement being laid by the Stamie-Mackey Const. Co. on State Highway No. 1, north of the city limits of Trinidad. This stretch of asphaltic concrete will be three miles in length when completed. It is the second stretch of this type of pavement laid in Colorado. The first piece was one mile east of Aurora in Adams county, completed early last fall.

Among the out-of-town manufacturers who will be represented at the Commissioners' Convention is the Colorado Culvert & Flume Co., of Pueblo, makers of Keystone corrugated culverts, which have found wide popularity among road builders in Colorado during the past few years. Messrs. L. R. Shallenberger and W. J. Sanderson will be in Denver to represent the firm.

Public opinion throughout the northern tier of states in the United States is demanding all-year roads. Gradually these forces of progress are demanding the means to make good roads open roads in the winter. And, lending an ear to these demands, the Monarch Tractor Company has designed two different styles of snow plows to be used in connection with their tractors. These include a blade snow plow and a 10 ft. 60 in. V-Type snow plow. Specifications of these plows have just been received by W. W. Griswold, of Denver, the Colorado distributor for Monarch tractors.

The main feature of the exhibit which Herbert N. Steinbarger & Co. have arranged for the Commissioners' Convention in Denver is a new model Russell Road Finisher. This machine is modeled after a grader with three blades which can be used for right or left-hand operation.

Harry P. Wilson, president of H. P. Wilson & Co., accompanied by Ray Corson, general sales manager of the firm, left Denver on January 3 on a trip to eastern factories. While in the east they will visit the Road Show in Chicago, returning home in time for the Commissioners' convention in Denver. Elaborate plans are being made by the Wilson firm for the entertainment of the commissioners during their stay in the Capitol city.

A new machinery firm has entered the Colorado field with offices in Denver. The firm name is Fink & Scharber, and its members are John W. Fink and Harry W. Scharber, both formerly connected with H. W. Moore & Co., the former having traveled this territory in the interests of the Moore concern for nine years. For three years Mr. Scharber was the western slope representative for the firm, with headquarters in Grand Junction.

The new firm will handle the Duplex line of maintainers in the Rocky Mountain region. The Duplex line consists of five different sizes of road maintenance machines suitable for every kind of work required by the counties.

The more people step on the gas the higher it goes.

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

Proj. No.	Location		Type
17R	Husted	2.339 mi.	Paving
116B	Breed-Colorado Springs	2,338 mi.	Paving and R. R. Grade Separation
243	Piedra, between Bayfield and Pagosa Springs	0.892 mi.	Gravel Surfacing
248A	Buena Vista, Salida	1.61 mi.	Grading and Gravel Surfacing
253A	West of Steamboat Springs	12.048 mi.	Gravel Surfacing
256B	Merino, northeast	6.506 mi.	Paving
257	Between Denver and Brighton	2.083 mi.	Concrete Viaduct
		0.282 mi.	

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

Proj. No.	Location	Length		Type
116C	North of Breed	3.22	mi.	Paving
242	Grand Junction-Fruita	3.5	mi.	Gravel Surfacing
254A	Hot Sulphur Springs, Byers Canon	1.5	mi.	Grading
255B	Brush, west	2.9	mi.	Paving
811	East of La Jara, over Rio Grande Del Norte River	200	ft. span	Steel Truss Bridge
901	Petersburg-Ft. Logan	1.9	mi.	Paving

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1923

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
71-B	Durango-Hesperus	3.6 mi.	Gravel Surf.	Peterson, Shirley & Gunther	$ 61,556	57	71-B
81-A	Rifle Range-Vernon Canon	3.50 mi.	Crushed Rock	H. C. Lallier Constr. & Engr. Co.	37,264	87	81-A
102	Ouray-Red Mountain	1.06 mi.	Mtn. Grading	Johnson & Johnson	58,972	47	102
116-A	Colorado Springs paving	4.18 mi.	Conc. Paving	Standard Engr. & Constr. Co.	238,944	98	116-A
119-B	Cochetopa Pass	7.5 mi.	Grad. & Surf.	Girardet-Hotchkiss Engr. Co.	53,709	70	119-B
125	Sapinero-Cimarron	11.3 mi.	Grav. Surf.	Dale Hinman	36,797	37	125
125	Sapinero-Cimarron		Steel Bridge	Winterburn & Lumsden	53,072	12	125
135	Denver-Morrison	5.3 mi.	Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	18	135
157-B	Buena Vista-Leadville	4.20 mi.	Grading	J. V. Stryker Const. Co.	65,715	52	157-B
163	St. Charles Bridge	0.5 mi.	Steel Bridge	Rogers & Pickard	85,636	100	163
168-B	Lamar-Hasty	6.86 mi.	Gravel Surf.	Standard Engr. Co.	60,194	64	168-B
174	Red Mountain	3.03 mi.	Mtn. Grading	Pickering Bros.	82,071	67	174
190	Summit County Bridge and Road	1.45 mi.	Grad. & Bridge	Colo. Bridge & Constr. Co.	40,154	61	190
207	Dillon-Kremmling	100 ft.	Truss Bridge	Rogers & Pickard	28,831	9	207
208-C	Grand Junction-Palisade	4.75 mi.	Gravel Surf.	Northwestern Const. Co.	46,627.35	23	208-C
210-A	Grand Valley-DeBeque	5.30 mi.	Grav. Surf.	F. L. Hoffman	57,429	72	210-A
211	Meeker, north	1.85 mi.	Grav. Surf.	Hinman Bros	34,445	100	211
213-B	Durango-Hesperus	5.26 mi.	Grav. Surf.	J. Edd. Hansen	72,960	50	213-B
214	Durango-Bayfield	3 mi.	Gravel Surf.	Dale Hinman	53,411.05	32	214
216-A	Holly, east	5.38 mi.	Grav. Surf.	W. A. Colt & Son	57,867	100	216-A
221	Loveland, north	4.05 mi.	Conc. Paving	Fred C. Dreher Constr. Co.	142,125	83	221
223-A	Kremmling-Rabbit Ear	2.88 mi.	Grav. Surf.	Henry Shore	30,565	42	223-A
225	Fitzsimons Hospital road	1.00 mi.	Bit. Paving	Miller, Douglas & Hanes	36,618	63	225
226-A	Brighton-Ft. Lupton	8.23 mi.	Conc. Paving	White & Johnson	241,133	83	226-A
226-B	Brighton-Greeley	2.86 mi.	Conc. Paving	White & Johnson	89,923	44	226-B
226-C	Platteville-Greeley	4.4 mi.	Conc. Paving	Engr. Constr. Corp.	120,114	19	226-C
229	Pueblo-Florence	1 mi.	Grav. Surf. & Bridge	H. M. Fox	34,646.50	13	229
231	Six Mile Creek Bridge	0.45 mi.	Steel Bridge	McCormick & Brockaway	25,165	70	231
240	Gypsum-Dotsero	5.185 mi.	Gravel Surf.	O. L. Hackett	66,178	5	240
241	Gunnison River, North of Delta	600 ft.	Steel Bridge	Winterburn & Lumsden	99,309	10	241
245-A	Las Animas-Hadley	4.54 mi.	Gravel Surf.	W. A. Colt & Son	42,786	11	245-A
246-R	East of Pueblo	2.537 mi.	Conc. Paving	R. A. White	78,431	4	246-A
255-A	Ft. Morgan-Brush	2.70 mi.	Conc. Paving	Colo. Bridge & Constr. Co.	85,763	47	255-A

C. A. Bishop, district sales manager of Bear Tractors, Inc., with headquarters in Kansas City, spent several days in Denver the latter part of December. He was in conference with Harry Sanford, of the Stearns-Roger Mfg. Co., distributors of the Bear Tractor. Plans for the introduction of the Bear in this territory were discussed at length. Both men were very enthusiastic over the prospects for the coming year.

Paul V. Jenness, the popular F. W. D. distributor and hauling contractor, has moved back to Denver, establishing headquarters at 2020 Lawrence street. Here he has installed a large stock of FWD parts of all kinds, which he is in a position to ship to any part of the territory on short notice.

One of the interesting exhibits to be shown at the Albany Hotel during the Commissioners' Convention will be a display of Hadfield-Penfield graders, which is a combination Fordson tractor and grader. This exhibit will be made by H. W. Moore & Co.

It is announced that the Moore concern will hold "open house" in their general offices at Eighteenth and Wazee streets during the convention.

Messrs. C. R. Hine and R. H. Atchinson will attend the Chicago Road Show and several sales conventions in January.

Ex-Senator T. J. Ehrhart will have charge of the Moore exhibits at the Albany. Harold W. Moore, president of the concern, is "booked" to address the commissioners.

Elton T. Fair, general sales manager for Thomas J. Fair, Rocky Mountain distributor for the Adams Leaning Wheel graders, has just returned to Denver from a six weeks' vacation trip through California. He was pleased to find that the Adams line enjoys great popularity among the road builders of the Pacific coast, and was told that sales in that territory during the past year had surpassed all records. "But they had nothing on us," he said. "We broke some records on our own account in Colorado in 1923."

Announcement is made by F. J. Altvater, president of the Liberty Trucks & Parts Co., that the Liberty truck has again gone into production.

Plans are now under way for the construction of a new road between Ophir and the Durango-Silverton highway, connecting with the latter a few miles south of Silverton. San Miguel and San Juan counties will co-operate in the project. The new road will be a very attractive scenic route.

THEY KNOW---

THE COLORADO STATE HIGHWAY

BUYS KEYSTONE KEYSTONE COPPER STEEL CULVERTS

THE NEW MEXICO STATE HIGHWAY

BUYS KEYSTONE KEYSTONE COPPER STEEL CULVERTS

THE WYOMING STATE HIGHWAY

BUYS KEYSTONE KEYSTONE COPPER STEEL CULVERTS

THE U. S. BUREAU OF PUBLIC ROADS

BUYS KEYSTONE KEYSTONE COPPER STEEL CULVERTS

THE U. S. RECLAMATION SERVICE

BUYS KEYSTONE KEYSTONE COPPER STEEL CULVERTS

THE U. S. FOREST SERVICE

BUYS KEYSTONE KEYSTONE COPPER STEEL CULVERTS

THE U. S. INDIAN FIELD SERVICE

BUYS KEYSTONE KEYSTONE COPPER STEEL CULVERTS

The Colorado Culvert & Flume Co.

PUEBLO

Makers of
KEYSTONE
CULVERTS

KEYSTONE
COPPER STEEL

They LAST LONGER
and
COST LESS

DID YOU GET ONE

Of Our New Calendars

?

IF NOT LET US KNOW AT ONCE!

To all our friends and customers, we wish

A Happy Prosperous New Year

County Commissioners and Officials Attending the Stock Show are cordially invited to use our Salesroom for their Headquarters where every courtesy will be extended them.

H. P. Wilson & Co.

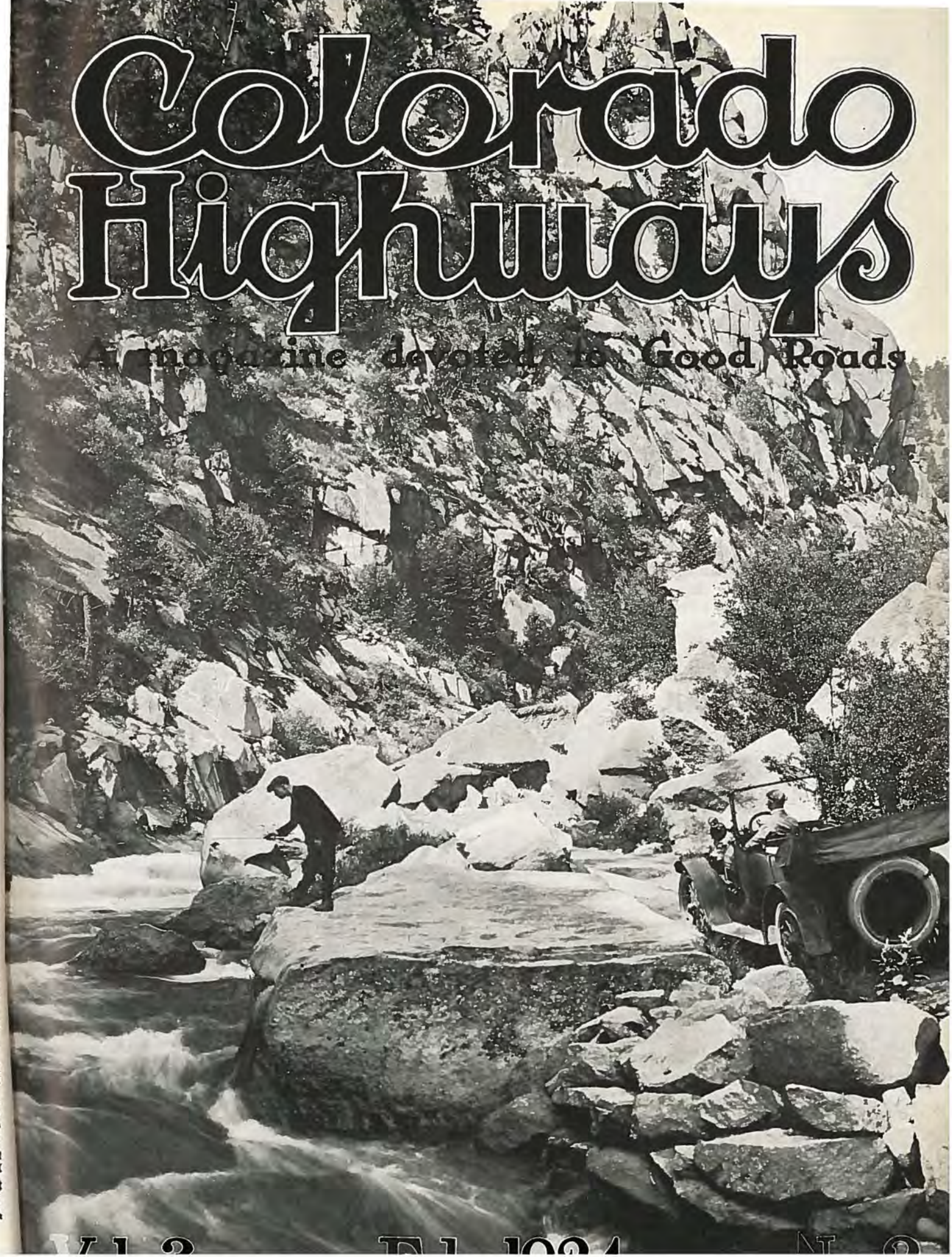
CONSTRUCTION MACHINERY

17th and Blake Sts. **DENVER**

THE BRADFORD-ROBINSON PTG. CO., DENVER

Colorado Highways

A magazine devoted to Good Roads



Vol. 3 Feb. 1924 No. 8

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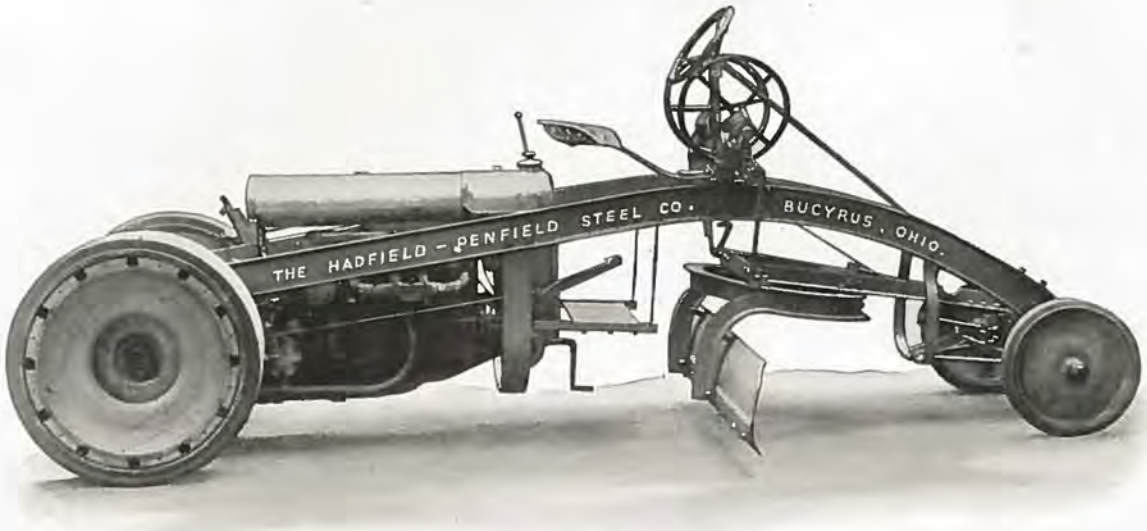

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Colorado Highways

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COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

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OUR COVER PICTURE

"Whipping the South St. Vrain for the elusive trout"—that's the title of the picture on cover page of this month's issue of Colorado Highways. A little early? Yes! It comes with the first breath of spring. And, then the fishing season will soon be here again. So the picture is printed at this time as a forecast of happy days to come in the very near future. This spot is reached by a broad, smooth highway—just sixty minutes from Denver—in Boulder County.

Colorado Highways
"BETTER ROADS"
VOLUME III. FEBRUARY, 1924. NUMBER 2.

Report of State Road Progress

BY L. D. BLAUVELT,
State Highway Engineer

SOME three years ago, in this sacred Chamber, a child was born, conceived by the Legislature, mothered by the Governor of the State and, I am advised by your Secretary, fathered by the County Commissioners; then baptized in the flood waters of the Arkansas and Platte, and cast upon the whims of the taxpayers to struggle for its existence. The name of the child was the Colorado State Highway Department. As in numerous instances, this was an unwelcome child; nobody wanted it, and it was viewed with distrust and suspicion from the day of its birth. Prophecies were frankly made as to its early demise, and that from it nothing good would accrue. It now comes before you to render an accounting of its accomplishments during the past year, and to submit in a brief way its plans and hopes for future activities.

The Department has expended, in the 1923 Fiscal Year, for Administration, Construction, Maintenance and Equipment, $5,453,000, or approximately $1,500,000 less than would have been expended had weather conditions permitted, and $1,283,000 less than was expended in 1922—being seriously handicapped by the continued, abnormally wet weather, entailing delays in the completion of construction projects, additional and sometimes useless maintenance work, all with attendant increased cost to the contractor and the state, reflected in administration and overhead costs as influenced by delays.

Regardless of this condition, I am glad to report that our Administration costs have been held down to 1.15%, and the Preliminary Engineering to 2% of the total expenditures.

The total construction mileage accomplished during 1923, segregated as to different funds, is as follows:

	Miles.
State and federal aid.....	191
State (only).....	387
County bond....	686
or a total of....	1,264

together with some 97 new bridges.

You will appreciate that in the past two years a large mileage of roads has been constructed and improved by the $2,500,000 County Bond Fund. This fund is now about exhausted, only $123,000 remaining as of November 30, 1923.

The policy of maintaining our more important state roads by the patrol system is gaining in popularity as the beneficial results are evidenced; and we believe —notwithstanding the handicap of continued rains and cloudbursts, causing repeated washouts and damage to our drainage structures and necessitating a no small amount of maintenance funds to be applied to repairs and renewals that otherwise might have gone to betterments and normal maintenance work —that the results obtained have been gratifying, not only to this Department, but to the general public. Efficient maintenance can only be obtained, under present conditions, by the closest co-operation between the counties and the Department. In general, such co-operation has existed, and was reflected by the excellent condition of your roads; and it is right that I again ask you to back up our maintenance work with the strongest support you can give, that the dollars spent on maintenance may produce results that will place your state among the foremost in the good roads movement of the country.

In 1923, 5,292 miles of road were patrolled, as compared with 4,224 in 1922, at an average cost of $175 per mile for all classes of road. This cost compares favorably with that of other states from whom data has been obtained.

During the year, $126,000 was expended by the Purchase and Traffic Division, which includes the expense of shop maintenance. In this amount is represented costs of surplus war equipment, repairs of same, freight charges, automobile repairs (for all state departments as well as the Highway), new road equipment, and an addition to the shop building, affording more room to facilitate the work.

In order that a traffic count might be made that would influence the selection of types of roads for future construction and, if continued from season to season, show the rate of increase of motor vehicles on respective roads, this work was undertaken, beginning in July and continuing until October, this year's count being confined to the main highways east of the Continental Divide. Interesting and valuable results were obtained; and it will surprise you to know that, approaching our larger cities, there is an average daily motor vehicle traffic of some 3,700 cars and trucks.

In this connection I might add that several counties, within whose borders the density of traffic is so great that lives and property are jeopardized by violations of the state traffic laws, and where damage is being done to our highways by excess loading and speed, have employed traffic policemen to enforce the law; with the result that when the public recognized that laws were being enforced, a marked decrease in the violations was evident.

Appreciating the value of this work, the saving of lives and protection of our roads, I would be glad, in behalf of the Department, to financially co-operate with you in the cost of policing our roads.

Recognizing the necessity for a uniform and adequate system of marking our roads with direction, distance and caution signs, a contract was entered into by the Rocky Mountain Motorists Association and the Highway Department, the terms of which obligate the Motorists Association to manufacture, assemble and deliver to the Highway Department, at its sole cost,

Steam shovel excavating approach to under-pass railroad crossing, near Wolhurst.

the signs and standards ready for installation, the Department to assume the cost of erection. These signs bear no advertising matter, and conform to designs prepared by the Department. Some 2,000 requisitions for signs have been placed with the Rocky Mountain Motorists, and 952 have been received to date by the Department.

The financial condition of the Department is in admirable shape as far as it goes. It is on a cash basis; we can pay as we go, discount our bills and take advantage of all savings that available cash funds always command.

At our last formal meeting, at Colorado Springs in October, 1922, your Association, with the Department, outlined and approved a financial program that would provide adequate funds for four years of continued construction and maintenance. With the able help of your organization, the bond issue of $6,000,000 was submitted and endorsed by the voters of the state by a very flattering majority of approximately three to one. The funds to pay interest and retirement of these bonds were to be provided by the Highway Department from its share of the motor vehicle license fees, without costing the taxpayers of the state one cent of additional general taxation. After providing for this obligation, there would still have remained in the Department's share of the motor vehicle license fund a balance to apply to state road projects. You are all probably familiar as to where we landed in the final analysis. Not only was the necessary amount to provide for interest and redemption of the bonds withheld from us, which was as we intended, but all motor vehicle license receipts were withdrawn, the half-mill levy was repealed, and the Department found, when the smoke cleared, that while having ample funds to protect Federal Aid, its funds for state construction projects were curtailed some $900,000. Where any reduction in taxation was effected, except to railroads, industries and municipalities, I fail to see.

The policy of the Department, now and since its creation in 1921, has been to construct and maintain a system of State Highways that will benefit the majority, with due recognition of the rights of the minority, with the ultimate end in view of developing, by transportation arteries, the resources of the state, and keeping pace with its traffic requirements in so far as the Department's funds would permit.

The preparation of an Annual Budget, submitted by the Advisory Board, is no easy work for these gentlemen, considering the salary they receive for their labors; and the less funds available, the greater the job. In tribute to their fairness and unbiased judgment in allocating Highway funds for the best interests of all the people, irrespective of sectional prejudice, I wish to thank them for their time, hearty co-operation, and valuable advice.

Our policy of highway development is largely influenced as a result of recommendations received from, and conferences held with, you Commissioners; and I believe, in order that our road-building program may continue and receive unanimous and unqualified support, that these recommendations and conferences and "get together" meetings of the Commissioners and the Board should continue. I believe that I can speak for the Highway Board when I say that they will endorse me in a highway construction program that is based on the improvement of a selected system of state roads, with the ultimate end that such improvement will tend to serve the present and future development of the state and its greatest transportation requirements. County lines, imaginary or real, would not influence the ultimate completion of the road as a whole, and that is fundamentally what we are all after.

Modern drainage structure constructed on Colorado mountain highway

The Department has such a system now outlined as expressed in the so-called Seven Per Cent System of the state, which has the endorsement of the U. S. Bureau of Public Roads; and is receiving Federal Aid in the improvement thereof. It is to be regretted that some eleven counties do not participate in this Government co-operation, not having roads on the Seven Per Cent System; and to these counties it is no more than just that a proportionately greater amount of state road funds be allotted, to compensate for the loss of Federal funds, and the Highway Board and its engineer, in preparing the 1924 budget, were so influenced.

We heretofore stated that it was the policy of the Department, in its improvement program, to keep pace with the traffic requirements of the state. The following figures will give you some idea of how rapidly, year by year, motor vehicles are multiplying.

In 1913 there were 13,000 registered motor vehicles in the state.

In 1915 there were 27,000 registered motor vehicles in the state.

In 1917 there were 66,000 registered motor vehicles in the state.

In 1919 there were 104,000 registered motor vehicles in the state.

In 1921 there were 145,000 registered motor vehicles in the state.

In 1923 there were 188,000 registered motor vehicles in the state.

These 188,000 motor vehicles represent an investment by our taxpayers of approximately $200,000,000, when tires and auto accessories are included. To protect this investment, to render it efficient, and to receive the greatest revenue possible from it, common business principles would dictate that every precaution be taken to **decrease** cost of operation and maintenance, and **increase** the revenue received; and this can only be accomplished by improved highways commensurate with the traffic requirements. The public which has this two hundred million dollar investment is more and more insistent that our roads be maintained, and they will dictate to us as to what is **good** maintenance; and, gentlemen, with a million and a half dollars available for maintenance for the year 1924, there is no reason why we should not have well-maintained roads. The users of the roads pay into the road fund of the state, counties and Highway Department from motor vehicle license fees and gas tax over $2,000,000 annually; and we are acting in good faith when we devote fully this amount to road maintenance and improvement to protect the two hundred million dollar investment.

Your program is full and time is limited. I should like to continue and show, from government and state tests and experiments, the savings in operation of the motor vehicle effected by improved types of roads; but this is a matter on which all who are interested can inform themselves through current literature on the subject.

At the Colorado Springs meeting, certain recommendations pertaining to highway administration and policies were submitted by me for the consideration of your Legislative Committee, and met with the approval and endorsement of the Association, but failed to impress

(*Continued on Page 16*)

Is the State Highway Department Over-Engineered?

BY J. E. MALONEY
Assistant Highway Engineer

THE subject that I have been asked to speak upon can be taken in several ways. It might be assumed, for instance, that the matter refers to the law of 1921 as to whether the organization as provided for by that act was the best that could be devised for furthering the objects of construction and maintenance of our road system. Under provisions of this law, the office of Assistant Highway Engineer was provided for, the duties of which are defined as follows: "The person so appointed shall have had five years' experience in the construction and improvement of highways, and shall be a graduate and licensed engineer of at least five years' general experience. The Assistant Highway Engineer shall have charge of all the engineering work of the Department, and in the absence of the State Highway Engineer shall act for him."

I have assumed that the question relates to the work of the Engineering Division itself as distinguished from the other divisions into which the State Highway Department is divided, but desire at this time to give a general outlie of the divisions of the State Highway Department.

The executive head is the State Highway Engineer in charge of all the work of the department, subject to the approval of the Governor of the State, and he is assisted by an Advisory Board of seven members who represent the different districts of the state as provided for by the Highway Act.

The Department itself is divided under the following sub-heads: Engineering Division, Maintenance Division, Accounting Division, and the Purchase and Traffic Division. The Engineering Division does all of the engineering work, and this is the work I will attempt to outline to you without touching upon any of the other activities of the State Highway Department.

What does the Engineering Division do?

In general, the work may be described as making all preliminary investigations for proposed or projected improvements of roads. This work includes the preparations of plans for all drainage structures, such as culverts and bridges. Succeeding these preliminary investigations which may or may not be used in any particular year, it proceeds with the location survey, establishment of grades, necessary cross-sections for obtaining the quantity of material and detailed plans which are to be submitted to the Government Projects. Also, all on all Federal Aid necessary information is furnished to the State Highway Engineer, Counties and Contractors for all Projects, whether Federal Aid, State or County Bond Projects.

When the surveys and plans are completed, and quantities figured, they are submitted to the Bureau of Public Roads for approval for Federal Aid Projects, then advertised for letting. Bids are received and tabulated, and contracts drawn with the successful bidder under the specifications which have been prepared in each case for the particular piece of work. This is all preliminary to the actual beginning of construction work. Every year it has been found necessary to anticipate much of this preliminary work, so that our reconnoissance and preliminary surveys are, as far as is found practical, in advance of the actual budgeting of the work. It is not always possible to do this, but wherever possible it is done. When the contract has been awarded, the Engineering Division is looked to, to supervise and inspect the work of the Contractor. This part of the work is included under "Construction Engineering;" and, it may be said in a general way, that the cost of this branch of the work expressed as a percentage of the actual construction work, will always be higher the smaller the project is—that is, on inspection and construction work, it takes but very little more engineering costs to carry on a $100,000.00 project than it would to carry on a $25,000.00 or $30,000.00 project. On small projects, the percentage of cost of engineering is relatively high.

In addition to the preliminary surveys, plans, blue-printing, advertising, letting of contracts, supervising and inspecting construction work, there comes to the attention of the Engineering Division the compilation of many and various forms of statistics for answers to innumerable questions which naturally came to this department from other states, counties throughout the state, and the National Government as well as individuals. This relates to mileage of roads, character of improvements, characteristic specifications and plans, number of people employed on the roads, etc.—also all general and special road maps. All of these are given consideration and attention. This of course takes time and costs money.

In connection with the preliminary surveys, I want to mention the fact that we keep two engineers as locating engineers whose duties are to go over and inspect the location for each project. They are experienced in this matter of location, and choice of ground, grades, and economy of construction, so that when we finally make our recommendations to the State Highway Engineer on any project, we have had the benefit of their expert advice as well as the judgment of the Division Engineers and the Resident Engineers. In this connection, on Federal Aid Projects, we also have the advice and recommendations of the Federal Inspecting Engineers, who go over the alignment, grades and character of structures before the Federal Office approves the plans.

There are other investigations such as survey of available road material for use in construction. We have been in co-operation with the State Agricultural College in this matter, and believe that this investigation, while costing some money, has paid for itself in giving the contractors information as to available material to be used in the construction of the various projects.

There is also the matter of traffic census which is handled by this department—that is, counting and classifying the traffic upon main roads of this state. This has been done in the eastern portion of the state during the past year. The western portion will be taken care of next season. This information is extremely valuable, showing the tremendous increase in traffic, use of the roads and the economical desirability as to the various questions which naturally come to this department as to the various types of improvements which are made necessary by the character and intensity of the traffic.

On all our important work, all the cement is tested, the gravel and sand is tested, and tests are made of characteristic samples of culvert material and reinforcing bars. Our reinforcing bars are tested at the University of Colorado, Boulder, while the cement and sand tests are made for us by the Pierce Testing Laboratories.

The preliminary

State Highway forces in winter camp in Eastern Colorado.

work required on Federal Aid Projects is very clearly set forth in the rules of the Bureau of Public Roads, Department of Agriculture, which prescribes very definitely the manner in which surveys, plans and specifications must be submitted for approval on Federal Aid Projects. Any expense incurred in these preliminary surveys, plans, specifications and advertisements upon Federal Aid Projects is borne entirely by the State. Federal Aid does not commence until the work is let and construction started. Whatever may be said as to the necessity for preliminary engineering upon any other class of projects, it MUST be done as the Government requires it for Federal Aid Projects. These rules and regulations concerning the desired preliminary information were adopted only after thorough study and consideration by the leading engineers of the Government Department and of the States, and must be accepted as their judgment of what is desirable to have in the form of surveys and plans before beginning construction on any important project. This being true of the improvements on our State Highways upon which we receive Federal Aid, why is it not true also for important State Projects? If this information is desirable for the economic determination of the alignment and character of improvement before expending the Government funds, it seems to me that it is just as necessary to prepare for the expenditure of State funds with as much care and safeguards by the obtaining of the necessary preliminary information. These considerations apply to every important project. Upon the smaller and less important projects, I do not believe this same degree of care or detailed preliminary examination is at all necessary, or called for.

Our budget contains many items of from one to three and four thousand dollars, which are intended to assist the counties in the particular improvement of some small stretches of road, or of some small drainage structure. The plans for these smaller drainage structures are generally standard, and the county can readily put them in. The road improvements may consist of re-gravelling a short stretch, or grading a short piece of road and in my opinion, can be handled very nicely by the counties without having an inspector or engineer located on the work. In fact, these small pieces of improvement partake of the nature of maintenance or reconstruction, and can be covered by the Division Engineers on their trips throughout the particular sections of the state in which they are undertaken.

There are cases, however, upon which the County Commissioners and the State Highway Department agree, that the improvement is to be in the nature of a progressive improvement, and that work should be pursued according to an absolute plan decided upon in advance. In these cases it is necessary to expend some money for surveys and supervision. In cases of bridge construction, it is necessary to have sufficient inspection to know that the work is properly done.

In this general outline I have endeavored to give you the work that the Engineers of the State Highway Department have been called upon to do. Now, to answer the question propounded as the subject matter of this paper, resolves

Denver-Brighton Concrete Highway — an average of 3700 vehicles per day pass over this road

itself into the general inquiry: Has this work been done at a reasonable cost? This would be one way of looking at it. Or, we might ask: Are we paying the Engineers more than a reasonable sum for their work? This can be answered the same way that you would answer your own question if you were paying a man $5.00 a day for certain class of work and wanted to know whether it was a reasonable wage or not. You would inquire as to what others were paying for the same grade of work. I will answer in the same way by giving you the rates we pay, and the wages our neighboring states are paying for the same work.

The rates of pay for the different grades of work in the Engineering Department of Colorado are as follows:

	Per Mo.
Assistant Highway Engineer	$333.00
Locating Engineers	275.00
Division Engineers	275.00
Office Engineers	275.00
Chief Draftsman	200.00
Bridge Engineer	250.00

In the field, working under the Division Engineers, are the following:

	Per Mo.
Resident Engineers	$150.00 to $200.00
Instrument Men	125.00
Rodmen	100.00 to 125.00
Inspectors	100.00 to 150.00

When necessary, additional help may be hired in the field classed as Engineering Laborers, their rate of pay being from $3.00 to $3.50 per day.

In the Engineering Office, a stenographer and clerk is employed at the rate of $125.00 per month.

The average of thirty-one states report pay for the Assistant Highway Engineer as $330.00 per month. These rates vary from $250.00 to $500.00 per month. For the classification of Division Engineers, forty-three states report an average of $272.00 per month. These rates run from $150.00 to $408.00 per month. For Chief Draftsmen, thirty-seven states report an average of $200.00 per month, the rates running from $150.00 to $300.00 per month. For Bridge Engineer, thirty-nine states report an average of $287.00 per month, running from $200.00 per month up to $540.00 per month. For Office Engineer, twenty-two states report an average of $275.00 per month, running from $150.00 to $400.00 per month.

From these reports it is readily seen that Colorado is not paying more than the average rates which the same service receives in other states; and, it seems to me this answers that portion of the question thoroughly as to whether the rate of pay for engineering now in force in Colorado is too high, as it shows that we are only paying what is an average rate for these services.

The position of Assistant Highway Engineer and Division Engineers have no subsistence allowance, and are allowed only the actual and necessary travelling expenses when going over the work for the Department. On the construction of projects, subsistence has been allowed to the Resident Engineers, Instrument-men, Rodmen, Inspectors and any other assistants they may have when their location requires them to be away from their regular established homes. This particular feature for the payment of subsistence has not in my opinion worked out entirely satisfactory; and the Department is now and has been for some time, considering this matter so that it may be adjusted. In going over this matter and comparing with other states, it is to be noted that there is a great deal of difference in their practice in this particular matter. Some states allow a maximum of $50.00 per month to employees on construction work; some $40.00, and some $35.00 per month for subsistence. In some of the states the salaries range from $25.00 to $50.00 per month more than ours and no subsistence allowed, but the actual expenses are allowed on survey parties which are shifting their location continually.

The following is an outline of the salaries of the various grades of men in the field as compared with other states:

The salaries for Resident Engineer in Colorado range from $150.00 to $200.00 per month, with an average subsistence of approximately $60.00 per month. In Montana, the salary for this position pays from $175.00 to $250.00 per month, but allow no subsistence. New Mexico pays $165.00 to $200.00 with no subsistence, except in occasional cases. Nevada pays $200.00 to $240.00, no subsistence. Oregon pays $150.00 to $200.00, with an allowance of $50.00 for subsistence, or they pay in lieu thereof $200.00 to $250.00 per month. Utah pays $187.00 to $225.00, no subsistence, Washington pays $175.00 to $225.00, no subsistence. Kansas $200.00 to $300.00, no subsistence. Nebraska $150.00 to $175.00 and allows $45.00 for subsistence. Texas $250.00 per month, no subsistence. Wyoming $175.00 to $225.00 per month, plus expenses. Idaho $150.00 to $200.00 and $50.00 per month for subsistence. California $235.00 to $250.00 and expenses. Louisiana $150.00 to $200.00, plus $40.00 per month for expenses.

The salaries for the position of Instrument-men range as follows:

This department pays $125.00 per month and allows subsistence, which averages about $60.00 per month. The practice in

the other states is either to allow a specified amount for subsistence, or they are paying a larger salary which practically covers the same item. For instance—Utah pays $130.00, no expenses. Kansas $150.00 to $200.00, no expenses. Montana $100.00 to $150.00, no expenses. Washington $125.00 to $150.00, no expenses. Texas $175.00, no expenses. Nebraska $110.00 to $140.00 plus $40.00 allowance for subsistence. Oregon $120.00 plus expenses, or $170.00 without expenses. Nevada $125.00 plus expenses. Wyoming $125.00 to $150.00 plus expenses. New Mexico $90.00 to $140.00 plus expenses. Idaho $100.00 to $125.00, plus expenses. California $135.00 to $165.00 and expenses. Louisiana $100.00 to $125.00 plus $40.00 subsistence.

The salaries for the position of Rodmen range as follows:

This department pays $100.00 to $125.00 per month, plus subsistence, which will average about $60.00 per month. Our neighboring states for this position pay as follows: Wyoming $75.00 to $120.00 plus subsistence. Kansas $100.00 to $125.00, no subsistence. Utah $85.00 to $100.00, no subsistence. Oregon $90.00 to $115.00, no subsistence, or $40.00 to $65.00 with subsistence. Nevada $75.00 to $100.00 plus subsistence. New Mexico $50.00 to $75.00 plus subsistence. Montana $75.00 to $125.00, no subsistence. Idaho $80.00 to $100.00 plus subsistence. California $80.00 to $100.00 plus subsistence. Washington $100.00 to $125.00, no subsistence. Texas $100.00 to $125.00, no subsistence. Nebraska $80.00 to $100.00 plus $35.00 for subsistence. Louisiana $75.00 to $125.00 plus $40.00 for subsistence.

For the position of Inspector—This Department pays from $100.00 to $150.00 per month with subsistence when the employees are required to be away from their homes. Our neighboring states pay: Idaho $100.00 to $150.00 plus subsistence. Montana $100.00 to $165.00, no subsistence. New Mexico $110.00 to $150.00, no subsistence. Nevada, $110.00 to $165.00, no subsistence. Oregon $100.00 to $150.00, no subsistence. Utah $125.00 to $150.00, no subsistence. Washington $125.00 to $150.00, no subsistence. Wyoming $150.00 to $175.00 plus subsistence. Kansas $100.00 to $150.00, no subsistence. Texas $150.00 to $175.00, no subsistence. Louisiana $125.00 to $175.00 plus $40.00 subsistence.

For the grades which would be similar to our Engineering Laborers for which we pay from $3.00 to $3.50 per day plus subsistence, other states have the same position under the title of Chainmen or Surveyors' Assistants, and their salaries range from $50.00 to $100.00 per month for this class of labor. The subsistence allowance is the same as the Resident Engineers, Instrument-men and Rodmen in the various states.

I have gone into the details of this matter in order to put before you the conditions and salaries as they are in the Highway Organization of this Department, and of the other states.

From these reports, it is clear that our rates of pay of the various grades are practically the same as paid by the neighboring states taking into consideration the allowance for subsistence, except that apparently we are paying $25.00 to $35.00 per month more for the positions of Rodmen and Engineering Laborers than other states. This comes in because we allow subsistence in addition to the salaries, which brings the amount we pay higher for these two positions than the neighboring states pay.

As to the personnel of the Engineering Division and their qualifications for carrying out the work entrusted to them: In various parts of the state, you are individually acquainted with the members of this organization who are stationed in your respective sections, and I believe that the Department has in these men who are in responsible positions a capable body of men who are looking after the work in a conscientious manner, seeking only the best interest of the State and counties, and that they are of as high a standard as any other Highway organization in the United States.

For the year 1923, the total amount of construction work handled by the Engineering Division was $4,305,563.00. This was entirely construction work and includes no part of any other expenditure. The total cost of construction engineering for the direction of this work was 6.7 per cent of the actual construction work accomplished. In addition to this, the Engineering Division expended $69,996.00 on preliminary engineering which has been described before. This amount charged against the construction work would amount to 1.6 per cent. This represents the total cost of preliminary surveys and enginering construction supervision for all projects.

Therefore, the total Engineering costs based upon the actual construction work done would be

Construction Engineering	6.7%
Preliminary Engineering	1.6%
	8.3%

In attempting to compare this with the percentage costs for engineering in other states, we find that the other states do not all divide their costs up so that they can be separated. Many of the states include all preliminary expense under "Administration"; but there are some who have separated their costs so that they can be compared. The Bureau of Public Roads, Department of Agriculture, separate their costs for the work done on the Forestry roads. A total of $658,710.00 was expended upon construction work in Colorado; South Dakota and Wyoming, their "Construction Engineering" cost was 6.45 per cent, and the "Preliminary Engineering" 4.39 per cent, making a total of 10.84 per cent. In Idaho, the "Construction" and "Preliminary Engineering" are given as 7.5 per cent; in Nebraska, 10 per cent; Nevada, we have figured their percentage for "Construction" and "Preliminary Engineering" as 10.4 per cent. This is based upon a total expenditure of $4,400,000.00. Montana, 9.13 per cent, based upon a total expenditure of $3,900,000.00. California, 7.15 per cent, based upon a total expenditure of $68,000,000.00. Oregon, 7.73 per cent, with a question as to the cost of surveys in advance of construction. In New York, the cost is practically 11.6 per cent, based upon a total expenditure of $100,000,000.00. This includes an item for "Administration Engineering," which would probably be about 2 per cent, leaving 9.6 per cent for "Preliminary and Construction." Oklahoma reports 4 to 6 per cent for "Construction Engineering," and $200.00 per mile for cost of "Preliminary Engineering." In this connection, I might state that the cost of our preliminary surveys during this past year will run about $90.00 per mile for the field work. To this work would have to be added the preparation of plans, and getting the projects ready for advertisement. In New Mexico, they give 3.5 per cent for their administration, but do not separate their actual engineering cost. They assume 10 per cent for "Preliminary and Construction Engineering." Texas reports that the counties pay the "Preliminary" and part of the "Construction Engineering" costs; that the state's administration run from 2½ to 3 per cent.

Kansas reports that all preliminary work is done by the counties who also pay construction engineering. The state's cost for their administration supervision is 3.7 per cent.

These returns from the various states indicate that our engineering costs for construction in 1923 were not unduly high; although it may be said that, had the season been favorable in its weather conditions, the contractors could have completed at least $1,000,000.00 more of construction work; and, in doing this, it would have involved but very little more engineering cost.

The total amount expended for "Construction Engineering" upon any project depends upon the progress of the work. The slower the progress, the higher the ratio of construction engineering expense will be.

During the organization of this Department from February, 1910, to December 1, 1923, there was expended by the State Highway Department for construction and maintenance, $25,266,945.43. This included Federal Aid Projects amounting to $11,075,410.95, and of this $1,417,766.91 was for "Preliminary and Construction Engineering." This is equal to 5.6 per cent of the total.

Considering the many varying conditions in the state, difficulties of location and construction, and the necessity of running two, three and sometimes four lines to determine the most favorable location, will render a comparison as between the different divisions or even between different projects difficult, unless all of the surrounding circumstances are taken into consideration.

Taking the total volume of construction work completed and now under way, I can say that, in my opinion, the engineering costs of the State Highway Department have not been excessive.

(Address read before County Commissioners' meeting, Jan. 22, 1924.)

NOTICE

Change of Address.

In the event of a change in your address, or firm name, we would appreciate having you notify the editor of COLORADO HIGHWAYS of such change, at your earliest convenience, giving both your old address, and the new address to which future issues should be mailed.

This will insure COLORADO HIGHWAYS reaching you regularly each month.

Commissioners Propose High Truck Tax

REPEAL of the one-half mill levy for state road purposes and engineering costs of the State Highway Department were the principal questions discussed at the annual meeting of the State Association of County Commissioners held in Denver on January 21-23.

Over two hundred and fifty delegates from all parts of the state attended the meeting, which was one of the most spirited ever held by this body. And after the smoke had cleared away everyone was unanimous in the opinion that "it was a good meeting".

In his annual address J. W. Shy, of Cheyenne Wells, president of the association, deplored the repeal of the half-mill levy. He declared that the shortage of funds to carry on road work in many of the counties was due to the action of the last legislature.

After reviewing the accomplishments of the association during 1923, Mr. Shy pleaded for unity between the association and the State Highway Department, in order to bring about the fullest co-operation in the building of state roads.

Delegates to the meeting were welcomed by Mayor Benjamin F. Stapleton of Denver, and H. F. Tiffany of Brighton, Colo., responded. All counties in the state were represented at the convention by one or more commissioners, and county attorneys and county clerks from a large number of counties were present.

Gov. William E. Sweet addressed the commissioners on the second day of the convention, on the subject of taxation. He made an appeal for lower taxes. He advocated a law to stop the issuance of tax-exempt bonds and securities, and at the same time proposed a state income tax law. Only by a reduction in county and local taxes, he declared, could there be a material reduction in amount paid by Colorado taxpayers.

J. W. Shy, of Cheyenne Wells, Colorado, re-elected president.

Maj. L. D. Blauvelt, chief engineer of the State Highway Department, outlined the work of the Highway Department for the past year and explained some of the projects soon to be begun. His address in full is published in another section of this issue of Colorado Highways.

Addressing the convention on the subject, "Is the Highway Department Over-Engineered", James E. Maloney, assistant state highway engineer, declared that the costs for engineering in Colorado compared favorably with other states.

The total cost of construction engineering for the direction of work which cost the state $4,305,563 in 1923, was 6.7 per cent, Mr. Maloney said. In addition to this, the engineering division expended $69,996 on preliminary enginering. The total per cent on engineering costs therefore would be 8.3 per cent, it was explained.

Mr. Maloney's paper is published in full in another section of this issue.

A vigorous attack was made upon motor bus and truck companies in their alleged abuse of state highways, by T. W. Monell, county clerk of Montrose county, and O. G. Smith, county commissioner of Pueblo, in their addresses before the convention. Both advocated stringent laws to curb the activities of these agencies and it was proposed that a heavy tax be placed upon busses and trucks operating within the state.

Mr. Monell, who is also secretary of the state association, cited several instances where trucks had done several hundred dollars damage to the roads in his district, whereas the tax paid by these truck owners was only a few dollars per year.

The statement of Messrs. Monell and Smith in reference to the abuses of the trucking outfits operating in the state were received with vociferous applause by the entire convention body.

SIXTEENTH ANNUAL CONVENTION OF THE COLORADO ASSOCIATION

Other addresses, restricted to five minutes, were made by E. E. Sommers, representative of the First District on the state highway advisory board; J. A. Clay of the Third District, G. L. L. Gann, Fourth District; Chas. B. Lansing, Fifth District; John A. Donovan, Sixth District, and Frank H. Blair, Seventh District.

In a special address, William Weiser, chairman of the advisory board, declared that only the consideration of what is best for the state as a whole, representing a step toward completion of a well-defined system of interstate highways, now actuates the members of the board in making the construction budget.

He declared that the old theory that each of the sixty-three counties of the state must receive construction work costing as much as the amount of money paid into the state treasury in taxes, is a thing of the past.

Mr. Weiser created a stir among the county commissioners by suggesting that the counties turn over all maintenance of interstate highways included in the 7 per cent federal aid system, to the state highway department, instead of continuing the present practice of maintaining them themselves with funds furnished by state and counties. He declared that state maintenance would prove more satisfactory and economical.

County Attorney Johnson of Cheyenne Wells reviewed the legislative accomplishments of the association during the year. He pointed out that but two of the eight measures put before the state legislature by the county commissioners' association had met with success and that all three of the referendum measures backed by the association, including the $6,000,000 road bond issue, were passed.

The following resolutions relating to roads were passed by the commissioners:

"We reaffirm Resolution No. 7 of last year, in relation to truck and passenger cars, page 88 of the 15th annual convention proceedings, as follows: 'We believe that the basis on which the price of auto vehicle licenses now fixed, namely, the cost price of the car at the factory, is fundamentally wrong and should be changed at the earliest possible moment. The cost of any particular license should be based upon the use to which the car is put upon our highways.'

"We, therefore, recommend that the present law be so amended that the following factors be taken into consideration in fixing the license price and not the method now used, viz: Net weight of car; maximum carrying capacity; horsepower, speed, size and construction of tires.

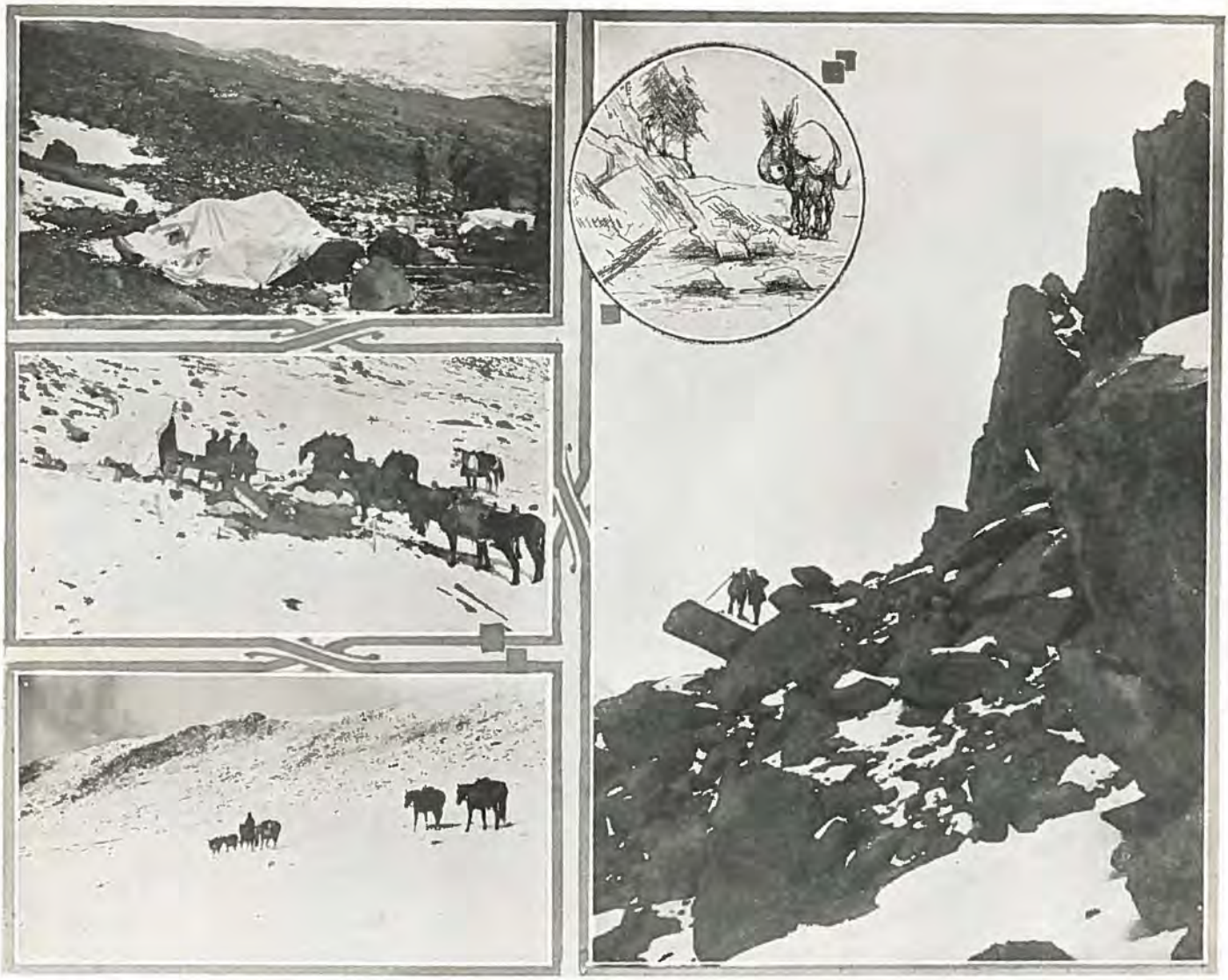
"And in addition thereto those vehicles making use of the highways for hire—whether by the haulage of freight or passengers—should be required to pay an additional license fee over and above that required by the owners of private cars, and to this end that the most destructive users of our public highways may in a small measure repay a portion of the expense by them entailed.

"We recommend the passage of a law fixing this additional license charge upon

(Continued on page 18)

Newly elected officers of the Colorado Association of County Commissioners—W. L. Rees, Pueblo, second vice-pres.; James E. Beckley, Delta, first vice-pres.; T. W. Monell, Montrose, secretary-treasurer, and Joe Hartman, Montrose, third vice-pres.

OF COUNTY COMMISSIONERS HELD IN DENVER, JANUARY 21-23.



Upper left—Camp after a snow storm. Middle left—Breaking camp. Lower left—"On the trail." Circle—Narcissus at rest. Right—A transit point on grade.

Story of Mount Evans Road Survey

BY DREXEL LACEY

ON the evening of September seventh we arrived at the Royal Ranch, an inviting spot in the beautiful Deer Creek Valley. There were five in our party, sent out from the Highway Department to locate the continuation of the Mt. Evans road, the present terminus of which is at Summit Lake. It was our job to survey a location over the ridge of Mt. Evans and down the other side, to connect up with the Deer Creek road. We were fully equipped for camping, and had a two months' supply of beans and bacon.

The following morning we started out to establish our camp up near the summit of Mt. Evans, each leading a horse packed with some portion of our equipment. The procession was headed by Betsy and Narcissus, our faithful burros. We were all novices in the art of "packing," and by the time we had gone a mile or so, some of the packs were hanging underneath the horses, making it difficult for them to walk; some were on the "northeast corner," some on the left ear, and some even dragging behind. We managed, however, after fighting packs and frequently stopping to mop perspiration, to reach an abandoned sawmill at the end of the trail. It was necessary to make several trips between the ranch and the sawmill before we got all of our equipment together, but this was finally accomplished, and a temporary camp established there.

Our immediate job was then to cut a trail through the woods from the sawmill to timber line, so that we could bring our equipment on up to our ultimate camp. This done, we located a camp site on the southern slope of Mt. Epaulet, at an elevation of 13,000 feet; a spot apparently sheltered from the wind, and near a spring—and here we pitched our tents. A beautiful panorama lay before us, from Como and Fairplay, across South Park and the Platte River Valley, with Devil's Head Mountain to the east, and Pike's Peak looming up to the south. After several trips to and from the sawmill, we were established in camp, and ready to begin our survey.

Our camp was located about three miles from Summit Lake. We started out the first morning in a fog, with a climb of about twenty minutes, almost straight up, then a gradual slope of about a mile over the top of Mt. Epaulet. The fog became so dense, however, that we decided to return to camp. An argument soon arose as to the direction, and we discovered that we were lost. After considerable wandering about, the fog lifted some and we were able to recognize a few rock formations, and made our way back to camp. We soon became accustomed to being lost; it was almost a daily occurrence.

And the next day it snowed!!

On the third day there was a high wind, and we drew straws to see who should go to the top of Mt. Epaulet to see what the prospects were for working. The two

unfortunates returned after an hour, a little the worse for wear, with an unfavorable report.

Notwithstanding the days of severe winds and snow, we succeeded in bringing our line to a point in the saddle between Mt. Evans and Mt. Epaulet, where a future road will branch off to the summit of Mt. Evans, to an elevation of 14,260 feet. Here we were overtaken by a blizzard lasting several days, during which time one of our party—John Campion—died.

We would like to devote a few words here to the memory of John Campion, beloved by all members of our party, and all who were associated with him. In honor of the man whose indomitable spirit was so clearly shown by his favorite expression, "Well, boys, I didn't think the old man would make it, but he's still on the line!" We have named this pass between Mt. Evans and Mt. Epaulet, "Campion Pass."

On the day following his death we carried the body down through the snow and in the face of a terrific wind. We were able to make about fifty feet at a stretch. Leaving the camp at 8:30 in the morning, we arrived at the ranch, completely exhausted, at 5:00 o'clock in the evening; a trip of about ten miles over a rocky trail, through narrow passages, and down steep slopes.

Two days later we returned to the top with a new member of our party. A first-class initiation awaited him; during our absence our camp was almost entirely destroyed—Campion's tent was torn to shreds, the other tents were down and badly torn, with the poles in splinters. Our cots and bedding were in the open and covered with snow. We had brought an army tent up with us on Narcissus. Numb from cold, our teeth chattering, we pitched the tent and set up a sibley stove.

The next day we resumed work on the line, carying the survey from Campion Pass around the east side of Mt. Epaulet. We ran about a mile, with a grade estimated to carry us through the saddle between Mt. Epaulet and Mt. Rosalie. We were forced to abandon this location when we came to a great chasm, about a thousand feet deep and a thousand feet across, lying between us and the saddle; and which, owing to the topography of the country, was undiscernible even at a short distance. Only one possible location remained, taking us around the west side of Mt. Epaulet, where the country is very rough, with great rock bluffs rising about fifteen hundred feet from the lake-dotted basin below, the basin, itself, being above timberline. These bluffs extended out at intervals to sharp points, through which it was necessary to locate three short tunnels. This portion of the road will open to the public a wild and rugged country, unsurpassed for scenic grandeur.

There were several vantage points around Mt. Epaulet where we were able to set up the transit. The rocks and ledges were covered with snow and ice, however, and we had to be very cautious when letting each other down with ropes. We did all of our work by stadia, and computed our center line stationing, also taking considerable topography. We were forced to work in all kinds of weather in order to get our survey down to timberline before we might be marooned on top by deep snow. There were days when the wind blew so hard that it took two men on the level rod.

During the time we spent on top it was necessary for the pack train to make several trips to the ranch for supplies; also, we had to go about two miles to get wood. The days chosen for this were unfit to accomplish anything with our survey. On one occasion one of the big horses from the ranch, carrying a load of logs, became frightened and ran away, falling over a five-hundred foot cliff. The pack train was often delayed for days by storms and arrived at all hours of the night. Charlie Royal, who was in charge of the train, was nicknamed "Paul Revere."

It was a day of celebration when we reached timberline with the survey, and were able to move our camp down to the sawmill. We resumed operations, but again had about three miles to go to our work. We carried our transit line down to a point above the sawmill; the weather being too severe to go to timberline to bring down the levels, we had continued our location to this point.

(Continued on page 24)

Upper right—Survey party on summit of Mt. Evans, left to right: Drexel Lacey, Homer Winters, Charles C. Royal, and Charles Balaz. Middle—Breaking through the snow. Circle—"We chained and shoveled out stakes for three miles in order to run our levels down."

Cartoons—"Betsy in action" and "Packing up"—drawn by Mrs. Elza Montgomery.

Fifty Thousand Attend Four Day Session of National Road Show in Chicago

Fifty thousand people!

Some crowd at one convention. All parts of the world were represented.

They assembled in Chicago on January 14-17 to attend the annual National Road Show. Included in the attendants were national, state, county highway officials, engineers, contractors, manufacturers, dealers and jobbers of road equipment.

From the standpoint of magnitude it was the biggest exhibition of the year. Every conceivable piece of dirt-moving equipment was on display.

Colorado was well represented. More than fifty road officials, contractors and dealers were in attendance. Yes, "a good time was had by all."

The exhibits overflowed the Coliseum into two adjoining buildings. Every large manufacturing concern in the country making dirt-moving machinery was represented with exhibits. A good many of them showed their machines in actual operation.

Everything from huge draglines to portable screening plants were on display. One of the outstanding features of the show was the large number of Fordson attachments on exhibit. These included compressors, graders, road rollers, maintenance machines and draglines.

Attracting unusual attention was the Austin Pup, a new product of the Austin-Western company. This machine consists of a combination road roller and grader mounted on a Fordson tractor.

One of the most interesting exhibits of the show was that of the Bureau of Public Roads, showing various road-building methods employed in the different states. On the same floor were exhibits by the Asphalt Association and the Portland Cement Association.

Over 200 exhibits were on the main floor of the Coliseum. Among these were displays by the Pawling & Harnischfeger Co., Russell Grader Co., Koehring Company, Austin-Western Road Machinery Co., J. D. Adams & Co., Buckeye Traction Ditcher Co., Galion Iron Works and the Osgood Steam Shovel Co.

Sessions of the American Road Builders Association were held in the Congress Hotel. Speakers before this convention included Thomas H. McDonald, head of the Bureau of Public Roads, and Col. H. L. Bowlby, chief of the surplus war materials division.

Col. Bowlby announced that the bureau has been assured of 2,000 trucks and 1,500 tractors for distribution to the various states during 1924 for road-building purposes. Arrangements are now being made by T. R. Elkins, head of the purchase and traffic division of the Colorado Highway Department, to secure as promptly as possible Colorado's share of these trucks and tractors. These will be distributed to the various counties.

The show and convention was handled by Chas. M. Upham, state highway engineer of North Carolina. Heretofore these events were in charge of a committee of several members. The change in management proved highly successful.

About two hundred and thirty of the leading manufacturers of equipment, materials, and supplies used in building and maintaining highways, had exhibits in the Coliseum and two adjoining buildings. The convention of the American Road Builders' Association, of which Frank Page, chairman of the North Carolina highway commission, is president, was held in the Congress Hotel.

ROAD SHOW SIDELIGHTS

Some party—we'd say—that represented Colorado at the Road Show. Never a better bunch of fellows "hit the trail" together. All Chicago knew that Colorado had arrived—"ride 'em, cowboy, let 'er buck." Ask Asphalt Carpenter.

"Our Yellow Cab will arrive at 2 o'clock," said Everett Young and Barney Miller. "What's the number? 640!" "We'll report to the company right away."

"Ladies and gentlemen, Mr. A. K. Vickery will now lead us in singing 'Colorow'." Altogether now. "Ring the Bell for Anna"—"He Was an Old Billiard Drinker"—popular song titles, written and dedicated to Jodey Bennett.

Asphalt vs. Cement—three rounds to a draw. "Morrison Hotel, give me room 1914. Or maybe it might have been Congress, c-322." Who can tell?

Who said Dan Reid didn't see the show? He bought a dragline; ain't that proof enough? If you don't believe it, ask Jim Collier. Jim was his roommate. Some people are born lucky. Joe Gordon, please write. "Where's Frank Kirchoff?" Fred Schmidt might be able to answer.

Three cheers for Tom Burnite—he's the best little fixer around these diggin's. Tom saved the day with his room reservations. On hand to greet the gang from Colorado upon their arrival in Chicago were Harry P. Wilson, Herbert N. Steinbarger, Harold W. Moore, Larry Grannis and Ray Corson. They formed the advance guard from Denver.

Jim Beckley of Delta was the only county commissioner from Colorado on deck. Jim took home enough literature to keep him in reading for three months. At one booth it took three salesmen to answer all his questions about a certain piece of maintenance equipment.

When does Roy Atchison sleep? Ask us something easy. Charles Hine acted as "poet laureate" of the gang. Oh! shades of Kipling. It is rumored that Howard Pigg has gone into the hammock business.

Yes, Joe Draney was there—as big and jolly as ever. Some entertainer, this boy.

STATE ROAD NEWS

A program by which they will improve and make as nearly standard with the State Highways all of its rural roads has been adopted by the county commissioners of Ouray county, according to a statement recently issued by George B. Croft, chairman.

It is stated that that portion of the Million Dollar Highway (Durango-Silverton-Ouray) within the limits of Ouray county will be in shape for tourist travel by June 15. Work on the three projects located on this highway is now being pushed with all possible speed.

Craig Bradford, formerly connected with the highway forces of Weld county, has been appointed superintendent of the Denver mountain parks. Fred C. Steinhauer, widely known engineer, will supervise the 1924 improvement program.

One of the improvements suggested is the construction of a new road from Echo Lake to Idaho Springs.

The Highway Commission of New Mexico recently passed a resolution to include the road from Shiprock northward to the Colorado line in the Federal Highway system. Improvement of this road from Cortez, Colo., is expected to attract cosiderable all-year travel.

Improvement of the road from Meeker through the White River forest to the headwaters of the Williams Fork next summer if plans of the Routt county commissioners from officials of the Forest Service are carried out. Supervisor Blair has been in conference with the Routt county officials regarding the work. The proposed road will tap a wonderfully wild and rugged country.

At the end of 1918 there were 12.5 miles of completed federal aid projects. Since then projects totalling 29,772 miles have been completed, 15,318 are under construction, and an additional 6,000 miles have been approved for construction, according to Thomas H. McDonald, chief of the Bureau of Public Roads.

The U. S. Forest Service is co operating with the state highway department in the marking of state roads which run through the forests. The forestry signs will be marked with green letters on a white background. These will be mounted on steel posts and will be used in connection with the round signs carrying the road number, furnished by the state. centered directly beneath the forest sign.

The far-famed Wind River canon highway project, located near Thermopolis, was officially opened on January 23 by Samuel Conwell, chairman of the Wyoming state highway commission. Cost of the completed project will be $585,000. It will be ready to carry the heavy tourist travel out of Casper to Yellowstone park next spring.

Significant reduction of real property taxation can be made only by reduction of county and local taxes, according to experts of the U. S. Bureau of Public Roads, who have just completed a study of the problem in Wisconsin.

TRADE MARK ARMCO REG. U.S. PAT. OFF.

Ingot Iron

95,454 Analyses

Since 1916, the American Rolling Mill Co. has made 95,454 analyses of ARMCO Ingot Iron, taken from 10,606 different heats, and representing a total tonnage of 692,014 tons.

1. These analyses prove that the average of impurities in ARMCO Ingot Iron is .13 per cent, or .03 per cent less than the amount of impurities claimed.
2. Average *Variation* in impurities is less than .02 per cent, and always toward greater purity.

No other commercial iron or steel has ever approached this record. It means that:

1. You can be *sure* of the *same* quality in your ARMCO Culverts year after year.
2. It means that you will get the same service given by "ARMCO Veterans," hundreds of which have been in the ground without deterioration for 15 years.

Compare this record of certainty with other metals offered you, or with massive culvert materials, that tend to change in composition with each new installation.

Highest Uniform Purity

This Little Dot

↓

■

If this triangle were a sheet of ARMCO Ingot Iron, this little dot would represent all impurities. If it were the least bit larger by the addition of any other material, the iron could not bear the ARMCO Trademark. There is less than 1 part impurities to every 625 parts of pure ferrite—less than 1 *ounce* to every 39 *pounds* of pure iron.

Begin today saving money by sending all your orders to HARDESTY—where your patronage is always appreciated, where for over thirty-six years every customer has always been given a square deal.

The R. Hardesty Mfg. Co.

DENVER, COLO. MISSOULA, MONT.

ARMCO CULVERTS

Scene on Wolf Creek Pass, elevation 11,000 feet, showing section of new highway constructed by State Highway Department forces.

ROADS ANTEDATE HISTORY.

By W. W. Gaines, President Atlanta Board of Education.

Roads have existed since the earliest times. They are spoken of in the Bible many times. Sometimes the Bible highways, sometimes ways, and sometimes roads. No sooner is a country settled than roads are laid out and built. Roads antedate history.

The ancient civilizations had wonderful roads. Rome was a country of famous roads; and they all centered in the city of Rome. All roads led to Rome. When the Apostle Paul was carried a prisoner to Rome he traveled a part of the distance along the Appian Way, one of their great roads, a road so splendidly and permanently constructed that it still exists as a great thoroughfare to this day. There are magnificent roads in Belgium and in France and in Germany and in England now, built by the Romans, as good in every way today as when they were first built, a thousand years ago. Many countries of Europe and Asia have splendid highways that are hundreds of years old.

By means of a road you are able to go around mountains, and across creeks and rivers, and to reach your destination. We could not go far in this world without roads. Nobody would live in a country without roads.

A road tells you many things as you pass along it. It tells you a story of the country through which it passes. A good road means a good, prosperous country. A bad, narrow, torturous road means a poor and backward country. You can judge a country by the character of its roads. On a good road you will find good homes and high-priced land. On a bad road you will find common homes and low-priced land. Money spent for good roads is a good investment; it brings back its cost many times over.

A MILE OF CONCRETE PAVEMENT.

A mile of concrete pavement, 18 ft. wide, 7 in. thick at the edges and 8 in. thick at the center, requires 2,249 cubic yards of concrete. This amount of concrete takes 3,913 barrels of Portland cement, 1,102 cubic yards of sand and 1,664 cubic yards of stone. It is estimated that 30 gallons of water are needed to mix and cure a square yard of concrete pavement, so over 300,000 gallons of water must be furnished for a mile of concrete pavement.

Approximately 4,500 tons of concrete go into the construction. In making 3,913 barrels of cement over 390 tons of coal are burned at the cement mill. Approximately 19 tons of gypsum are required to regulate the setting time of the material. To get the cement shipped from the mill over 15,600 cloth cement sacks are needed —approximately 15 bales of cotton must be woven into cloth to make these sacks. In the cement quarries about 450 pounds of dynamite were shot off in blasting loose the raw material for making the cement.

For the mile of pavement, 42 cars of sand, 65 cars of stone and 20 cars of cement are used—127 cars for the basic materials.

When it is considered that the equivalent of over 7,000 miles of 18-foot concrete pavements were placed under contract during the past year, the magnitude of the transportation involved can be realized. More than 800,000 freight cars are needed to transport the cement, sand and gravel for this construction.

The one-handed driver faces two dangers: arrest and matrimony.

A hog can't root and squeal at the same time. Likewise a man.

Report on State Road Progress

(Continued on page 4)

our Legislature. There is one item that I cannot refrain from again calling to your attention, and that is the necessity for legislative action toward imposing a fair and reasonable tax on commercialized highway motor transportation companies—those using our highways for revenue without paying their proportionate costs for the use of the facilities provided by public funds. Are we so affluent that we can afford to donate to these companies? I know this is an unpopular subject, but I believe the principle is right, and should again be considered by this Association with a view to obtaining results in the next session of the Legislature.

Being the administrative officer—and I might say, in the final analysis, the "goat"—of the Highway Department, my attention is called to certain complaints that come to me (not direct, but in a roundabout way) from this or that person, sometimes a County Commissioner and sometimes just an ordinary man. I don't object to the complaints, for they are sure to come; but I do object to the way they reach me, and I want to say to you gentlemen that when something appears to be wrong, if you will only come in person, or write, full explanation will be given. If we are wrong, then we will try to right such conditions; from such conferences, only, can mutual help come. But when these complaints come third- or fourth-handed, we dont get anywhere. Gentlemen, our books and records are open to you at all times, and are kept with such detail and such accuracy that the average layman can readily get the information desired—thanks to a subdivision of the Highway Department officered and manned by an accounting force superior to any other in the state, bar none. A cordial invitation is extended you to come and see us and straighten out what oftentimes may prove to be imaginary wrongs.

In conclusion, gentlemen, I wish to express my appreciation for your help and co-operation in our joint activities during the past year, and for your patient attention to my report; but before closing I wish to refer to a matter that has been broadcasted among the Commissioners, and that is, the criticisms directed toward the bridge designs and plans of the Department as conveyed to you by means of anonymous communications.

After very mature consideration, covering investigations of types in use by other states where years of experience have taught the proper bridge requirements for present traffic and for future traffic, and being further influenced by the approved types of the American Association of State Highway Officials and their engineers, and by the standards of the U. S. Bureau of Public Roads, we believe that the bridge standards of the Colorado State Highway Department are serving the best interests of our taxpayers. We are not alone trying to build for the traffic of today, but for the estimated probable traffic that may accrue during the life of the bridge. We believe, fundamentally, that in our bridge construction the element of permanent foundation is of primary importance; and that even though the superstructure may deteriorate and have to be replaced, at least the foundation upon which it rests should be of permanent construction.

Appreciating the responsibility that rests with me in performing the duties of my office, I can state to you that it is not my judgment alone, or even combined with that of our bridge-designing force, that permits me to advise you that our designs are acceptable; but we are fortified with the expert opinions of eminent highway bridge designers and constructers of national reputation, who have made a careful study of our plans and specifications.

You gentlemen appreciate, of course, that types and standards are subject to modifications influenced by present and future traffic conditions, and further modified as between primary, secondary, and less important roads.

Gentlemen, as long as I am your State Highway Engineer I shall continue to strive for permanency in the construction of our more important bridges; and will not sacrifice quality for cheapness, and try to "gyp" you into the belief that economies are thereby effected.

(Address delivered at the County Commissioners' meeting, Denver, January 22.)

EXTENDING HARD SURFACE HIGHWAYS

The State of Michigan has recently awarded a contract for building an eight-mile stretch of asphaltic concrete road.

It has been considering a type of road paving which would allow the greatest salvage on 3,500 miles of gravel roads now in use in the state.

By covering the existing 6-inch gravel base with a 5-inch coating of asphaltic concrete, the State Highway Department was able to save $4,000 a mile in initial cost and maintenance expense.

If road paving programs are to go ahead and every section of a state receive its share of road funds, highway officials are coming to understand that old pavements and solid gravel and macadam roads are worth from $4,000 to $10,000 a mile as the base for an asphaltic concrete wearing surface.

It is a crime against the taxpayer to tear up such old road construction when it can be utilized as the base of a new paved highway.—Fort Collins Courier.

Better be a minute late at the crossing than ten years or more ahead of time at the Pearly Gates.

Commissioners Propose High Truck Tax

(Continued from page 9)

some equitable and just ton mile and passenger mile basis.

"Whereas, it is desirable that full harmony shall prevail between the State Highway Department of Colorado and the Boards of County Commissioners of the several counties of the state, and

"Whereas, such harmony can be best secured by a thorough understanding of each proposed project or each project under consideration, being had by all concerned, and

"Whereas, the lack of such understanding tends to friction and absence of cooperation, which, if allowed to continue, will seriously hamper the highway development of our state; and

"Whereas the County Commissioners of the various counties of Colorado have been assisted and benefited materially by the State Highway Department in most instances in the solution of their various road problems:

"Now, therefore, be it resolved, that the State Highway Department be requested to discuss each project with the Commissioners affected before letting the contract and especially in cases where the project under consideration has not been previously recommended by such boards.

"Be it further resolved that we express our appreciation for the support and cooperation received from the Highway Department, and re-affirm our faith in its efficiency and integrity."

Members of the resolutions committee were: James E. Beckley, Geo. R. Sellers, John I. Palmer, F. E. Baxter, Milton R. Welch, V. H. Johnson and W. L. Rees.

The convention also passed a resolution recommending that the various counties of the state co-operate with the City of Denver and the Denver Tourist Bureau in placing of county exhibits in the "Hall of Nations" at Overland Park during the summer tourist season.

President Shy appointed a committee composed of E. B. Hill, of Boulder; H. B. Tiffany, of Brighton, and William Bartells, of Colorado Springs, to cooperate with the Denver officials in arranging the various exhibits. The space in the building at Overland Park is donated to the counties free of charge, the only expense to the counties being that of collecting and installing the exhibits.

This action was taken by the commissioners following an address by Harry N. Burhans, executive secretary of the Denver Tourist Bureau, who explained the plan in detail. During the summer months thousands of people from all over the world camp in Overland Park.

At the close of the sessions J. W. Shy was re-elected president of the organization. J. E. Beckley of Delta was elected first vice-president; William L. Rees, Pueblo, second vice-president; F. J. Hartman, Montrose, third vice-president; and T. W. Monell, re-elected secretary-treasurer.

These officers comprise the executive committee of the association. Tentative arrangements were made to hold the next annual meeting in Denver during the Stock Show.

WORK ON PUEBLO CONSERVANCY PROJECT STARTED WITH BIG FORCE OF MEN

Bids on work estimated to cost $3,500,000 were opened by the Pueblo Conservancy on January 15. There were 173 bidders on the work.

Successful bidders on the various units into which the work has ben sub-divided are as follows: Platt Rogers & C. S. Lambie, Denver; Cole Brothers, Green ay, Wis.; A. S. Hall & Son, Colorado Springs; Sallee & Sallee, Pueblo; Virginia Bridge & Iron Co., Denver; Storbel Steel Const. Co., Chicago; Mt. Vernon Bridge Co., Mt. Vernon, Ohio; Pueblo Bridge & Const. Co., Pueblo; P. C. Croll, Pueblo, and William Olsen & Sons and John Olsen.

Work on the first unit of the project has already been started by Arthur & Allen, Pueblo, under a sub-contract with Rogers & Lambie. This work involves 125,000 yards of excavation.

Unit No. 2 has been sublet to B. T. Strange, Pueblo, by Rogers & Lambie. This phase of the work calls for monolithic slope paving.

The certified checks accompanying the bids totalled over $500,000.

It is estimated that three years will be required to finish the entire project.

D. Kirk Shaw has been re-appointed road supervisor of Rio Blanco county for the year 1924. Efficient management of the country's road forces by Shaw during the past year was the reason for the board's action.

Pueblo to Construct Modern Road on Inspiration Point

BY RALPH C. TAYLOR
Staff Correspondent

A seven-mile boulevard will be built from Pueblo to Liberty Point as a short inspirational drive. The late Governor Alva Adams, thrice governor of Colorado, appropriated $5,000 in his will to be used in building such a boulevard. The first move to be taken to start such a highway was made by the Sons of the American Revolution who acquired a plot of ground 7 miles west of Pueblo which they have dedicated as "Liberty Point."

"Liberty Point" is located on top of a high cliff overlooking the Arkansas River where the flood protection dam will be built. The point is the highest in a wide territory and from its peak may be seen the Spanish Peaks to the south, the Greenhorn, Wet Mountains and Sangre de Cristo ranges to the west, and the Pike's Peak range to the north. A wonderful panorama of 150 miles of mountains is visible, including the San Isabel National Forest. All of Pueblo can be seen from the point.

Great stretches of the state highways entering Pueblo may be seen from the point which is connected with rich romance of early days. At present the point is reached by a road leading off the main Pueblo-Canon City Highway.

RUSH WORK ON LAFAYETTE ROAD

Two of the longest culverts ever installed on a Colorado road have been placed on the new concrete pavement project north of Broomfield over Goodhue Hill. These are 122 ft. long and have been installed under the huge fill which eliminates the horse shoe turn on top of the hill.

About 10,000 yards of the grading has been completed by Monaghan & Cunningham on the project under a sub-contract with R. M. Larsen, according to B. T. Miller, resident engineer. Larsen is pouring the concrete abutments. He will also start pouring cement on the pavement with the first break of spring.

This is a Federal Aid Project and will carry the pavement north of Broomfield to a point a short distance south of Lafayette.

SIX GRADERS FOR MAINTENANCE

To furnish power for the six Adams graders recently purchased, the commissioners of Las Animas county purchased two small tractors last month. These purchases were made in order to carry out the maintenance road construction activities planned by the county next summer, according to the commissioners. Las Animas is one of the largest counties in the state in point of area and has several important roads radiating from Trinidad, the county seat, which must be patrolled constantly in order to keep them in shape for the heavy traffic.

"VANISHING TRAILS OF ROMANCE" TELLS HISTORIC TRADITIONS OF COLORADO.

"Vanishing Trails of Romance" is the title of a new book filled with delightful romances and legendry and historic traditions and incidents woven about scenic spots in Colorado, written by Warren E. Boyer, publicity director of the Denver Tourist Bureau.

The work has just been placed on the book market. In this work Mr. Boyer presents in a new way many enchanting sidelights on the state's progress. It should find wide popularity, because the stories have all the essentials of present-day fiction, yet each has something characteristic of the Indian tribes of Colorado, the anticipation of the gold seekers and the adventure of cattlemen and pioneer settlers.

EQUIPMENT NEWS

Some low-out, we'd say—that Hardesty banquet. Nothing to equal it hereabouts in a long time—maybe never before, at least in our time.

Pat and his gang certainly did themselves proud. Clean, high-class, dignified entertainment, every it of it. And, the only thing that prevented everyone from throwing their hats in the air, when Dan Straight proposed three rousing cheers, was that they were all left in the check room.

To stage such an entertainment takes a strong heart and a flush pocketbook—nothing else, but. And due credit must be given the Hardesty organization, from Rudd Hardesty on down the line, for having all of that.

T. J. (Pat) Patterson was the chief "offender," and every member of his sales force were right on the job every second of the time.

Covers were laid for 1500. uests included state, county and city officials, friends of the Hardesty organization and their wives and swethearts. It was a great entertainment—such as only big, smiling, whole-hearted, "Pat" could conceive and put across.

It was the big, bright spot of the county commissioners convention and will remain long in the memory of all who attended.

A new trench pull-shovel is announced by the Northwest Engineering Co. Bulletins on this new machine are now being distributed by Searns-Rogers Mfg. Co. It is designed especially for sewer digging.

The Novo Engine Co. has just issued a new bulletin, No. 184, on their single cylinder engines.

A Keystone ditcher scoop has been purchased by the Lock oint Pipe Co. for use on four miles of work for the Denver Water Works.

Harold W. Moore, head of a Denver equipment concern, has suggested to the county commissioners of Colorado, that they bring their road supervisors to their district metings for the purpose of discussing the care and upkeep of road machinery.

If the suggestion meets with favor among the county officials, Mr. Moore says that the equipment dealers will send their service men to the district meetings to discuss problems on equipment and the operation of machinery in the counties with the road supervisors.

A big saving in time and money to the taxpayers of the state should result from such discussions, Mr. Moore said.

Thomas J. Fair, has just returned from Indianapolis, where he attended the funeral of J. D. Adams, head of the firm of J. D. Adams & Co. Mr. Fair was closely associnated with the grader manufacturer for fifteen years, having sold the first Adams grader in Colorado.

Sauerman Bros. have just issued a new pamphlet (No. 22) on slackline cableway excavators, describing their design and construction, with various uses and advantages. These are now being sent out by Herbert N. Steinbarger, Denver distributor. Users of these outfits in this territory include the Fountain Sand & Gravel Co. of Puelo, and J. E. Irvine of Green River, Wyo.

Paul Fitzgerald, Denver representative of Landes & Co., sales agents for P. & H. products, reports the sale of a dragline during the past month to Arvid Olsen, Denver contractor.

Circular No. 237 issued by the Osgood Company shows various to which Osgood material handling equipment is being put in different sections of the country. During the year 1923 a total of thirty-four Osgoods were sold in the Rocky Mountain territory, according to Barney Miller, Denver representative.

Results of an interesting test on culvert materials has just een given out by the American Sheet & Tin Plate Co. The data is compiled in a pamphlet now being distributed by the Colorado Culvert & Flume Co. of Pueblo.

A new type concrete mixer mounted on rubber tired wheels adapted to city use is announced by the Koehring Company, acording to H. P. Wilson & Co., Colorado distributors. Several improvements on the Koehring heavy duty mixers and pavers also are announced in several new bulletins just issued.

Installation of the latest improved Barber-Greene coal conveyor was made by the Colorado Fuel & Iron Co. in its Denver yards during the past month. Several other Denver dealers have placed orders for like equipment since seeing the C. F. & I. machine in operation.

PROJECTS ADVERTISED FOR BIDS

Proj. No.	Location	Length	Type	Bids Opened
253-A	West of Steamboat Springs	6.506 mi.	Gravel Surface	Feb. 7, 1924
256-B	Merino, northeast	2.083 mi.	Pavement	Feb. 7, 1924
811	East of La Jara, over Rio Grande Del Norte River	200 ft. span	Steel Truss Bridge	Feb. 14, 1924
243	Piedra, between Bayfield and Pagosa Springs	1.61 mi	Gravel Surface	Feb. 19, 1924
226-C	Pav. Div. 2, northeast of Platteville	6.335 mi.	Pavement	Feb. 19, 1924

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

Proj. No.	Location	Length	Type
17-R	Husted	2.339 mi.	Pavement
116-B	Breed-Colorado Springs	0.892 mi.	Pavement and R. R. Grade Separation
248-A	Buena Vista-Salida	12.048 mi.	Graded and Gravel Surface
257	Between Denver and Brighton	0.282 mi.	Concrete Viaduct

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

Proj. No.	Location	Length	Type
116-C	North of Breed	3.22 mi.	Pavement
242	Grand Junction-Fruita	3.5 mi.	Gravel Surface
254-A	Hot Sulphur Springs, Byers Canon	1.5 mi.	Graded
255-B	Brush, west	2.9 mi.	Pavement
275	Between Wolhurst and Castle Rock	10. mi.	Pavement
283	Between Loveland and Berthoud	2.5 mi.	Pavement
904	Petersburg-Ft. Logan	1.9 mi.	Pavement and Steel Truss Bridge

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1923

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
2-R	Trinidad, north	3 mi.	Asphalt Pavemt.	Strange-Maguire Const. Co.	$121,934	5	2-B
71-B	Durango-Hesperus	3.6 mi.	Gravel Surf.	Peterson, Shirley & Gunther	61,556	67	71-B
81-A	Rifle Range-Vernon Canon	3.50 mi.	Crushed Rock	H. C. Lallier Constr. & Engr. Co.	37,264	100	81-A
102	Ouray-Red Mountain	1.06 mi.	Mtn. Grading	Johnson & Johnson	58,972	48	102
116-A	Colorado Springs paving	4.18 mi.	Conc. Paving	Standard Engr. & Constr. Co.	238,944	98	116-A
119-B	Cochetopa Pass	7.5 mi.	Grad. & Surf.	Girardet-Hotchkiss Engr. Co.	53,709	89	119-B
125	Sapinero-Cimarron	11.3 mi.	Grav. Surf.	Dale Hinman	36,797	43	125
125	Sapinero-Cimarron		Steel Bridge	Winterburn & Lumsden	53,072	40	125
135	Denver-Morrison	5.3 mi.	Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	22	135
157-B	Buena Vista-Leadville	4.20 mi.	Grading	J. V. Stryker Const. Co.	65,715	70	157-B
168-B	Lamar-Hasty	6.86 mi.	Gravel Surf.	Standard Engr. Co.	60,194	68	168-B
174	Red Mountain	3.03 mi.	Mtn. Grading	Pickering Bros.	82,071	84	174
190	Summit County Bridge and Road	1.45 mi.	Grad. & Bridge	Colo. Bridge & Constr. Co.	40,154	80	190
207	Dillon-Kremmling	100 ft.	Truss Bridge	Rogers & Pickard	28,831	15	207
208-C	Grand Junction-Palisade	4.75 mi.	Gravel Surf.	Northwestern Const. Co.	46,627.35	33	208-C
210-A	Grand Valley-DeBeque	5.30 mi.	Grav. Surf.	F. L. Hoffman	57,429	100	210-A
213-B	Durango-Hesperus	5.26 mi.	Grav. Surf.	J. Edd. Hansen	72,960	52	213-B
214	Durango-Bayfield	3 mi.	Gravel Surf.	Dale Hinman	53,411.05	46	214
221	Loveland, north	4.05 mi.	Conc. Paving	Fred C. Dreher Constr. Co.	142,125	98	221
222-C	Broomfield-Lafayette	2.82 mi.	Conc. Pavement	R. M. Larsen	134,933	5	222-C
223-A	Kremmling-Rabbit Ear	2.88 mi.	Grav. Surf.	Henry Shore	30,565	51	223-A
224	Morrison-Baileys	5 mi.	Grading	M. J. Kenney Const. Co.	59,781	23	224
225	Fitzsimons Hospital road	1.00 mi.	Bit. Paving	Miller, Douglas & Hanes	36,618	80	225
226-A	Brighton-Ft. Lupton	8.23 mi.	Conc. Paving	White & Johnson	241,133	95	226-A
226-B	Brighton-Greeley	2.86 mi.	Conc. Paving	White & Johnson	89,923	47	226-B
226-C	Platteville-Greeley	4.4 mi.	Conc. Paving	Engr. Constr. Corp.	120,114	28	226-C
229	Pueblo-Florence	1 mi.	Grav. Surf. & Bridge	H. M. Fox	34,646.50	62	229
230-A	Wolhurst, south	0.852 mi.	Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	3	230-A
230-B	Wolhurst, south	3.99 mi.	Conc. Pavement	Brodie & Anderson	153,971	11	230-B
231	Six Mile Creek Bridge	0.45 mi.	Steel Bridge	McCormick & Brockaway	25,165	83	231
240	Gypsum-Dotsero	5.185 mi.	Gravel Surf.	O. L. Hackett	66,178	19	240
241	Gunnison River, North of Delta	600 ft.	Steel Bridge	Winterburn & Lumsden	99,309	16	241
245-A	Las Animas-Hadley	4.54 mi.	Gravel Surf.	W. A. Colt & Son	42,786	38	245-A
246-R	East of Pueblo	2.537 mi.	Conc. Paving	R. A. White	78,431	12	246-A
255-A	Ft. Morgan-Brush	2.70 mi.	Conc. Paving	Colo. Bridge & Constr. Co.	85,763	47	255-A

Story of Mount Evans Road Survey

(Continued from page 11)

Then came the three-foot snow, and we were forced to chain and shovel out three miles of stakes in order to run our levels. We drove four-foot stakes at every hundred feet, that we might not lose them in the event of another deep snow. The weather moderated for a while, however, and we were able to make very good progress until we could no longer work advantageously from the sawmill; then moved our camp to a cabin over near the head of Elk Creek.

Beyond the Creek we located a switchback and dropped at an average grade of 4 per cent over the ridge into the Deer Creek Valley. Again we moved our camp; this time to the Royal Ranch, and continued our survey following the Deer Creek road for a greater portion of the way. After bucking snow drifts and encountering temperatures of 25 degrees below zero, we "tied in" our line to the Morrison-Bailey survey on January 13, 1924, having run 25 miles of location, with a maximum grade of 6 per cent, and dropping 5,000 feet in elevation.

This road, which has been named the Warren G. Harding Highway, will be free to everyone, and when completed will open to the world for all time a wonderland of rare scenic beauty, heretofore practically unknown to man—a worthy tribute to the memory of our late President.

Members of the surveying party at different times were E. E. Montgomery, special engineer; Drexel Lacey, chief of party; Homer Winters, intrument man; Jake Morrison, instrument man; Harold Mulnix, level man; Vernon J. Duke, rodman; Charles C. Royal, chainman; William Lentz, chainman, and Charles Balaz, chainman.

The owner of Two Buttes mountain in Colorado, a woman residing in Rocky Ford, has offered the Baca County stately buttes, elevation 4,716 feet, for sale. The mountain was acquired thru homesteading and in the early days was used by Indians to signal with beacon fires.

WHY WE SELL KEYSTONE COPPER STEEL KEYSTONE CULVERTS

BY THE

Tests - American Society for Testing Materials

(From Copyrighted Proceedings)

Comparing COPPER-BEARING with NON-Copper-Bearing SHEETS
PITTSBURGH, PA. - - - Exposure 5 years and 4 months

16 gauge sheets (1/16" thick) *ungalvanized*

(Same gauge as used in 12" to 24" culverts)

KEYSTONE Copper-Bearing Steel	52 sheets in test;	failures *NONE*
Other Copper-Bearing Steel	41 sheets in test;	failures *NONE*
Copper-Bearing Pure Iron	39 sheets in test;	failures *NONE*
NON-Copper-Bearing Steel	65 sheets in test;	40 failures—61.5%
GROUP "SS" *Pure Iron;*	14 sheets in test;	14 failures—100% (Complete failure at 3 years and 10 months)
Other Pure Iron	47 sheets in test;	34 failures—72.3%

22 gauge sheets (1/32" thick) *ungalvanized*

KEYSTONE Copper-Bearing Steel	46 sheets in test;	15 failures—32.6%
Other Copper-Bearing Steel	63 sheets in test;	58 failures—92.1%
Copper-Bearing Pure Iron	37 sheets in test;	37 failures—100% (Complete failure at 4 years and 4 months)
NON-Copper-Bearing Steel	42 sheets in test;	40 failures—95.2%
GROUP "S" *Pure Iron*	14 sheets in test;	14 failures—100% (Complete failure at 1 year and 10 months)
Other Pure Iron	28 sheets in test;	28 failures—100% (Complete failure at 3 years and 5 months)

The Colorado Culvert & Flume Co.

Pueblo — Makers of Keystone Culverts

THEY LAST LONGER AND COST LESS

Any Model C Buckeye Can Have this Cutting Range

This Model C-10 Buckeye, owned by the Orman Construction Co., cuts 10 ft. deep. Standard cutting widths are 20, 24 and 30 in.

This machine, when equipped with Rotary Auxiliary Cutter, will cut trench 20 to 44 in. wide. *Thus its range is increased 14 inches* at so little extra cost that it will be absorbed on the first job.

Similarly, the C-15 has a range of 24 to 60 in. and the C-20, 24 to 76 in. wide, when so equipped.

This great range of cutting widths plus Buckeye Quick Shift Conveyor, Oversize Power and Parts and Electric Steel Digging Chains are the reasons why Buckeyes *dig more trench at less cost. Let us show you.*

H. P. Wilson Company Seventeenth & Blake Sts.

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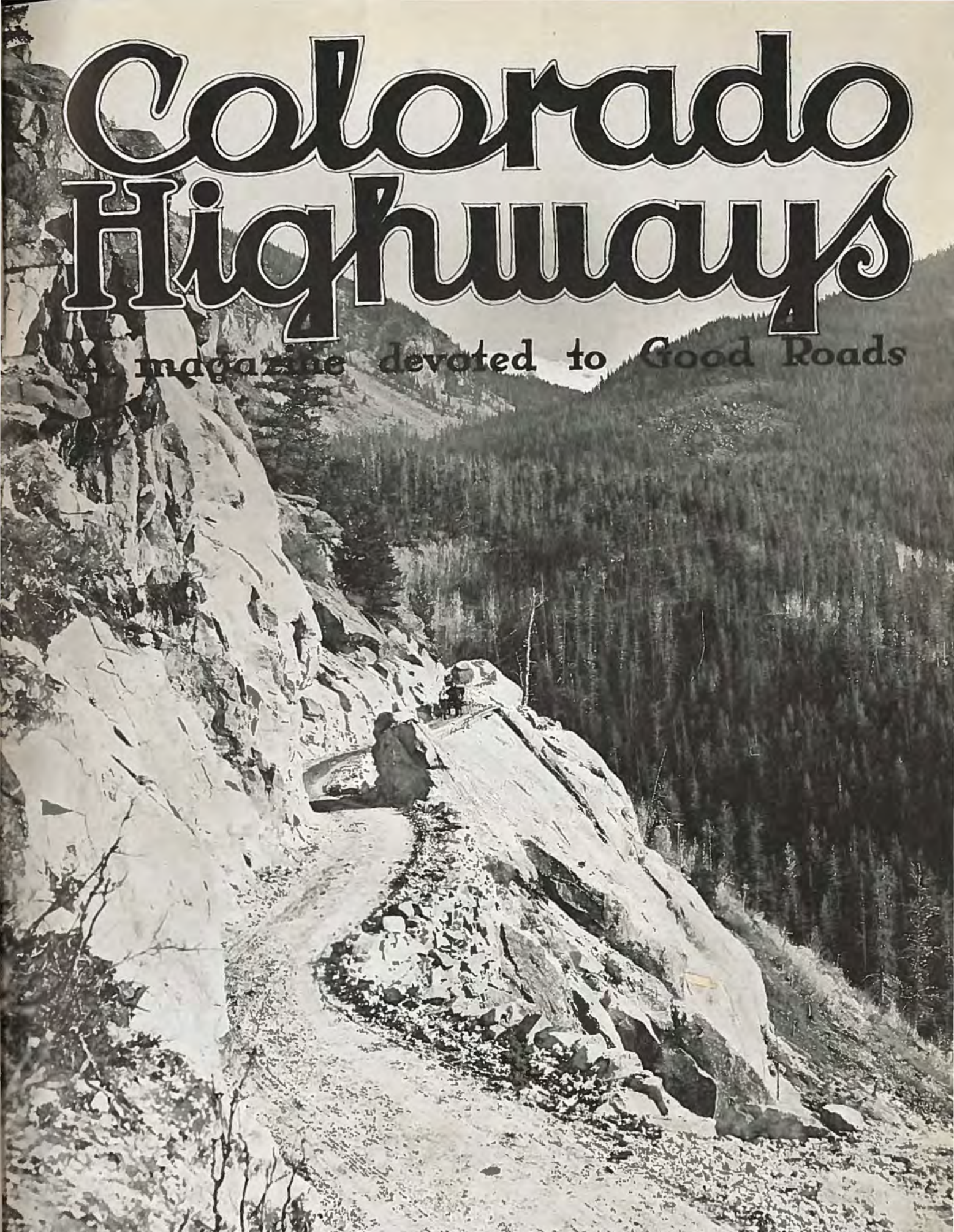

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THE LOW BIDDER IS ESSENTIALLY THE CONTRACTOR WITH SUITABLE EQUIPMENT—NOT NECESSARILY HEAVY, COSTLY EQUIPMENT, BUT EQUIPMENT "BUILT TO FIT THE JOB."

Whether your work calls for a walking dredge, a track type dredge, a floating dredge, or a gravel loader and clay excavator, there is a BAY CITY built to your requirements. Light, but strongly constructed of steel, each BAY CITY is easily dismantled, transported and reassembled. Oil-burning engine insures ample power at low operating cost.

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Efficiently takes care of light excavation work, small tile trenches and ditches, loading or digging clay, sand or gravel, and stripping. This sturdy little machine displaces a dozen men, and soon pays for itself where the volume of work does not warrant installation of heavy or costly equipment.

Contractors all over the country are enthusiastic over the BAY CITY because it fills the increasing demand for strong, light weight, easily portable, economically operated and efficient dredge and crane equipment.

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Which model BAY CITY is "Built to Fit Your Job?" Our Engineering Department will help you to decide.

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Colorado Highways

"BETTER ROADS"

Official Publication of the
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

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M. W. BENNETT, Editor.

Articles on the subject of road building and highway development in the West are solicited. Manuscripts should be addressed to the Editor, with return postage. Photographs should accompany articles whenever possible. Manuscripts not found available will be returned promptly.

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Independence Pass! Two words to conjure with in the motorist world. On the cover of the March issue of Colorado Highways is found a splendid view of this remarkable mountain highway. During the coming summer a large sum of money will be spent by the U. S. Forest Service in co-operation with the State Highway Department in opening this road to Aspen, Colo., one of the picturesque mining towns of the state. Until the road over Independence Pass was constructed the wilds of this region were largely unknown to the general public. Towering peaks, bold but weird, fantastically shaped rocks and everlasting snow fields add to the interest of the traveler.

Photo by courtesy of U. S. Forest Service.

Colorado Highways
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Cost of Highway Engineering

BY C. L. CHATFIELD.
Member of the Colorado Society of Engineers.

FIRST of all, is an engineer necessary at all in the construction of roads and bridges? As to bridges, that is easily answered in the affirmative without fear of contradiction. Who among us are willing to risk life and limb on a bridge that was not designed, the stresses computed and construction supervised by an engineer? Only those who are non compos mentas.

Since roads themselves are built on the ground and the safety factor in traveling them ordinarily is controlled by the rate of speed of travel, the necessity for engineering devolves itself into a question of cost. Cost or price that can be economically paid is contingent on dividends received, the same as in the purchase of stocks and bonds. Dividends are saving in cost of travel and transportation, whether for business or pleasure, and saving in cost may again be subdivided into component parts. This will not be attempted inasmuch as some of these elements are indeterminable.

The simon pure subject of engineering costs cannot be strictly adhered to, as it is necessary to browse a little first into the justification for any expense whatsoever before the proper economic cost can be reached.

Experiments have been conducted along the lines of resistance to traffic of various types of roads and gasoline consumption, and inasmuch as positive conclusions may be drawn from them, it is logical that parallel results are obtained in all other elements.

The following sets forth results of tests conducted by the University of California in resistance to loads over various types of roads:

PULL IN POUNDS PER TON.
Trucks and Teams.

Type of Road.	Pull in Pounds per Ton.
Concrete, Excellent	27.6
" "	30.0
" ⅜ in. surface asphaltic oil and screenings, Excellent.	49.2
" Excellent	51.6
Macadam, water bound, Excellent	64.3
Concrete base, 1½ in. Topeka top, Excellent	68.5
Gravel, compact, good	75.0
Oil Macadam, Good	78.2
Oil Macadam, Good	81.3
Gravel, packed	82.3
Plank, Topeka top—soft, Good	88.3
Earth, firm 1½ in. fine loose dirt	92.0
Plank, Topeka top—soft	92.6
Earth, dirt ¾ to 2 in.	99.3
" mud, stiff, firm underneath	218.0
Gravel, loose, not packed	263.0

These tests tell a tale of enormous loss in power on certain types of road that the average citizen finds hard to realize. In so many words, it requires about 2 times the power to transport the same load over macadam as concrete; 2½ times the power on gravel or earth road; 5½ times the power in mud with firm bottom; 6½ times in loose gravel, and if no bottom exists you may conjecture.

Chimney Rock as seen from State Road No. 10 in Archuleta county.

The White Company of Cleveland, Ohio, in co-operation with the Portland Cement Association conducted experiments to determine the relative quantity of gas per mile used by trucks on various types of roads. The results set forth in the following require no explanation.

Type of Road	Miles Per Gal.	Relation to Concrete Per Cent
Concrete	11.78	100
Good brick	11.44	97
Fair brick	9.88	84
Fair bituminous macadam	9.48	81
Good gravel	9.39	80
Fair gravel	7.19	61
Earth	5.78	49

Piling up the evidence, Iowa State College at Ames, Iowa, states that if a certain car can travel 14 miles on a gallon of gas on a dirt road, that the same amount of gas will propel it 21 miles on macadamized or gravel surface and 31 miles on concrete. Most of us believe that increased mileage per gallon of gas is due almost entirely to increased efficiency of motor in autos now manufactured over the olden type, but such is not the case. It is partly chargeable to that and the fact that automobiles are now almost fool proof, but the devil must have his due by conceding much to better and higher types of road construction.

We now know that good roads are essential and desirable; that the automobile has accelerated the demand and that they pay dividends, but that we are going to have them, come what may. The only question is, are we paying more than a legitimate charge?

The rose has been pinned on the engineer inasmuch as construction costs are held to a low level by competition, the contractor exonerated.

Drainage is the basic feature in good roads of whatever type, as neither foundation nor surface, no matter how good, will stand the gaff if wet and subjected to freezing and thawing. Drainage comes within the engineer's province. There are a few wiseacres who believe that an appendix can be removed by a blacksmith (and it can, but not successfully) who would try to convince you that correct drainage is not a science. Railroad companies constructing and operating thousands of miles of railroad never construct one foot of line even on the prairie land apparently without the slightest wrinkle but what a careful engineering investigation is made. Profiles are run; cross-sections made and yardage estimated; drainage areas above the tracts carefully determined; possible run-off estimated and culvert and bridge areas fixed, allowing a safety factor to carry maximum floods. The entire line is drained and cross-drained. Construction is superintended by engineers who check yardage of all earth moved, not only as to quantity and quality, but also to see that it is obtained from and deposited in the proper place and at proper elevations. In fills allowance must be made for shrinkage.

At times the foundation for a fill or embankment is found to be such that it will not support the fill weight. Piling must then be driven or other arrangement suitable for the occasion made.

Again, cut and fill must be balanced as nearly as physical conditions will permit or excess yardage will be handled, resulting in waste of money. This brings to mind one instance alone on a road contract where a saving of ten thousand dol-

lars, several times the cost of proper engineering location and supervision, would have been saved if the cut had been adjusted to the fill and yet as good a location and grade obtained.

If fills, superimposed by hard surfacing, are not correctly placed, compacted and settled, uneven settlement will occur, resulting in fracturing and breaking up of the surfacing. Even on macadamized roads a rough, bumpy, uneven surface will obtain.

It is not always the first cost that controls in economy of road construction. Maintenance charges are of paramount importance and will run higher on an improper than a properly constructed job. "What comes after the purchased price?"

Every bit of concrete aggregate, viz.: sand, gravel, rock, reinforcing and cement, is carefully tested before using to determine its suitability in obtaining necessary strength of concrete. Failure of structures, buildings, bridges, retaining walls, etc., have occurred heretofore from improper design or the combination and use of improper materials, with a resultant loss of life and hundreds of thousands of dollars, and will occur again. Therefore, any legitimate cost of engineering obviating such occurrences is warranted and economical.

If railroad companies, after years of experience in such matters, consider that money well spent in engineering is well invested and that it results in a saving in cost and loss of life, who then among laymen—men with no experience in such matters—are qualified to say that engineering on our roads is not necessary and that full value is not received for any necessary money expended?

We all know or should know that if it were not for the interest that the Federal Government is taking in the construction of a primary road system throughout the nation that the program would be delayed beyond conjecture. Further, it is a known fact that our Highway Department was seriously hampered on account of lack of funds and the real work was never commenced until this co-operation was effected.

A synopsis of the Federal Aid arrangement and related data follows:

Area of State.....	103,948.00 sq. miles
Area of unappropriated lands.....	12,734.78 sq. miles
Ratio u n appropriated lands to area State.	12.25%

Federal Aid participation 50% of cost per mile up to a maximum of $32,500 per mile plus one-half of the per cent relation of the unappropriated or public lands of the state to its total area, or a total of 56.12% of total cost within the maximum.

Total highways of State.....	48,000 miles
Total highways designated as State	8,921 miles
Total highways designated for Federal Aid (7%).....	3,360 miles

In addition to the above restriction the State was required to designate, to be approved by the U. S. Bureau of Public Roads, a definite system of main highways or arteries that would dovetail with the interstate system, but were limited to a maximum of 7% of the total highway mileage of the State. This system has been designated and approved.

All other work handled by the State Highway comes under two classifications, viz.: State Projects and County Bond Projects.

View of State Road No. 4 from Red Cliff looking toward Tennessee Pass.

Under Federal Aid the State makes all surveys and plans, but these plans must be approved by the U. S. Bureau of Public Roads. That Bureau, a branch of the Department of Agriculture, has laid down rules and regulations based on nation-wide experience, which must be followed or no aid is given. Its methods might, in part, appear to the uninitiated to include burdensome obligations, but in actual practice are found to be generally so satisfactory by the State Highway Department that they have been for the most part adopted.

The following will give an idea of what has already been accomplished:

Federal Aid Projects Completed.	Miles.	Av. Cost Per Mile.
Concrete pavement.....	99,849	$37,651.21
Gravel, crushed rock and sand clay.....	291,210	11,253.10
Graded, including mountain work.....	135,048	13,088.38
3 bridges (other than the 82 included in the above types).....	149	1,405,384.76
Total	526,256	b17,127.43

(a) Average means little. Cost of three bridges total $209,402.23.

(b) Average cost per mile including bridges.

Total cost of the above.....$9,013,414.04

State Projects Completed.		
Surfaced	707,731	1,062.99
Graded and drained.....	330,201	2,759.35
Pavement	1,992	7,930.85
46 bridges other than included in the above.....	.....	.....
	1,039,924	a1,832.30

(a) Includes all bridges.

Total cost including all bridges..$1,905,457.30

Note—All concrete paving done under Federal Aid. The only strictly State work is less than two miles to fill in gaps, in 3 places, between Federal Aid and towns.

County Bond projects cannot be reliably tabulated as to totals (mileage and cost) inasmuch as some of the work was done before the present State and Federal Aid Systems were worked out and the data would have to be supplied by referring to County records. However, the cost to the State is accurately kept by a comprehensive system, as it is also on Federal Aid and State alone.

From this system it has been found possible to obtain the following definite figures for the fiscal year ending November 30, 1922. Nineteen hundred twenty-three books were not closed at writing, but, judging by preliminary data, the figures will follow those for the year 1922 close enough for all practical purposes.

STATE HIGHWAY DEPARTMENT

Per cent of engineering costs to construction expenditures for year ending November 30, 1922.

Project.	Per Cent of Total Project.	Per Cent of Total Construction Expenditures.
Federal Aid Projects—		
Preliminary Engineering	2.25	
Construction Engineering	5.89	
Construction	91.86	47.58
Total	100.00	
State Projects—		
Preliminary Engineering	0.30	
Construction Engineering	5.57	
Construction	94.13	22.12
Total	100.00	
County Bond Projects (a)—		
Construction Engineering	2.62	
Construction	97.38	28.54
Total	100.00	
Administration—		
Engineering Administration	73.58	
Engineering Preliminary	26.42	1.76
Total	100.00	
		100.00
Preliminary Engineering...	1.60	
Construction Engineering..	6.08	
Total Engineering.....		7.68
Construction		92.32
Total		100.00

(a) Preliminary engineering done and paid for by county.

Note—Includes Administration but excludes road machinery and equipment and maintenance.

Note—Major portion of heavy and permanent work done under Federal Aid, demanding more engineering and compliance with Federal Aid requriements.

Percentages of all Disbursements of State Highway Department for fiscal year ending November 30, 1922.

Subdivision.	Per Cent.
Administration—All, General and Engineering	2.49
Road Machinery and Equipment (a)	2.32
Maintenance	10.50
Federal Aid Construction	41.02
State Projects	19.07
County Bond Projects	24.60
Total	100.00

(a) State is reimbursed for the expenditures by counties. Includes auto repairs.

The maintenance represents the proportion of State money spent on that class of work, but in dollars and cents the amount would have to be doubled, inasmuch as the counties do all maintenance work and are reimbursed by the State to the extent of 50 per cent.

A great deal of comment and discussion has been had on the relative merits and economy of concrete pavement and macadam surfacing. Greater economy of transportation on concrete has already been demonstrated, but there remains installation, replacement and maintenance costs to be considered.

For all practical purposes we may assume an average cost for concrete paving of $35,000 per mile and macadam $12,000 per mile, with an average life of 20 years for the former and 10 years for the latter.

The average cost of maintenance of concrete pavement for available years of record from 1915 to 1919 inclusive in New York, Illinois, Connecticut, Wisconsin, Maryland and Washington was $90 plus per mile per annum, and that on macadam in New York for years 1915 to 1917 inclusive $974 plus per annum, or 10.8 times as great. For greater convenience of discussion say $100 for concrete and $1,000 for macadam.

In the final analysis the 20-year period relative cost of concrete and macadam per mile is as follows:

	Concrete.	Macadam.
Initial cost	$35,000	$12.000
Replacement, 10 years	.....	12,000
Maintenance	2,000	20,000
Interest on investment, 6%	42,000	21,600
Interest on maintenance, 6%	1,200	12,000
Total, 20-year period.	$80,200	$77,600
Per annum	4,010	3,880

Concrete will, therefore, cost in total about $130 per annum per mile, or 3% more than macadam. Against this, 100% more load can be transported over concrete than macadam with the same horsepower, while the same amount of gas will transport an equal load about 25% farther. Quod erat demonstrandum.

Much has been said so far about costs, but very little about engineering costs alone. It has, however, been stated that economy in engineering costs is whatever it is necessary to legitimately pay in order to obtain the desired results, and that railroad companies never make a move in construction or maintenance before securing full engineering data, and then the move is made under engineering supervision. Railroad companies are "big business" and those interests never knowingly submit to waste.

State Highway figures given heretofore show that 7.68% of all construction and administration expenditures is chargeable to engineering. The administrative part of the work is in reality in the interest of engineering. Engineering is the business of that department. What business man but would be pleased to say that he could operate with as little as 25% overhead. Most of the time if he receives a 10% or 15% net return on his investment he is doing very well indeed. No attempt will be made to add the cost of maintenance and interest on the investment and maintenance, but if it were done the total would be well within the safety limit.

State Road No. 2 in Moffat county looking east toward Craig.

Included in the engineering costs are items that are not properly chargeable to work that has already been done, such as surveys and plans for future work and the legging and locating of material grounds such as sand, gravel and clay for future use. A knowledge of quantity and quality of pit run materials available all over the State is not only of inestimable value to the Highway Department in planning work and estimating costs, but also affects a saving in construction costs, as a contractor is able to figure his bid more closely when he knows what his material haul will be, what it will cost and what will be accepted as coming up to standard of specifications.

Not only is this pit run material tested, but laboratory tests of its physical qualities are made before any of it is permitted to be used. These records kept, as they are, are beyond value for present and future reference.

If this charge, which is productive of dividends in the future by reducing construction costs, were eliminated, it would reduce somewhat the present engineering percentage, but the saving would quickly be eaten up in future construction costs.

Taxpayers would not care to have bridges and pavement fail, or heavy, expensive early repairs or replacements necessary merely because a very little money is not spent in such work or in insuring that frozen material is not used or the contractor moves half the yardage he is paid for.

During a bad rainy season construction engineering costs increase in proportion to construction expenditures, because it is impossible to switch a crew from one job to another for every little shutdown on account of inclement weather, while at the same time construction, being only paid for as accomplished, each delay lessens the amounts paid contractor in a given period.

The U. S. Bureau of Public Roads is allowed a maximum of 2½% of construction cost for engineering on State work, when they having nothing whatever to do except pass on, revise and compromise on plans and make perhaps six or seven maintenance examinations during as many years, an allowance of 10% is made where they do all of the work. Under the latter category comes roads within National Forests and Parks. The State and U. S. Forest Service may co-operate in such cases by furnishing part of the money, but all engineering and supervision is handled by the Bureau of Public Roads.

In all carefully prepared estimates of costs for construction work, whether irrigation, drainage, power or other, it has been found necessary to add an engineering and contingent fund of from 15% to 25% of which engineering is at least 10%. In pre-war times when labor and materials had very little price fluctuation, the contingent portion of this fund could be reduced, as closer estimates were possible. Experience has demonstrated that this leeway is reasonable, and experience is the best teacher.

Last, but not least, the engineer is the taxpayer's official representative on the ground; first, to determine what should be done, then to see that it is done. He is the skilled employee who watches and safeguards the public interests to the end that no more material be moved than necessary; that no payment be made for material not moved or properly placed and that material and workmanship measure up to standard. He is disinterested as far as the contractor is concerned, and his professional reputation and success is at stake in all that he does.

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Boulder County Highways

BY C. H. VIVIAN.

IT IS not many years since "cussing the county commissioners" for abominable roads was one of the favorite all-year sports of Coloradoans. Comparatively few persons owned automobiles, but those few were usually people of means and influence whose growls caused some perturbation. They professed not to understand why dirt roads that had been built for slow-moving, steel-tired vehicles contained bumps and convolutions that jarred and vibrated their cars to the point of discomfort. The intervening years have seen remarkable developments, not alone in the roads but also in the automobiles. Longer wheel bases, longer springs, better-balanced suspension of bodies, improved tires and deeper upholstering have flattened out the irregularities that the well-meaning, hard-working county commissioners have failed to obliterate.

Boulder county has been fortunate during the transitory period in traffic in having as county commissioners men who stood unequivocably and flat-footed for good roads. When the great transformation in modes of travel came, they gave to complainants on road conditions the most effective answer that can be made—action. They set about to reconstruct their highway system to meet the new conditions. So well did they succeed that the present board members may spend an occasional day in their office at Boulder and actually feel secure from road "kicks." To say that they get no road complaints would not be literally true, but comparatively speaking it is correct. Five years ago the commissioners approached their office with the feeling that it would be best to throw their hats in the door and observe if the headpieces came hurtling back before having the intrepidity to make their entrance. Nine times out of ten there was waiting for them a delegation to see if something could not be done about this or that road.

Today you can travel Boulder county's 762 miles of roads without resorting to profanity, despite the fact that you will travel on concrete but 7.12 miles of the distance. Two hundred and eighteen miles are surfaced with sand or ashes, while 537 miles are classed merely as dirt roads.

Boulder county's road problem has been complicated somewhat by the fact that its nearly 800 square miles of area contains every variety of topography from sandy plains to precipitous mountain peaks. The foothills of the eastern front range cut the county almost in half, while the crest of the Continental divide forms the western boundary. Moreover, the surface soil found east of the foothills is mostly a sticky clay akin to gumbo. Roads have had to be built—not simply marked out.

Boulder Canon highway, leading to Nederland, famous during the war as a tungsten camp.

Despite these and other obstacles the road situation is the best in the history of the county. For the last two years the commissioners have even been able to shave a little off the tax levy for road purposes at a time when most boards were fighting an impulse to increase the rate. For half a dozen years a four-mill levy was in force, netting close to $200,000 for road purposes. This has been reduced until this year it calls for three and one-quarter mills, which will raise approximately $156,000.

The main artery of year-round travel is the Lincoln highway north and south, with its branch from Lafayette into Boulder, ten miles to the west. In summer months the entire system of mountain roads gets hard pounding, with traffic particularly heavy on the Boulder canon road and the North St. Vrain entrance to Rocky Mountain National park.

Approximately 130 miles of the total, or roughly seventeen per cent, are classed as state highways. These include the Lincoln highway from Broomfield north to the county line beyond Longmont, Arapahoe road into Boulder and up Boulder canon to Nederland, with an offshoot to Rollinsville on the south; the Longmont-Lyons highway and the North and South St. Vrain routes into Rocky Mountain National park; and the Boulder-Lyons road which skirts the base of the foothills.

The state highways which are in the valley are maintained by patrols stationed at convenient points. For maintenance of these roads, Boulder county and the State Highway Department this year have contracted to appropriate $27,000 each—a figure that is exceeded by no other state county, and equaled only by Weld. In the summer the patrol system is extended to the principal mountain roads. The maximum number of crews worked during the season of heaviest travel is seven.

The particular pride of the Boulder county commissioners is the newly completed South St. Vrain highway, leading from Lyons to Raymonds, where it veers sharply to the north and crosses the hills to the south entrance of Rocky Mountain National park. It has been completed as far as the top of Stanley hill, just above Raymonds. Throughout its canon portion it is surfaced with from one to two feet of natural gravel from the disintegrated granite. It is maintained daily during the summer months, rendering it in boulevard condition. In fact, it is so tempting to automobile drivers that a traffic officer is dispatched there at intervals to allay superfluous pressure upon the accelerators. The road is eighteen feet wide, has a maximum of six per cent grade and follows one of the most scenic canons in the state. The

Rustic bridge in Gregory Canon, donated to Boulder county by W. L. Armstrong, Boulder citizen. Photos by H. P. Gerlach.

Stanley hill portion was constructed during the summer of 1923 on a special state appropriation of $14,000. The complete road was built at a cost of $100,000, being a model of economy. R. C. Cronin was in charge of a county crew during most of the project.

The Boulder canon road, built by convict labor at a cost of $87,000, is another favorite with motorists. It connects with the United States Forest Service road at Nederland, which crosses northward to Ward. From that town the traveler may descend to the plains on the water grade of Left Hand canon or continue to the north and connect with the South St. Vrain highway at Raymonds.

Maintenance costs in the mountains are low, owing to the better natural material and the comparative lightness of travel. Maintenance of valley roads has resulted in considerable experimentation with surfacing material which has led to the discovery of an ideal substance. This is the burned-over slack of the coal mine dumps that abound in the Lafayette-Louisville section. For want of a better name the material is termed "red ash," although it is more correctly a baked clay. Placed on the clay roads to a depth of six inches and rolled it forms a compact, even surface that packs well, does not become muddy and resists the high winds common to the section. Fifteen miles of this material now covers the roads and it is being used more each year. It can be economically handled by use of a steam shovel and a fleet of dump wagons hauled by a Holt ten-ton tractor. Its success has been such that neighboring counties are considering transporting it for their own use.

Boulder county's road program for 1924 is the largest in its history. The combined budgets of the county, state and Federal Aid projects and the United States Forest Service total $650,000. This is $20.40 per capita and half as much as the total to be paid by residents of the county in municipal, county, state and school taxes during the year.

Three hundred forty-two thousand dollars will go for nine miles of concrete paving. Eight miles of this will be on the Lincoln highway, leaving but five miles of that thoroughfare to be paved, and one mile will be laid on Arapahoe road into Boulder, which already has three miles of hard surfacing.

The county budget calls for $223,000 for construction and maintenance. The forest service will spend $51,000 on a six-mile standard road from Glacier lake to Rainbow lakes, opening up to motorists the glacier region which promises to become a paradise for tourists. The service also will build lesser roads in the same section at a cost of $18,000. A state appropriation of $16,000 for special work on the North St. Vrain highway and construction of two concrete bridges makes up the total.

Commissioners in charge of roads are Sanford D. Buster of Hygiene, chairman; E. B. Hill of Boulder and Guy Miller of Nederland. The latter is in charge of the mountain areas, while Buster and Hill divide the valley portions.

Road equipment is valued at $25,000 and includes two Holt ten ton tractors, thirteen trucks of from one to five tons capacities, a steam shovel, modern pile-driver, two rock crushers, an Austin-Western "Rip-Snorter," Galion "Big Buster," seven Havelock maintainers, twenty-five small blade maintainers of Adams, Austin-Western and Galion makes and numerous plows, scrapers and fresnos.

Portion of road leading to Flagstaff Mountain scenic highway west of Boulder. (Insert) Garage and machine shop, maintained at Boulder by Commissioner E. B. Hill for care of trucks and road equipment used in his district. The building formerly was a metal reduction plant and treated millions in gold, silver and tungsten ores during the county's heydey of mining. Boulder county commissioners—left to right, Guy Miller, Nederland; Chairman Sanford D. Buster, Hygiene, and E. B. Hill, Boulder.

In addition to the money accruing from direct tax on property, the estimated road revenue for 1924 contains the following items: Automobile licenses, $21,469; state gasoline tax, $3,848; miscellaneous, $3,850. The total from county sources is $185,967.

Commissioner Hill maintains at Boulder a garage and machine shop for care of the equipment used in his district. The plan has resulted in a saving, he reports.

The projected road to the east portal of the Moffat tunnel may traverse a portion of Boulder county. An old railroad grade up South Boulder canon above Eldorado Springs furnishes a two per cent grade for a considerable portion of the way. It connects in the valley with the Coal Creek road, a state highway.

Another proposed road to which the commissioners are giving thought is a foothills highway connecting Boulder with Golden, twenty miles to the south. Here again an old railroad grade could be used to advantage. Such a road would furnish another avenue of reaching Denver and fit in well with the network of scenic roads already existing, furnishing a connecting link with the Denver Mountain parks system.

The United States Bureau of Roads is engaged in a survey for a new mountain highway connecting Ward with Peaceful Valley, on the headwaters of the Middle St. Vrain. This will join with the Neder-

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Colorado Federal Aid Project No. 1

BY JAMES E. MALONEY,
Assistant Highway Engineer.

THE North and South road which starts at the Wyoming line south of Cheyenne, coming south to Fort Collins, Longmont, and passes through Denver to Castle Rock, Colorado Springs, Pueblo, Trinidad and over Raton Pass into New Mexico, is the heaviest traveled highway in Colorado.

During the past five years the traffic on this roadway has increased three-fold since the census of 1918. The past summer the Highway Department completed another census, when it was found that between Denver and Colorado Springs there is a minimum of 1,200 vehicles of classes a day, and at some points it runs as high as 3,500.

The first improvement made on the North and South road south of Denver was between Denver and Littleton. This was Federal Aid Project No. 1, and was built in 1918. This road was built 16 feet wide, with an average of 5¾ inch thickness. The next improvement was from the city limits of Littleton south for 2.7 miles. This was followed in 1921 by F. A. P. No. 130, which was for a distance of one mile. This brought the pavement just a short distance south of the Arapahoe county line.

As the first project was found to be too narrow and as the traffic had increased, particularly truck traffic, the last two projects were built 18 feet wide with an average thickness of 6¾ inches. These pavements are all built with an extra shoulder on each side, which is graveled, giving a total width of the top surface of 26 ft.

Two projects are now under construction south of Littleton, one from the end of the pavement at Wolhurst going under the D. & R. G. and Santa Fe railroads to a point one mile south, eliminating a very dangerous crossing. The construction of this mile is now under way by the Kinney Construction Company. From the end of this project south for four miles, another project has been contracted and the work is now in progress by Brodie and Anderson Construction Company.

This brings the improvement to a point about 1½ miles north of Gann. The 1924 program includes an appropriation of $400,000 to extend the pavement further south to a point about two miles north of Castle Rock. From the Colorado Springs end, work has been practically completed on F. A. P. No. 116-A, which runs north of the city limits a distance of 4.2 miles, ending at a point one-half mile south of Breed. Appropriations have been made and plans are now awaiting approval for the elimination of the present railroad crossing at Breed.

From thence north plans are now in progress to carry the pavement about 5.8 miles, thus making the pavement complete between Colorado Springs and Husted.

These projects are all of similar type, being cement concrete pavement, 18 ft. in width with a 4 ft. shoulder on each side. The bridges are designed on the minimum loading adopted by the Highway Department, which is ample for a 15-ton truck, plus an impact factor.

The completion of the contracts under way and to be let early in the spring will give a continuous pavement from Castle Rock to Denver, with all the accruing benefits which such a type of improvement will bring. The economy of a paved road as against a dirt or gravel surfaced road for this heavy volume of traffic, and a saving in the cost of transportation of this traffic might be figured along the following lines:

Dollar for dollar, the paved roads in Colorado return every cent invested in their construction and they pay in cash. The dependability, comfort and safety which are made a part of the road itself are added dividends.

Motorists can tell this instinctively. When a stretch of pavement is reached the motor relaxes and the speed picks up easily and without strain. You are burning less fuel, causing less wear on tires and on the car itself.

Experiments conducted at the Iowa State College, Ames, Iowa, show just how much this saving amounts to on a concrete road as compared with a gravel surface.

The relative ton-mile per gallon of gasoline was the basis for this test. A distance of twenty-one miles was obtained on a gravel road, while on pavement this amount was increased to thirty-one miles per gallon.

At an average price of 20c per gallon for gasoline, the fuel cost per ton-mile on the gravel road amounts to .0095c as against .0065c on the concrete highway, a difference of .003c per ton-mile in favor of the latter.

To show how these figures affect the motorist on any stretch that has been paved, scan the results of a traffic census taken on the Denver-to-Littleton highway. The daily traffic (3,764 vehicles) averaged 5,887 tons.

The saving of .003c per ton-mile for the pavement over the gravel road would result in a daily amount of $17.66, or a total of $61.99 for the 3.51 miles of paved roadway.

In a year, this saving on gasoline would amount to $22,316.40, and in five years, the period of time in which this road has been in service, a total of $111,582.00.

In addition, the average cost for maintaining a gravel road in Colorado amounts to $192.00 per mile per year. Mainte-

Elevating grader outfit moving dirt on State Road No.1, south of Lafayette, preparatory to laying pavement.

New steel highway bridge under construction on State Road No. 72, near Arvada in Jefferson county.

nance on the pavement has cost an average of $125.00 per mile per annum. Thus a saving of $1,176.00 should be added in favor of the paved road, increasing the total gain of the latter to $112,758.00 for the five-year period.

The following table offers an ultimate cost comparison between the two types of construction during the time in which this road has been in service:

Type	Initial Cost	Maintenance Cost	Fuel Cost	Total Cost
Gravel Surface	$10,000	$3,370	$353,358	$366,728
Concrete Surface	*59,022	2,194	241,794	303,010
Total difference in favor of the concrete road				$63,718

* One-half of this amount paid by U. S. Bureau of Public Roads.

These figures conclusively show that this section of pavement has not only paid for itself, but during this period has produced an asset to the state amounting to $4,696.00. It is safe to predict that this hard surfaced road will render at least 20 years additional service, which will further increase this asset to $18,800.

This amount of saving, if applied to the 8,000 miles of gravel roads in the state, would reach the tremendous total of $37,568,000 during a five-year period, or an average of $7,513,600 per annum.

But the saving does not stop here. Granting that it is easier on the car itself, if it can be driven on rutless, bumpless pavement, the life of the car's service is lengthened. Motor men say that the average car is good for five years. Paved roads would add at least a year to its life.

Mount Blanca and Old Baldy in Costilla county, as seen from State Road No. 10—gravel surfacing paid from Federal Aid Funds.

In Colorado there are 165,000 motor vehicles. If every car lasts five years, residents of the state must buy 33,000 new ones a year, and at an average cost of $800 per car, that means $26,400,000 spent. When we apply the year or more of life that pavement adds, we find that the huge sum of $5,280,000 could be saved in annual replacement costs for automobiles alone.

There has been some comment and speculation by various writers and self-styled economists on the great sums being spent for public improvements, particularly for paved roads and streets. It has been said that the country cannot afford these improvements on such a wholesale scale. The United States has manufactured, bought and now uses, more than 84 per cent of all the motor vehicles in the world.

These vehicles at present have to be provided with chassis, engine and tires designed for bad road and street conditions. Even with the present vehicle, it has been repeatedly demonstrated that the savings in operating costs effected by paved roads are considerably more than sufficient to pay off the annual principal and interest requirements on a paved road system.

If the country can afford to have thirteen million motor vehicles in service, it can well afford the cost of well paved roads and streets.

Tractor-grader outfit used on road construction in Alamosa county.

"Bill," said Henry, "I wancha to be very careful. Firs' thing y'know you'll have us in the ditch."

"Me?" said Bill, in astonishment. "Why, I thought you was driving."

Where is the automobile first mentioned in the Bible?

When Moses went up on high.

Mrs. McGowan across the hall was speaking of the trouble she'd been having with her car.

"But everybody has trouble lately," she said; "and it's nothing in the world but them using these raw materials at the factories."—Motor Life.

The Three Wise Men are: Stop, Look and Listen.—Georgia Highways.

Reconstructed steel bridge over Arkansas River east of Pueblo, erected with county funds.

How Pueblo County Saved Old Bridge

How counties can utilize parts of old bridges in the construction of new ones is found in the new highway structure over the Arkansas river on the outskirts of east Pueblo.

The bridge, almost 800 feet in length, is the longest bridge in southern Colorado. The two steel spans are connected by piling which will be replaced later by steel construction. The county funds for 1923 were not sufficient for the complete steel structure.

This new structure, which is known as the Stockyards bridge, is located a short distance east of the junction of the Arkansas and Fountain rivers.

In the foreground of the accompanying picture can be seen an unusual flood fence which was erected to confine the river to the wide channel. The span on the south end of the project, which is the one in the foreground of the view, is the salvage from the bridge which spanned the Arkansas until the flood of June 3, 1921, at the Santa Fe Avenue crossing.

The Arkansas river, berore the flood, was confined to a 165-foot channel under the north span, which is the one in the background in the accompanying photograph. After the flood the channel was changed and it was impossible for the county bridge crews to turn the river back to its old bed without a heavy expense, which would have been greater than the cost of the new bridge.

When funds become available the wood pile structure which now connects the two steel spans will be torn out and replaced with steel. Plans for the proposed additions already have been completed.

While of comparatively light construction, the new bridge is more than adequate to serve the present needs of traffic, according to engineers, and taking the gradual increases of the past few years as a basis, it should meet all requirements for at least fifteen years.

ROADS PRESENT AND TO COME.

Government interest in and contributions to good road building is unalloyed statesmanship. All government of an enlightened character now seeks to promote trade—to encourage and facilitate business in every legitimate way. Prosperity depends on business. Thrift and industry alone breed content, and a people can be contented only with full opportunity to thrive righteously.

Materialism is condemned by many idealists, but only on the material can spiritual growth occur. Things physical may not be neglected lest spiritual truth be obscured. Food, clothing and shelter are the first necessities. When they are secure the soul may revel in its finest manifestations, but hardly before. The man who devotes himself to spiritual things while his family goes hungry and ragged, is a fraud. The enemy of property, of profits, of wealth, is an enemy of all progress, because upon the business of the world rests all its good things.

Industry which produces wealth, and wealth which in turn affords opportunity for industry, are natural evolutions of creation. All intelligent men know how essential transportation is to business and to prosperity. Elimination of waste by good roads is a self-evident proposition, and if there is any one certain fact in the affairs of civilization, it is that our public roads from now on should be built to carry a vast traffic. Motor transportation grows to prodigious proportions, but the roads must come first. They are now to general business what power is to the factory, the building to the merchant, the courts to law—that is, the place where things can be accomplished.—Gallipolis (O.) Tribune.

Pioneers, O Pioneers!
Bring the wagon, yoke the steers,
Cast behind all doubts and fears!
Forward, through the waiting years!
Pioneers, O Pioneers!

'Tis your toil shall break the road;
'Tis your backs shall bear the load;
'Tis your souls must feel the goad!

Where ye sow shall others reap;
Others laugh where ye must weep;
But your deathless souls shall keep
Vigil through the waiting years,
Pioneers, O Pioneers!

You may not have your path through life strewn with flowers, but that doesn't keep you from planting a few on the highway for the other fellow.

Road News, Views and Gossip

Work of clearing snow from the roadway over the Blue mesa to Sapinero was started by Road Supervisor R. V. Berry and a maintenance crew on Feb. 20. Camp has been established at Halfway House. Equipment of the crew includes graders, scrapers, plows and other tools for fast work. From Sapinero to Gunnison the road is said to be in fine condition. It is expected that the Rainbow route via Montrose will be the first road open and in general use over the Continental divide. When the bridge at Sapinero is finished early in the summer this road will rank as one of the finest routes across the state.

U. S. Senator Thomas Sterling of South Dakota, chairman of the senate committee on postoffices and post roads, advocates a federal appropriation of $100,000,000 a year for ten years for road building in this country. He says a like amount should be spent by the states. Senator Sterling declares that this sum of money is needed if the country is to complete its system of 170,000 miles of highways within ten years.

"We must not forget that good roads built under this system serve even a higher use than that of the tourist," says Senator Sterling. "We must think of the commercial and economic advantages of a system of good roads; of what they mean to the farmer, who, on such roads and by means of the motor truck finds it easy and a great saving of time and expense to transport, not only his grain, but his hogs and sheep or cattle to market.

"Another consideration is the enhanced value of his land, due to the good roads at his very door or running nearby. One of our great economic and commercial problems is that of bringing the market and the producer closer together.

"I do not believe there should be the least hesitation about going forward with the program. The policy of federal aid highways has proved itself to be thoroughly sound and workable. Seven years of achievement, each year showing a greater result than the preceding, has removed the possibility of any doubt as to the wisdom of federal aid."

County Commissioner Buster of Boulder county has announced that six miles of the Springdale road west of Longmont will be gravel surfaced early this summer. This road was built many years ago and the gravel laid at that time has worn off.

D. J. Cox of Denver with a party of assistants is engaged in making surveys for the street paving in Canon City. Glenn W. Izett will be the engineer in charge of construction.

By an agreement made between the commissioners of Larimer county, the Greenland Ditch company and the town board of Berthoud, the way for paving State Road No. 1 west of Berthoud has been opened. Under the agreement a new right of way has been found for the irrigation ditch west of Berthoud. Cost of digging the new ditch will be paid for jointly by the county and the ditch company. Permission was granted the ditch company to locate the ditch on the road thirty years ago.

A. T. Hannett, chairman of the New Mexico State Highway Commission. has announced that $200,000 will be spent on improvements to the road between Gallup and the Navajo Indian reservation. This news is of great interest to the people of southwestern Colorado. Contracts for the work will be let in March or April.

Plans for a $40,000 concrete bridge over the Rock Island tracks north of the city limits of Colorado Springs on State Highway No. 1 are now being drafted by state highway engineers. About 600 feet of concrete approach also will be laid to the bridge. This will connect with the city asphalt paving.

Operating expenses of the state highway department during 1923 amounted to 3 per cent of the revenues; equipment cost 2 per cent and 95 per cent of the receipts of the department were expended in maintenance and construction work, according to a statement made by L. D. Blauvelt, state highway engineer.

Work on grading the Santa Fe trail one mile east of Rocky Ford, preparatory to the laying of another mile and a quarter of concrete paving has been started.

The Devil's Gap cut-off on the Canon City-Parkdale link of the Rainbow route has been thrown open to public travel. This piece of roadway was constructed by prison labor under the direction of Warden Tom Tynan, and is one of the most important road improvements made in Fremont county. It takes this division of the road out of the creek bed and lifts it from seventy-five to 100 feet up the hillside. It is approximately four miles in length and cost $20,000 to construct. There were two heavy fills to make on the new line, one of them requiring 7,000 cubic yards of stone and earth and the other 6,000 cubic yards.

An appropriation of $24,000 has been made by the U. S. Forestry Service for the construction of a road to Lake Brainard in the Ward district of Boulder county. Plans are said to be under way to start work on the Arapahoe Peak road early in the summer. This road will have its terminus at Rainbow lakes.

Boulder county will have $210,000 available for road improvements during 1924. This includes state, Federal Aid, U. S. Forestry and county funds.

Citizens of Paonia have subscribed $310 for the construction of a new road between Paonia and Glenwood Springs. Construction of this 12-mile strip of highway will bring Paonia 100 miles nearer to Denver. The road will run over McClure Pass.

It is expected that public travel will start on the Midland highway, which follows the abandoned Colorado Midland roadbed from Divide to Florissant and Lake George to Eleven-Mile Canon, thence to Howbert, about June 1, according to Ernest Montgomery, district engineer of the state highway department. The new road will eliminate the steep grades and rolling character of the present route, facilitating the trucking of products from the fertile South Park country.

An appropriation of $25,000 has been made by the state highway department for the improvement of the road between Cortez and Dolores. Also the sum of $10,000 has been set aside for the improvement of canon crossings on the Dove Creek highway, on State Road No. 10 in Dolores county.

During the past winter eighteen miles of highway in the west end of Adams county were gravel surfaced. Twenty-five teams and five trucks have been working for several weeks on the road from Henderson to East Lake. Farmers donated 20 per cent of the cost of the work, according to Commissioner H. G. Nunemaker. Two miles of graveling is planned near Berkeley.

Completion of the work in Byers canon, between Hot Sulphur Springs and Parshall, the most difficult mountain hill between Denver and the western slope by way of the Victory highway, will be eliminated. Plans for the project have been completed and the work should be started early this summer.

The arch of the Sapinero bridge across the Lake Fork river has been put in place. and riveters are now completing the structure. This is one of the highest structures in the state, being 153 ft. in length and 135 ft. above the waters of the Lake Fork. Winterburn & Lumsden, contractors, expect to complete the bridge early in the summer. Steel for the structure was furnished by the Minneapolis Bridge & Const. Co. A big celebration is planned by the citizens of Gunnison county at the opening of the bridge.

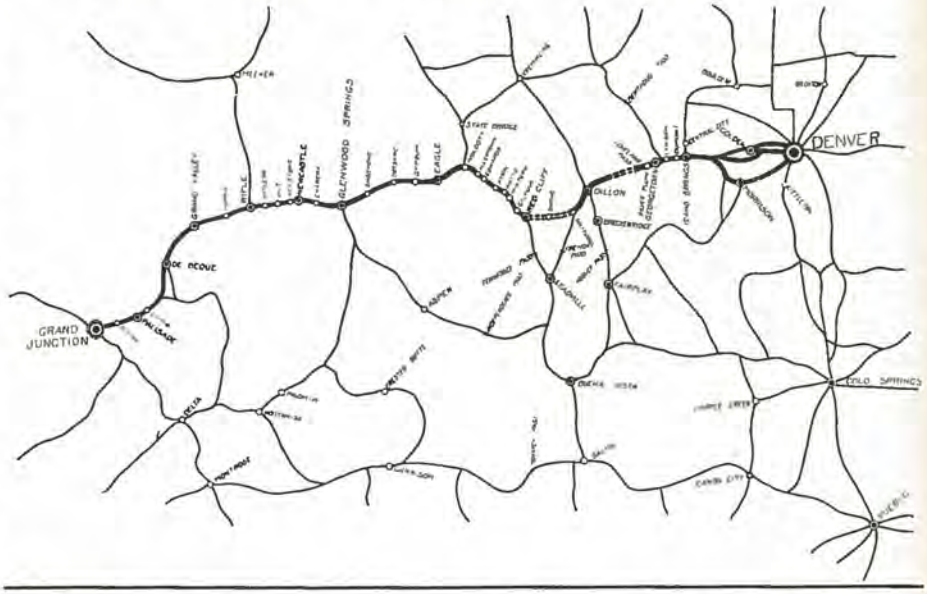
Boulder county road forces have started work of improving the North St. Vrain road north from Lyons, according to County Commissioner Guy Miller. Graders and other equipment are being used. A new bridge to eliminate the right-angle turns at Welch's ranch will be constructed. The road will also be widened at this point. The road from Stanley Hill to Allenspark will be widened by the county steam shovel this summer. Work on the South St. Vrain will not start until about June 1st.

Loveland Pass Highway Project

BY HERBERT G. ALTVATER.

A direct route from Denver to Grand Junction via the Holy Cross Trail looms as a reality by the early part of 1926, and part of this trail may be opened to auto travel this year. This new connection between Denver and the western slope follows the Victory Highway out of Denver to Lawson, above Idaho Springs, thence goes over the old Loveland Pass road, which was used in the early days of the west by stage coaches, to Dillon; then along unimproved county roads to Red Cliff, where it joins the Pikes Peak Ocean-to-Ocean Highway and follows it down the Eagle River canon; at Wolcott it joins the National Roosevelt Midland Trail, which it follows to Grand Junction. The road from Denver to Silver Plume is well known. During 1923, R. W. McQueary, the veteran builder of the Fall River road, has completed a road to a point near the top of Loveland Pass and with favorable conditions during the coming construction season this can be connected with a road into Dillon before fall. The U. S. Bureau of Public Roads has completed a survey between Dillon and Solitude, so that it is expected that work will begin on this stretch soon. From Solitude to Red Cliff is not yet open to auto traffic, but the U. S. Forest Service contemplates construction of parts of this stretch during the coming year. From Red Cliff the new quarter million dollar Battle Mountain road takes you almost to Minturn, and fair-to-middlin' roads carry you to Gypsum. A new project is soon to be completed between Gypsum and Dotsero, and from there an excellent highway takes you down the Colorado River canon to Glenwood Springs. Slow, but passable roads carry you from there on into Grand Junction, on which $270,000 is to be spent during the next two years by the State Highway Department and the federal government.

To the tourist this route is crowded with historic and scenic interest—going through Denver Mountain Parks, through the gold mining settlements, within sight of the loftiest and most magnificent mountains, through the proposed shrine where the Mount of the Holy Cross can be seen in its sublimity, and down the Colorado River canon to the fertile fruit lands below. In addition to its desirability for tourist travel this cut-off will put Denver within reach of the commercial centers of the western slope, which at the present time are so



detached by a natural barrier—the Rocky Mountains—as it reduces the distance to these points by about a hundred miles. Glenwood Springs can be made in a one-day trip by auto. Denver business houses will welcome the accessibility of western Colorado trade. It is even likely that this will provide a motor truck route by which the losses on fruit crops will be recovered.

KANSAS LEADS TOURISTS CARS REGISTERED IN COLORADO LAST YEAR

With the single exception of New Hampshire, every state in the Union was represented among automobilists who visited Colorado during the past year. Every other state, the District of Columbia, the Territory of Alaska, the Hawaiian Islands and Canada and Honduras were represented among the thousands who viewed the scenic wonders of the state and enjoyed its matchless climate.

Secretary of State Milliken kept a record of the guest license plates issued to visiting motorists during the year. This record furnishes some interesting information. It shows that altogether 12,349 visitors applied for and received guest plates. Figuring four persons to an automobile, this figure indicates about 50,000 visitors. As a matter of fact, the actual number of visitors who came to Colorado last year was much larger, because many visitors failed to apply for the guest license plates. Only those who spent some time in the state went through this formality.

Kansas leads all the states in number of visitors. The Sunflower State was represented by 2,511 machines. Oklahoma and Texas are next in order with 1,757 and 1,207 machines respectively. For many years Colorado has been the summer vacation ground for the well-to-do of the southwest, and the past summer was no exception. Nebraska, Iowa and Illinois also contributed a large share of the visitors.

JUST DRIVE ALONG.

We now have roads of various kinds,
To meet the needs of travel,
The concrete roads, and roads of stone,
And many miles of gravel.

But as for me, I would prefer,
That is, when out for pleasure,
The quiet ways, the wayside ways,
To explore at my leisure.

I love to shun the busy pike,
Where all is rush and hurry,
And drive the lanes, the grass-grown lanes,
Forgetting cares and worry.

Along the peaceful country side,
By woods and lakes and hollow,
To drive along, just slowly drive,
Where winding roads, lead—follow.

—Dick Hoffman.

Early in the spring work will be started on a paving project one mile south of Loveland, extending through the town of Berthoud. An appropriation has been made by the State Highway department for the work. As funds become available, this paving will be extended into Longmont.

Personnel of Highway Advisory Board to be Changed in May.

Changes in the personnel of the state highway advisory board became certain on the last day of February when Mr. Elmer E. Sommers, Denver member of the board, submitted his resignation to Governor Sweet and the governor announced that he would appoint Mr. Benjamin B. Allen of Silverton upon the expiration of the three-year term of Mr. John A. Clay of Durango next May. Mr. Sommers' resignation and the governor's failure to reappoint Mr. Clay will remove two men from the board who have been members since the reorganization of the highway department in 1921 and who have contributed a goodly share toward making the Colorado highway department one of the finest organizations of its kind in the United States.

The departure of Messrs. Sommers and Clay will be universally regretted by the good roads enthusiasts of the state. Both men have taken more than ordinary interest in the good roads movement and have freely given of their time and knowledge to bring about the construction of a state-wide system of highways at the least possible expense to the taxpayers.

Mr. Sommers had been officially connected with the state highway department since 1918 when he was appointed a member of the old state highway commission by Governor Julius C. Gunther. Not only has he always looked after the construction and maintenance of the state highways in the territory embraced in the districts which he at various times represented, but he saved the people of the state many millions of dollars by obtaining for the state hundreds of automobile trucks, tractors and other road equipment at the time that the United States government decided to distribute surplus war materials. He took the initiative and obtained for Colorado what might be termed the pick of the material on hand.

A successor for Mr. Sommers had not been appointed at the time this issue of Colorado Highways went to press. It is possible, it was stated at the state house, that the governor will not fill the vacancy until May, when Mr. Sommers' term would have expired.

The announcement that Mr. Allen would be appointed upon the expiration of Mr. Clay's term came as a surprise, because Mr. Clay's term had yet to run two months. Good roads enthusiasts in southwestern Colorado had started a movement to bring about the reappointment of Mr. Clay in recognition of his services as a member of the board when Mr. Allen's appointment was announced.

Mr. Allen, who will take his place on the board in May, is one of the best known citizens of southwestern Colorado. He is a resident of Silverton and at present holds the office of mayor of that city. He is also, and has been for a number of years, cashier of the First National Bank of Silverton. The office of mayor of his home city is the only political office he has ever held, he having declined to hold any office to which a salary is attached. He is reported to be an enthusiastic good roads man and to be favoring the policy of a state-wide system of highways which affords all the people of the state the transportation facilities to which they are entitled.

Sleighs are being used by road forces from Ouray up to the work on the Ouray-Silverton highway. A total of 6,500 cubic yards of solid rock were removed during the month of January with the steam shovel between Bear Creek falls and Poughkeepsie bridge, according to Capt. J. J. Vandemoer, in charge of the engineering for the state highway department.

Plans have been completed by H. T. Reno, resident engineer, for a seven mile project west of Gunnison. This will consist of grading and widening of the road from the railroad crossing near the Chinery ranch to Steuben Creek. The road will be widened to 24 feet. A survey party is now placing stakes on the Blue divide for steam shovel work to run from the Montrose county line toward Gunnison.

It is announced that $500,000 will be expended in 1924 by the state of Utah on that part of the Pikes Peak Ocean-to-Ocean highway crossing the desert between the Colorado state line and Green River, Utah. This stretch of road has been the bugbear of travelers for years.

A new steel bridge will be constructed by Fremont county over Newland Creek this summer. The structure will have a 50-foot span and will replace a wooden bridge washed out by the floods of last July. County Commissioner S. G. Kelso announces that the road between Florence and Wetmore to the Custer county line will be graded and surfaced with sand this spring. A 10-ton Holt caterpillar tractor will be used in the work.

It is estimated that the cost of converting the old Cripple Creek Short Line from Colorado Springs to Summit into a highway toll road will be $100,000. The property, which was purchased by W. D. Corley, Colorado Springs capitalist, is valued at $200,000. Corley has applied to the department of agriculture for a permit to construct the toll road thru the Pike National forest.

Rapid progress is being made by the Colorado Bridge & Const. Co. on a new steel bridge 150 feet long over Clear Creek near Arvada, Colo., on State Road No. 72. The new structure replaces an old, narrow steel bridge constructed by Jefferson county about twenty years ago.

State Lets Contracts for Five Projects on 1924 Road Program

Five highway improvements in different parts of the state, consisting of eight and one-half miles of concrete pavement, seven and one half miles of gravel surfacing and two steel bridges, comprise the first 1924 construction list on which contracts were let by the State Highway Department during the month of February.

The contract price on the five projects, four of which are Federal Aid, totals $475,368.57.

The work on these projects involves the moving of 200,000 cubic yards of dirt and the two paving jobs will take 85,760 square yards of concrete. Most important of the contracts let is for 6,335 miles of standard concrete paving between La Salle and Platteville, which, when completed, will finish the ribbon of concrete running from Denver to Greeley.

This contract was awarded to J. Fred Roberts & Sons of Denver. Their bid was $175,647.90, based on a price of $2.35 per square yard for concrete. They agree to complete the work by Dec. 15, 1924.

The Northwestern Construction company of Craig, Colo., was awarded a contract for the construction of 6½ miles of gravel surfaced roadway west of Steamboat Springs on what is known as the Steamboat-Brookston road. The work includes the moving of 60,000 yards of earth and 40,000 yards of rock and the placing of 13,600 yards of gravel surfacing and 500 yards of concrete. The contract price was $139,000. Work is to start just as soon as weather permits. It is agreed by the contractors to finish the job by Sept. 1, 1925. This project will eliminate one of the worst stretches of road between Denver and Glenwood Springs on the Victory highway.

A contract for the laying of two miles of 18-foot concrete pavement north of Marino in Logan county was awarded to W. F. Pigg & Son of Denver on their bid of $53,702.50, based on a price of $2.45 per square yard on concrete, the engineer's estimate on which was $2.60 per yard.

Shields & Kyle, contractors of Pagosa Springs, received a contract for the construction of a bridge over the Piedra river and 1½ miles of gravel surfacing in Archuleta county between Durango and Pagosa Springs. The price was $48,311.30. This project calls for 13,500 cubic yards of common excavation and 14,900 yards of gravel surfacing.

The department also let a contract for the construction of a 200 foot steel truss bridge over the Rio Grande Del Norte river, located east of La Jara, to C. A. Switzer and J. T. Dillon, contractors of Denver. They were low bidders with a price of $28,117.05. Under the terms of the contract the bridge is to be completed by Sept. 1, 1924.

Highway Engineer Blauvelt said that additional 1924 improvements will be placed under contract as soon as plans are completed and approved by the Bureau of Public Roads. Plans are now being prepared on more than twenty projects under the 1924 program.

It has been announced at the highway department that successful contractors on state road projects will be bound to speed the work. This is under the department's policy of giving the public the use of highway betterments as early as possible.

Concrete vs. Gravel Surfacing

Traffic on some of Colorado's highways is so great that no amount of money expended for maintenance on gravel roads will keep them in good condition for travel. On such stretches of roadway it has been found more economical to lay concrete or asphalt pavement. Some people contend that they had rather drive a good gravel road than on concrete. That's a matter of preference. But the fact remains that hard pavements cut down the driving expense—no gainsaying that. And a majority of the auto owners know it. For example, the road between Denver and Colorado Springs—road experts agree that, regardless of the sum spent to maintain this highway, it would be physically impossible to keep it up to the standard of pavement. A traffic count on this highway shows an average of 3,500 cars per day at Littleton, with 1,150 per day at Palmer Lake. No gravel road ever constructed will hold up under such traffic for any length of time, while the maintenance expense will more than offset the cost of a hard surfaced roadway in just a few years.

We have been making all sorts of "drives" during the past few years, but they haven't all been on our road system.

Cost of Highway Engineering

(Continued from page 5)

He is on the job to see that the contractor toes the mark and delivers the goods. Not that contractors are dishonest, but there are a very few comparatively, thank goodness, who would steal the pennies off a dead nigger's eyes. Others are temporarily so by force of circumstances—perhaps losing money on too low an estimate or lack of system.

There is also another side to this question and occasion is taken to remark. Some few engineers have conceived the idea that the honest contractor, doing his level best to live up to specifications, and the dishonest one are all of one class—a common enemy, so to speak—and that it is the engineer's province to deal them all of the misery possible. An engineer is many times in a position to break a contractor by being ultra technical, and it has been done. The sooner engineers withdraw from that attitude, concede that contractors are human beings to be assisted, not obstructed, save their animus for the dishonest ones and acknowledge once and for all that true engineering is more than 50 per cent good common "horse sense," the quicker both engineer and contractor will understand each other and will be better enabled to serve the public at a no greater but less cost.

People who criticize the cost of engineering are those who have not yet realized that the physical advantages and comforts of our present civilization is due for the most part to engineers. Engineers execute; they design and build; without them our transportation systems would be nil. No telephones or telegraph; no artificial lighting or water systems, either domestic or irrigation; no sanitary works; no railroad tunnels; in fact the defy is thrown down that there is not a comfort or convenience of our present civilization that is not directly traceable to engineering in one branch or another.

Some may say that the principles involved in running a State department are not parallel to those in private or corporation affairs, but such is not the case, and a visit to the department will demonstrate that everything is being handled with system; that there is no overofficering, and every precaution is being used to hold down costs consistent with good service.

Taking all this into consideration, including the apparent low per cent of cost of engineering on Colorado State Highways, please investigate before you join the International Association of Asinine Assumers.

Boulder County Highways

(Continued from page 7)

land-Ward road on the south and with the South St. Vrain highway on the north. It will make St. Vrain glacier more accessible to motorists and open a wonderland of scenery as well as a fisherman's paradise.

Surveys have been completed and construction will be under way this spring on a Forest Service road westward from Ward to the Red Rock lakes group. Five mountain lakes in the region furnish an ideal setting for summer homes and cottage sites already have been laid out. These cannot be purchased, but are leased for a long term of years by the Forest Service.

At the present time, through an agreement between Boulder and Larimer counties and the State Highway Department, improvements aggregating expenditures of $25,000 are under way on the North St. Vrain entrance to Rocky Mountain National park. This is the most direct route into the park, which lies 22 miles distant from Lyons. The upper ten miles of the road are in Larimer county. The program calls for widening in places and lessening high grades and extreme curves.

One of the essentials of adequate road maintenance in winter, the Boulder county commissioners contend, is the removal of snow before it has a chance to pack. All road men have standing orders to cover their districts immediately after storms have ceased with blade maintainers or heavier equipment when necessary. Not merely a narrow passageway, but the entire width of the road is cleared. The result is that the roads are usually dry within two days and the surface is not deeply cut and rutted, as is the case when the snow is allowed to remain.

A highway means just what it says—a way high up from the water and mud.—American Highways.

"A rolling stone gathers no moss," but a lot of them rolled into the road makes them of great value.

Pueblo Highway News

BY R. C. TAYLOR.
Staff Correspondent.

Pueblo, Colo.—Several miles of county highways may be protected from floods along the Arkansas river in Pueblo county by a flood protection program being formulated by residents along the river. The plan will cost approximately $150,000 and will shorten the river's course one-half from the city limits to Pueblo to the east county line. At present the river winds its way through the valley and floods cause it to overflow and damage highways, bridges and agricultural land. It will be straightened by the use of flood fences, which will involve steel rails driven to bedrock and connected by wire netting, behind which will be rubbins and earth. The expense of the work is to be borne by a levy on all land benefited. The plan will reclaim $1,000,000 worth of valuable river bottom land as well as afford protection to highways.

Earl Cooley, state land commissioner, is working out a plan with the Pueblo county commissioners whereby six acres of state land will be exchanged for as much private land so that the right of way can be secured for improvements on the Santa Fe Trail twenty miles east of Pueblo, near the Huerfano river. The highway will be changed to eliminate some bad curves as part of the state highway project in a $139,000 gravelling project at this point.

The Denver-Pueblo Truck Line, which proposes to operate motor trucking lines, will not be given permission of the Pueblo board of county commissioners to operate in Pueblo county. The truck line can use the county highways regardless of what the commissioners say, under the law, but the officers cannot get their franchise from the Public Utilities Commission without consent of the counties along its route. The Pueblo commissioners are in sympathy with legislation to tax truck lines, which pay no more than any other motorist, and damage the roads greatly.

Damages of almost $2,000 are sought by Mary L. Shaw in a suit filed in the district court at Pueblo against the Colorado State Highway Department. Miss Shaw owns property near the St. Charles river bridge on the Santa Fe Trail east of Pueblo, which is a recent state project. Earth fills and bridge approaches were obtained from the Shaw property, which is of rolling nature. According to the complaint, an oral agreement was entered into whereby the earth was to be free as long as the land was left in an even manner; but Miss Shaw charges that a deep trench was left, and asks damages, basing the amount on a price per cubic yard of earth removed.

Work on approximately $100,000 worth of bridges in Pueblo county has been started and contractors state that the bridges will be completed by June 1, at the beginning of the flood season. The two bridges are entirely county projects. Salle & Salle, Trinidad contractors, are building a concrete bridge over the St. Charles river on the South Vineland road. Their contract calls for the erection of the 250-foot bridge for $39,077.64. The Pueblo Bridge and Construction Co. is erecting a 200-foot steel bridge over the Arkansas river at Boone at a contracted cost of $47,980.

A beautiful concrete viaduct-bridge 1,400 feet in length will be built across the Fountain river and D. & R. G. W. railroad tracks by the city of Pueblo funds at a cost of approximately $300,000. The viaduct will be erected on Eighth street and will make one of the most attractive structures in the state. It will be 44 feet in width, with 6-foot sidewalks for pedestrians. Ornamental lights will be installed on the viaduct, which will have a total of 16 arches. The piers will be designed to safeguard flood dangers.

A new subway, which probably will cost $5,000, will be built under the Santa Fe railroad tracks a short distance east of La Junta, according to Otero county officials. who are to be assisted by the railroad in the project. There is a subway at the place at present, but it is always sloppy and wet and is an objectionable condition for motorists.

The Otero county commissioners have decided to rip-rap the Arkansas river at Fowler and Hadley to keep it from cutting away from the present channel and making the bridges useless at these points. The river has been swinging north through lowlands in both locations and threatens to cut through the highways in new points. The work will be started at once to protect the two valuable bridges and highway as well.

Why Quality Equipment?

BY R. E. CORSON.

This world is made up of particles as well as human beings, animals, etc., that have quality; some more, some less. The lesser we term "poor quality" and the better "high quality," but in each case Quality of the high type is far supreme. This article is meant to be more or less a Quality machinery dissertation, but holds good in general.

Too many of us, not thinking of quality versus price, pay a higher price for inferior quality goods. Quality, Equipment and Machinery comes high, but in this world we pay for what we get only, and in case of inferior articles, pay more, in most instances, than what it is worth.

Did it ever occur to you that the fellow that has the highest quality article always makes the least profit? This is absolutely true. First, because his price is higher than prices on what is termed "competitive goods," and, naturally, his price must be kept at as reasonable a figure as possible. Therefore, the margin of profit must be, and is, in every case, smaller. The fellow with the inferior quality goods never considers profit, but advances his price as close to the high quality article as he dares, and out of ninety nine cases it can be proved that the customer buying the so-called "cheaper unit" pays considerably more in proportion to what he gets than the customer that buys the highest quality.

High Quality Equipment, as well as all other necessities, has to be really sold. The idea of price enters into it largely. In other words, we have to be convinced that the difference in price is fully compensated by the difference in quality, whereas, the man with the inferior article can always sell on price.

The maintenance cost of inferior machinery always runs higher; besides lacks the pleasure one would derive by using a piece of machinery that gives you the satisfaction of doing the work efficiently and effectively without the worry of mind and the expectation of having a continual break-down.

Sum this up for yourself. Put the two on the scales, and you will find that High Quality is cheap at any price and is certainly Supreme.

Pueblo County 1923 Road Bill Totals Half Million Dollars

The highways of Pueblo county were improved during 1923 with approximately half a million dollars of federal aid, state and county funds. Of this amount $280 went for bridge construction and almost $170,000 for concrete paving.

The federal aid bridge projects were: St. Charles river bridge on the Santa Fe Trail; St. Charles river bridge on the Walsenburg road; Six-Mile creek span on Santa Fe Trail. The county built a large concrete bridge over the St. Charles river on the Wilson road and another bridge over the Arkansas river at the Stockyards. State funds built three bridges on the Siloam road and seven others on the Kansas-Colorado boulevard. Large wooden structures by the county included the Undercliffe bridge on the Huerfano. Pinon bridge over the Fountain, Boone bridge over the Arkansas and Nepesta bridge over the Arkansas.

In 1923 there were completed three miles of concrete paving on the Santa Fe Trail and work started and partly completed on an adjoining 2.5 miles of concrete paving.

The smaller bridges and culverts constructed under supervision of Charles Stepp, county road superintendent, were: Four 70-foot bridges, eight 20-foot bridges, fourteen 36-foot bridges, two 6-foot concrete culverts, 30 corrugated culverts 2 to 6 feet wide, and 200 wooden culverts from 2 to 4 feet in width.

There are 2,200 miles of highways in Pueblo county, including 200 miles of new road graded during 1923, and 137 miles of shale surfacing. There were 500 miles of highway regularly maintained.

Five miles of grading is under progress in Turkey Creek, being an extension of Road No. 8 from Morrison to Conifer. The new improvement will extend to Conifer, from which point a state highway surveying party under W. J. Miller is now running a line to Baileys. Work in Turkey Creek is being done under contract by the M. J. Kinney Const. Co. It is expected that the project will be completed by late summer.

In order that better care may be given the highways in El Paso county, maintenance houses for road crews have been built on the Denver and Canon city roads, and a third house is soon to be erected on the Ocean-to-Ocean highway, according to J. Oscar Cell, county commissioner.

EQUIPMENT NEWS

A corduroy traction brake to give an extremely short turning radius is one of the many improvements made by Pawling & Harnischfeger Co., Milwaukee, Wis., on their gasoline shovel. In operation, one of the tractions is held fast while the other one operates, so that the machine really pivots about the stationary corduroy as a center.

An illustrated booklet describing the improved Buckeye backfiller is being distributed by H. P. Wilson & Co., Denver, Rocky Mountain distributors. This machine was exhibited at the Good Roads Show. The principal features are: alligator traction with cast steel treads giving 15 sq. ft. bearing area; each wheel driven separately for short turning; controls banked around operator's platform for maximum convenience; drag and hoist drums mounted on separate shafts, and cable leads direct from drums to boom line without sharp turns.

A highway safety guard applying the principle of aerial life net to prevent embankment, bridge and curve accidents has been placed on the market by the Page Steel & Wire Co., Chicago. The appliance, a ribbon of woven wire so fabricated as to absorb impact, is designed for use along highway "danger points."

The Austin-Western Road Machinery Co., Chicago, has added to its line two maintenance patrol machines. They are known as Western Patrol No. 1 and 2. They are built to meet the ideas of the maintenance departments in the various states, retaining necessary strength with minimum weight. No. 2 is lighter than No. 1. These machines have the necessary adjustments, but no unnecessary refinements to add to the cost. They are simple in design and operation.

A heavy demand for Trailmobile equipment was reported by H. W. Moore & Co. during the month of February. The Trailmobile people were the first to adapt the Fordson tractor to heavy haulage. By a special design they have worked out a series of haulage units said to be capable of utilizing to the utmost the power of the Fordson. Trailmobiles are built in capacities of from two and a half to six tons.

Announcement is made that Paul Fitzgerald, formerly a well-known Colorado contractor, has taken over the agency rights of the Pawling & Harnischfeger line of Colorado. Formerly P. & H. was represented in this territory by Landes & Co. of Salt Lake City, with a branch office in Denver. Fitzgerald for the past year was manager of Landes' Denver office. Before joining the Landes sales force he was in charge of the excavation on the Colorado Springs street paving project which attracted national attention.

Fitzgerald came to Colorado in 1909, doing railroad work for the Union Pacific. Prior to that time he was engaged in street paving in Lincoln and road work out of Omaha. He is the son of the late John Fitzgerald of Lincoln, Neb., who at the time of his death was one of the biggest railroad contractors in America, having built the greater part of the Burlington railroad in Nebraska and Iowa.

Agency of Studebaker sprinkler and flusher parts in the intermountain territory has been taken by the Liberty Trucks & Parts Co. of Denver. Included in the line are tar pots, paving tools, etc. During the past month the Liberty people enlarged their space in the Sugar building in order to provide space for additional truck and tractor parts.

A new Northwest Crawler Dragline has been delivered to Winterburn & Lumsden Co. at Grand Junction, Colo., for use on the Grand Junction Drainage project. In this project there is 300,000 yards of excavation. The dragline is of 1 yard capacity. J. C. Claybaugh is the engineer in charge of construction.

CONTRACTS AWARDED

Proj. No.	Location	Length	Type	Successful Bidder	Bid Price
226C	Pav. Div. No. 2, Northeast of Platteville	6.335 mi.	Concrete Paving	J. Fred Roberts & Sons, Denver, Colo.	$175,647.90
243A	Piedra, betw. Bayfield and Pagosa Spgs.	1.61 mi.	Gravel Surfacing	Shields & Kyle, Pagosa Spgs., Colo.	48,311.30
253A	West of Steamboat Springs	6.506 mi.	Gravel Surfacing	Northwestern Cons. Co., Craig, Colo.	126,374.50
256B	Merino, Northeast	2.083 mi.	Paving	W. F. Pigg & Son, Denver, Colo.	53,702.50
811	East of La Jara, over Rio Grande River	200-ft. span	Steel Truss Bridge	Switzer & Dillon, Denver, Colo.	28,117.05
904	Between Englewood and Ft. Logan	3-100 ft. span	Steel Truss Bridge	Chris. O'Neill, Platteville, Colo.	44,049.50

PROJECTS ADVERTISED FOR BIDS

Proj. No.	Location	Length	Type	Bids Opened
17R	Between Breed and Hustad	2.339 mi.	Concrete paving	March 11, 1924
257	½ mi. No. of Denver, toward Brighton		Concrete Viaduct	March 11, 1924

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

116B	Breed—Colorado Springs	0.892 mi.	Concrete Paving
248A	Buena Vista—Salida	12.048 mi.	Graded and Gravel Surfaced
254A	Hot Sulphur Springs—Parshall	1.057 mi.	Grading
255B	Brush—Fort Morgan	2.944 mi.	Concrete Paving

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

116C	North of Breed	3.22 mi.	Paving
242	Grand Junction—Fruita	3.5 mi.	Gravel Surfacing
246B	East of Pueblo	.787 mi.	Concrete Paving
266A	Durango—New Mexico State Line	4. mi.	Gravel Surfacing
275A	Wolhurst—Castle Rock	10. mi.	Paving
283A	Loveland—Berthoud	2.5 mi.	Paving

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1923

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
2-R	Trinidad, north	3 mi.	Asphalt Pavemt.	Strange-Maguire Const. Co.	$121,934	7	2-R
71-B	Durango-Hesperus	3.6 mi.	Gravel Surf.	Peterson, Shirley & Gunther	61,556	100	71-B
102	Ouray-Red Mountain	1.06 mi.	Mtn. Grading	Johnson & Johnson	58,972	71	102
116-A	Colorado Springs paving	4.18 mi.	Conc. Paving	Standard Engr. & Constr. Co.	238,944	73	116-A
119-B	Cochetopa Pass	7.5 mi.	Grad. & Surf.	Girardet-Hotchkiss Engr. Co.	53,709	89	119-B
125	Sapinero-Cimarron	11.3 mi.	Grav. Surf.	Dale Hinman	36,797	43	125
125	Sapinero-Cimarron		Steel Bridge	Winterburn & Lumsden	53,072	73	125
135	Denver-Morrison	5.3 mi.	Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	24	135
157-B	Buena Vista-Leadville	4.20 mi.	Grading	J. V. Stryker Const. Co.	65,715	70	157-B
168-B	Lamar-Hasty	6.86 mi.	Gravel Surf.	Standard Engr. Co.	60,194	68	168-B
174	Red Mountain	3.03 mi.	Mtn. Grading	Pickering Bros.	82,071	84	174
190	Summit County Bridge and Road	1.45 mi.	Grad. & Bridge	Colo. Bridge & Constr. Co.	40,154	89	190
207	Dillon-Kremmling	100 ft.	Truss Bridge	Rogers & Pickard	28,831	15	207
208-C	Grand Junction-Palisade	4.75 mi.	Gravel Surf.	Northwestern Const. Co.	46,627.35	33	208-C
213-B	Durango-Hesperus	5.26 mi.	Grav. Surf.	J. Edd. Hansen	72,960	52	213-B
214	Durango-Bayfield	3 mi.	Gravel Surf.	Dale Hinman	53,411.05	50	214
221	Loveland, north	4.05 mi.	Conc. Paving	Fred C. Dreher Constr. Co.	142,125	98	221
222-C	Broomfield-Lafayette	2.82 mi.	Conc. Pavement	R. M. Larsen	134,933	7	222-C
223-A	Kremmling-Rabbit Ear	2.88 mi.	Grav. Surf.	Henry Shore	30,565	51	223-A
224	Morrison-Baileys	5 mi.	Grading	M. J. Kenney Const. Co.	59,781	30	224
225	Fitzsimons Hospital road	1.00 mi.	Bit. Paving	Miller, Douglas & Hanes	36,618	80	225
226-A	Brighton-Ft. Lupton	8.23 mi.	Conc. Paving	White & Johnson	241,133	85	226-A
226-B	Brighton-Greeley	2.86 mi.	Conc. Paving	White & Johnson	89,923	47	226-B
226-C	Platteville-Greeley	4.4 mi.	Conc. Paving	Engr. Constr. Corp.	120,114	28	226-C
229	Pueblo-Florence	1 mi.	Grav. Surf. & Bridge	H. M. Fox	34,646.50	80	229
230-A	Wolhurst, south	0.852 mi.	Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	14	230-A
230-B	Wolhurst, south	3.99 mi.	Conc. Pavement	Brodie & Anderson	153,971	13	230-B
231	Six Mile Creek Bridge	0.45 mi.	Steel Bridge	McCormick & Brockaway	25,165	83	231
240	Gypsum-Dotsero	5.185 mi.	Gravel Surf.	O. L. Hackett	66,178	26	240
241	Gunnison River, North of Delta	600 ft.	Steel Bridge	Winterburn & Lumsden	99,309	60	241
245-A	Las Animas-Hadley	4.54 mi.	Gravel Surf.	W. A. Colt & Son	42,786	60	245-A
246-R	East of Pueblo	2.537 mi.	Conc. Paving	R. A. White	78,431	15	246-A
255-A	Ft. Morgan-Brush	2.70 mi.	Conc. Paving	Colo. Bridge & Constr. Co.	85,763	64	255-A

Within thirty days the state highway department expects to ask for bids on three miles of concrete paving south of Longmont. This stretch of pavement will join the present paved road south of Longmont, carrying the concrete to the Six-Mile corner. Plans are being made to use a county road east of the proposed project as a detour during construction.

The La Junta Chamber of Commerce has sent a protest to the State Highway Commission asking that the Old Trails highway be kept at its present routing on the north side of the river and not be changed to the new proposed location on the south side. It is pointed out that, although the new route would reduce the mileage and avoid two grade railroad crossings, it would take the tourists over a most arid and forbidding stretch of country. The present route passes through what is called "The Garden of Eden," and is a fertile section of improved farms and productive lands. Although the maintenance cost will be more, the boost will be better for Colorado in the eyes of the tourists.

The city of Pueblo now has 37.5 miles of paving. During the past five years $3,000,000 worth of paving has been done. Since the flood of June 3, 1921, there has been paved 405 city blocks and 47 more are now under consideration.

The City of Pueblo engineering department has started work to straighten and beautify Elizabeth street from Twenty-fifth street to the city limits. This street is the entrance to Pueblo from the Canon City and Colorado Springs state highways. The city purchased land for the improvements and will build two wide driveways with a 150-foot parking between which will be beautified with shrubs and flowers. This will not only beautify the entrance to Pueblo from the north, but will make it much easier for strangers to find their way.

Three crews of workmen are employed by the City and County of Denver in widening of the road thru Bear Creek canon. Most of the work consists of shooting off heavy rock corners and in making the roadway above the Gates home wider. It was at this point that the Harding presidential party went off the road, resulting in three deaths.

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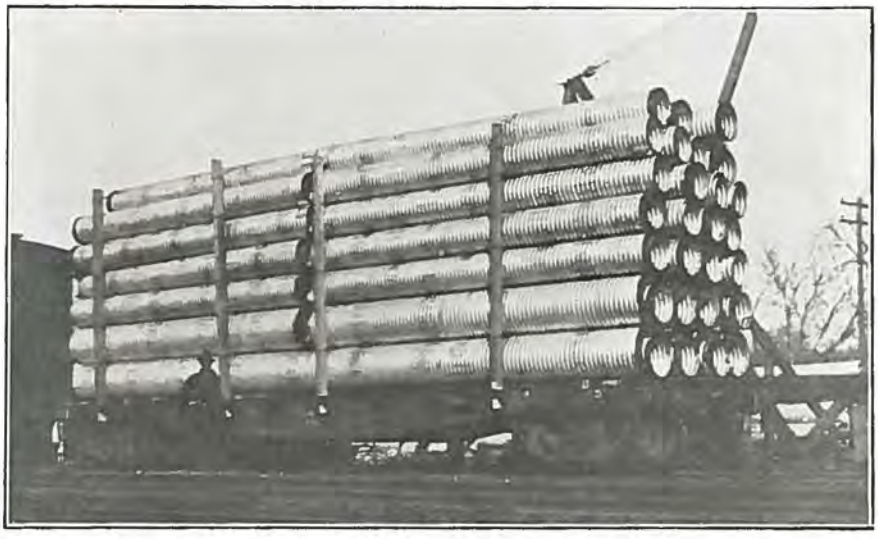

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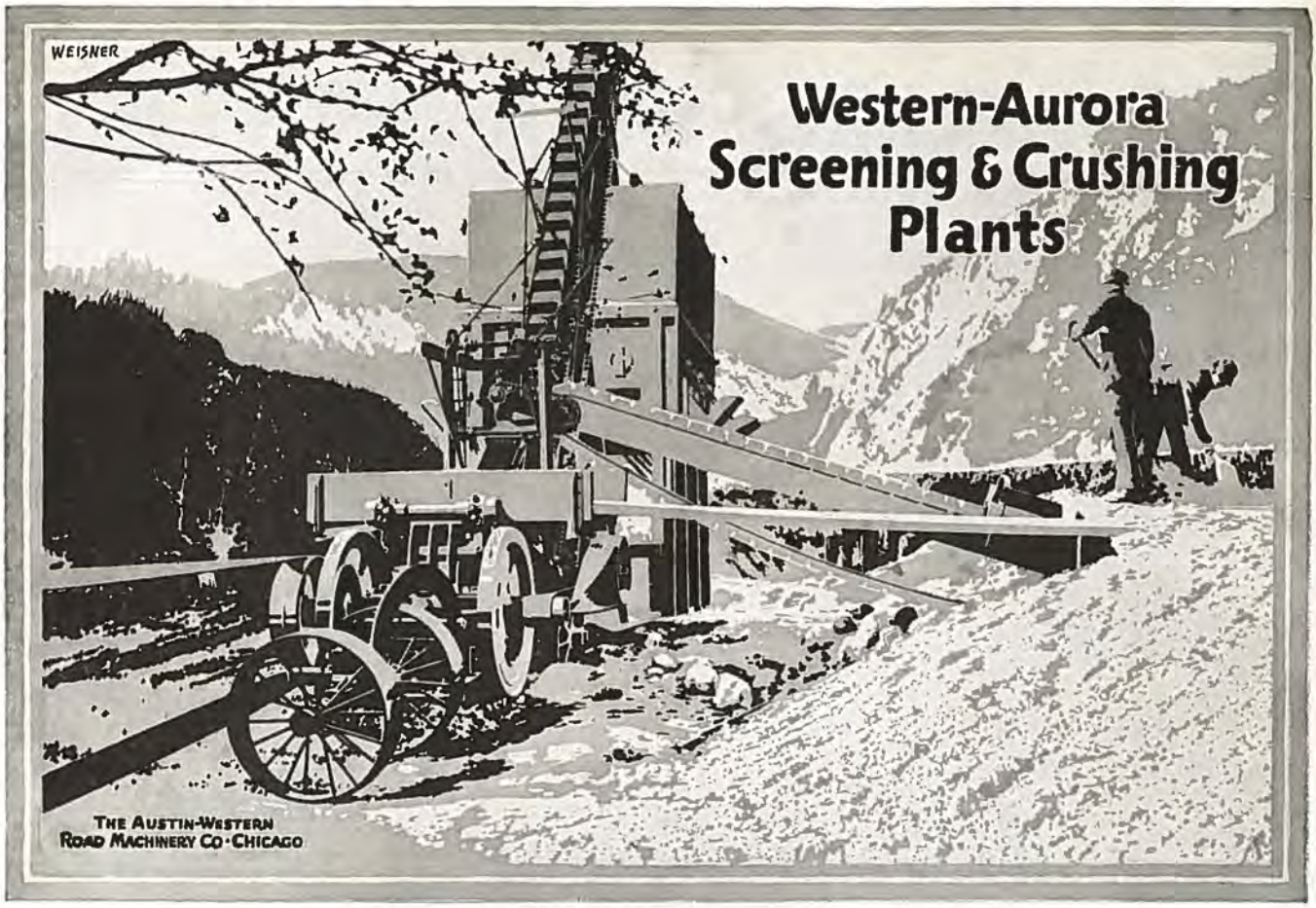

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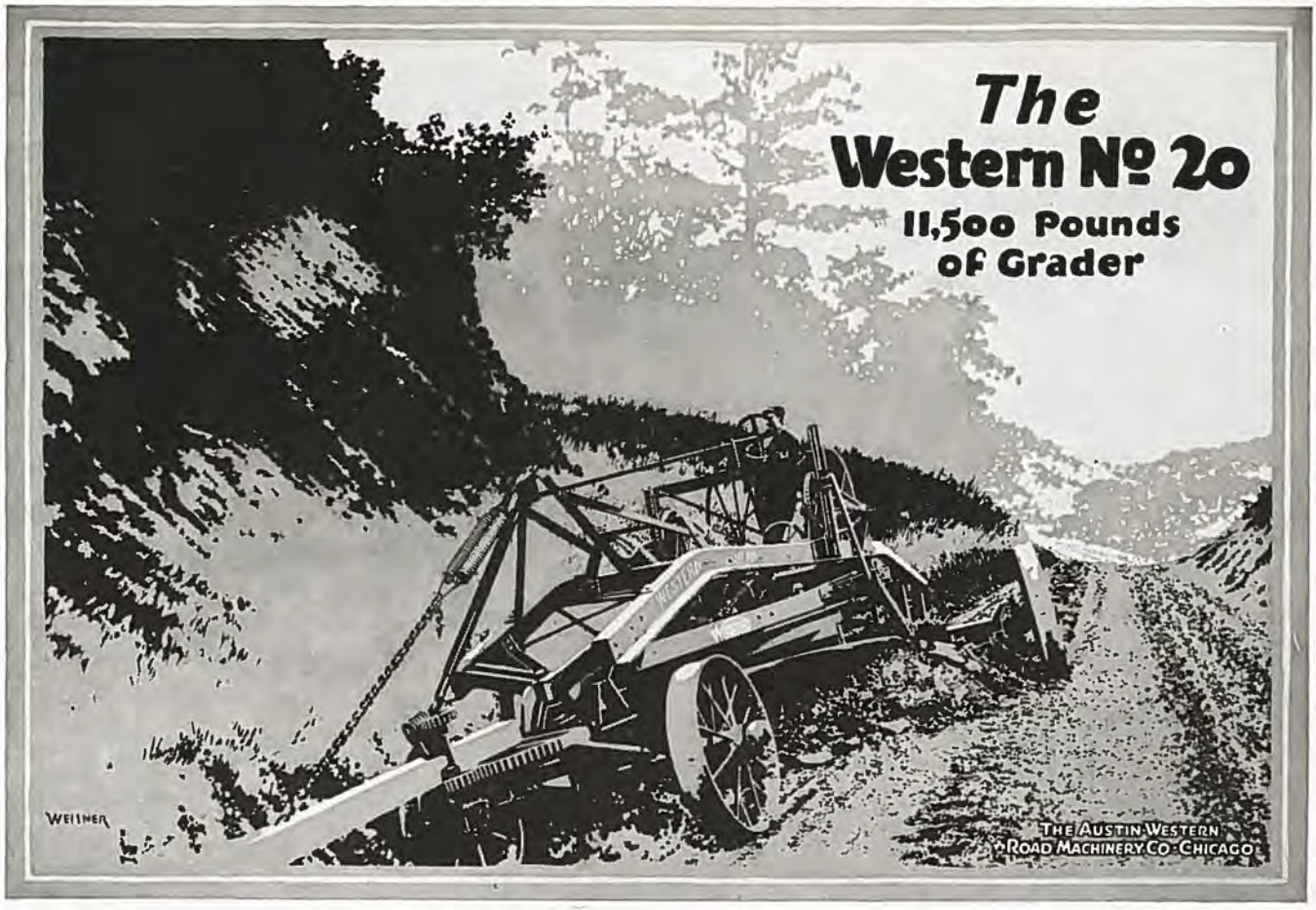
Colorado Highways

A magazine devoted to Good Roads

V 1 2 Aug 1934 No 4



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Colorado Highways

"BETTER ROADS"

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Denver, Colorado

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Articles on the subject of road building and highway development in the West are solicited. Manuscripts should be addressed to the Editor, with return postage. Photographs should accompany articles whenever possible. Manuscripts not found available will be returned promptly.

10 CENTS A COPY. **$1.00 A YEAR.**

The photograph on the cover of this issue shows a scene on State Road No. 115, southwest of Colorado Springs, in El Paso county, which has been improved by gravel surfacing with state and county funds.

A permanent maintenance camp has been established on this highway by the El Paso county commissioners in order to keep it smooth for the heavy travel. The patrol system of maintenance is employed.

Photo by Colorado Springs Chamber of Commerce.

Colorado Highways
"BETTER ROADS"
VOLUME III. APRIL, 1924. NUMBER 4.

Federal and State Policies in the Construction of the Federal Aid Highway System

By T. H. MAC DONALD
Chief, Bureau of Public Roads.

IN November, 1921, the Federal Highway Act became a law. In the two-year period since, in addition to administering very large programs of highway construction and maintenance, the State highway departments of the 48 States and the Bureau of Public Roads have selected, correlated and agreed upon the highway system which is to be first improved under the terms of this act. This is truly a noteworthy accomplishment. It is at once a promise and an assurance of progress in the development of adequate highways for this nation. There is the appeal of something fine, the challenge of security in our form of government, in the successful planning of this great system of interstate and intercounty highways, through the joint effort of the sovereign States and the Federal Government, each recognizing aspirations of the other.

Other nations have in times past built great road systems under military dictate, largely for purposes of conquest. The United States plans a system of highways to serve her people in the pursuit of economic freedom and happiness. As now visualized in the first real map of the major system of highways, the conception is truly national, but like all other of our great national institutions the scheme has been built from the foundation up and not from the top down. We, of the Bureau of Public Roads, are proud of this national plan, yet we most cordially and gladly give the credit for its accomplishment to the State highway departments.

The choosing of such a system has been a most difficult task. That it has now been brought to a successful conclusion is largely due to the selective processes which the highway departments have been exercising for years. Without this prior classification, which has been the cause of constant and vigorous protests where local and often selfish interests recoiled against the action of the State departments, the welding of a great network of major highways covering the whole nation into a comprehensive plan could not have been possible. The recent task largely narrowed to a process of joining the selected system of the States, and here again the departments have shown a wonderful spirit of co-operation. Conflicts at State lines have been settled in friendly conference around the table. It is more than evident that the highway departments and the field organizations of the Bureau have carried on the negotiations with sincere good will and mutual respect.

The task ahead is defined. It will be completed.

The present map includes 168,881 miles in the Federal aid system, about 30,000 miles less than the legal maximum based upon the certified total public road mileage in the United States of 2,886,061 miles. While there remain some details yet to be adjusted, they are in the main relatively unimportant and will not be allowed to cause controversy between the States and the Bureau. Only in one case was it necessary for the Secretary to hold a hearing before making his decision, and this was sought by an Association having no official status. I am convinced by the experience in this matter that no State highway department should accept financial contributions from any source outside public revenues unless no obligation, actual or implied, is thus incurred. That which may appear to be the proper course to follow today may not be in five years or less. Conditions in the highway field have undergone the most abrupt and unforeseen changes. Each highway department must remain free, morally and legally, to follow the course dictated by the most urgent needs of highway service.

The State and Federal governments are financially able, and the State and Federal highway departments are administratively and technically competent to build the roads in the order of greatest importance in the different sections of the country without the assistance of any voluntary organization, if it in the end shall become a source of embarrassment.

As indicative of the task ahead, the combined mileage of State systems as of January 1, 1922, is 220,000 miles. Of these, 80,200 miles are reported surfaced, or 36 per cent. The Federal aid system now approved is about 80 per cent of the total State highway mileage, and may be considered to this same extent coincident. Applying the same pro rata of improvement the first of the year 1922, about 30 per cent of the Federal aid system was surfaced, or about 50,000 miles. Of Federal aid highways on July 1, 1923, there had been completed 26,536 miles, and there were under construction 14,771 miles, a total of 41,307 miles of all types. Of these 8,686 miles were graded and drained, and 32,621 miles surfaced. All but a very small percentage of this mileage is on the Federal aid system as now established, and although, admittedly the above figure of 50,000 miles of surfaced roadways on this system is very rough, still it is apparent that the surfaced improvements added in the four-year period 1920-1923, have been equal to or greater than all the surfacing placed in all the prior years.

A careful study is being made, State by State, of the improvement status of this definite Federal aid system. If these estimates are found to be approximately correct, at the end of this year there will be about 60,000 miles of surfaced roadways, and about 8,700 miles graded. This leaves 110,000 miles to be surfaced. To surface this mileage in the ensuing decade, that is, by 1934, there must be an annual program of 11,000 miles of completed new construction. In addition, there must be the "stepping up" of many miles of lower to higher types, the reconstruction of surfaces built before the present traffic, and the widening of roadways to carry the increased traffic. During the ten-year period there will necessarily be added a considerable increment to the present approved mileage.

Nor does this yet represent the size of the essential construction program to bring this major system up to a satisfac-

tory operating basis in the next ten years. There are many miles of the system crossing Indian reservations, National Parks and National Forests in our western and southwestern empire. There are many new and important bridges required and a large program of bridge reconstruction, especially in the east and south. Added to all this is the ever increasing need of safety improvements, such as the elimination of railroad grade crossings.

These and similar problems are not to be indefinitely deferred. They must be met. From the standpoint of financing new construction, the most acute situations exist in a number of the western States. The new map shows the extensive network covering the eastern and Mississippi Valley States, focusing in a few lines east and west across the Rocky Mountain system, the great central plateau, and the Sierra Nevada system, finally to meet and multiply into the highways of the Pacific Coast States. While limited in number, these in-between connecting links present serious problems, financial and engineering—not through an unbroken length, but at times for long distances, where there is little or no local development, where the physical obstacles to road construction are unusually difficult, or where these necessary links are not so located that they, at the same time, serve the most urgent highway service needs of the communities or the whole State.

The sliding scale of financial co-operation does not meet these conditions. It alleviates, but does not cure. The agricultural depression has hurried the acute status, it is not the cause. The Bureau understands this condition and is in sympathy with its proper solution. This right solution can and must be found. There can be more than one approach. A readjustment of the scale of co-operation to meet specific extraordinary conditions, the general development of more economical design or construction. With the existing status of construction, both as to types and extent, Federal participation in maintenance as a general policy is not the logical solution.

Highway Traffic

The indicated necessary improvement program on the major highway system is large. It must be considered most seriously, but in the light of the amazing growth in highway traffic.

Economic data is becoming available by which we may measure the need for, and usefulness of, improved highways with certainty, and the conclusion is inevitable that the annual mileage of new roads is lagging behind the expansion of highway traffic. Highway transport is seeking to serve more rapidly than the handicap of inadequate highways is being removed. The State Highway Department of California and the Bureau have made two traffic studies covering the State system, the first in 1920, the second in 1922. At the same one hundred three counting stations, the two-year numerical increase in daily traffic was 47 per cent, thus closely reflecting the 54 per cent increase in registrations.

The Baltimore milk transportation survey shows 36 per cent of the city's supply now brought in by motor truck. In 1919 only 18 per cent reached the city in this way.

The Connecticut highway transport survey developed beyond question the fact that the direct connections between population centers are the major traffic lines, that the traffic is reasonably proportional to the population concentration in the centers directly connected, and that the heavy traffic both in weight and number is restricted to a relatively small percentage of the total mileage of public roads within the State.

The Bureau's predicted total registration for this year is 14,700,000, and for the following year 16,500,000 plus. The extension of freight and passenger lines is bringing rapidly to the individual, highway transport service, whether he is a car owner or not.

The report of Special Committee IV of the United States Chamber of Commerce on the "Relation of Highways and Motor Transport to other Transportation Agencies" states as one of its major conclusions:

"Trunk highways in any area should be able to carry the normal vehicular traffic of that area, and, if the traffic economically justifies the use of especially heavy trucks, highways with stronger sub-bases must be provided. This constitutes a problem requiring particular attention in the design of highway systems and in the regulation of traffic. In other respects present types of highways, present routes connecting principal centers of population and production, and the present trend in size, weight and speed restrictions of vehicles using highways show a rational system of highway development that should be continued."

Highway traffic presents a cross section of the business and social life of the communities. Upon this fact and the definite traffic data now being gathered may be predicated the character, amount and weight of the traffic which the highways should be designed to carry.

The solid black represents the states in which there is no gas tax assessed. In two of these states a gas measure passed by the legislature, was vetoed by the governor.

Highway Funds

There is a large discussion, much of it critical, of the expenditures for highway purposes. There is particular criticism directed against bonds to pay for the improvements. The tendency on the part of the uninformed and unthinking is to condemn expenditures for such purposes because they are, in and of themselves, large in amount. They forget that no one can pass upon the reasonableness and necessity of a public outlay of money without considering at the same time the utility and value which is brought to the use of the public because of such an expenditure. It is just as logical to judge the soundness of a business concern by looking only at the liability side of its statement without comparing it with the asset side, as it is to criticize expenditures for highway construction without taking into account the value of service which such highways render, i. e. their earning capacity. We have recognized for years the terrific annual loss of mud roads and the possible savings, direct and indirect, which accrue to the users of improved roads. A milk truck taking the milk of a certain group of farmers to the Baltimore market had to operate over a 5-mile stretch of unimproved road to reach a surfaced road. The regular price of transporting milk is 3 cents per gallon. In this case the operator of the truck charges his farmer patrons ½ cent per gallon extra for the six-months period from October to April because of the bad road conditions. Those farmers are actually paying $900 annually more than the regular charges, or $180 per mile, or the interest at 5 per cent on $3,600 per mile. This is the actual increased cost for milk alone. Considering the other traffic which exists, it would be good economy to borrow the money if necessary to improve that road. There is good reason to question the sincerity of these self-constituted "watch dogs" of public funds, who set in motion propaganda against highway expenditures and are

silent as to the net savings resulting from them.

In 1921 the Bureau made a thorough survey of all highway expenditures. The results are illuminating. Of the total $1,036,587,772, there was expended by or under the State highway departments $413,241,662, or 40 per cent, while under local authorities there was expended $623,346,110, or 60 per cent. These expenditures were divided as follows:

Expenditures—1921

By or under control of State Highway Departments

State and State-aid construction	$ 291,973,813	70.7%
State and State-aid maintenance	74,526,746	18 %
Engineering and administration	18,881,855	4.6%
All other items—(a)	27,859,248	6.7%
Total, States	$ 413,241,662	39.9%

(a) Includes payments of interest and principal of highway bonds, purchase of gravel pits, quarries, etc.

Local Expenditures—1921

Construction all classes	$ 334,991,560	53.7%
Maintenance	174,066,423	27.9%
Engineering and administration	17,149,498	2.8%
All other items—(a)	97,136,629	15.6%
Total, Local	$ 623,346,110	60.1%
Grand total expenditures, 1921	$1,036,587,772	100 %

(a) Includes payments of interest and principal of highway bonds, purchase of gravel pits, quarries, etc.

Remembering that on the basis of a billion-dollar highway program, the division is 40 per cent expended by the State and 60 per cent by the local authorities, note the division of income for all highway purposes.

Total Income for all Rural Highway Purposes—1921

Bonds	$ 438,109,273	38.1%
Taxes	415,680,010	36.2%
Motor Fees	118,942,706	10.3%
Gas	3,683,460	.3%
Federal aid and forest funds	79,333,226	6.9%
All others	93,689,221	8.2%
Grand Total	$1,149,437,896	100. %

*From state reports.

Property taxes contribute direct 36 per cent. As closely as can be estimated, this is about 10 or 11 per cent of the total annual tax bill, local, State and Federal.

Therefore, if there had been no highway program, State or local, property taxes would have only been reduced by say 11 per cent.

Examine now the division of income for State funds only.

Income to State Highway Funds—1921

State bonds and special assessments	$ 114,825,637	28.3%
State taxes, direct.	46,206,583	11.4%
State appropriations from general funds	20,817,354	5.1%
Funds from counties, etc.	29,302,653	7.2%
Motor vehicle fees.	101,284,479	25.0%
Gas tax	3,273,988	.8%
Federal aid and forest funds	79,333,226	19.6%
Miscellaneous sources	10,494,479	2.6%
	$ 405,538,399*	

*There is an apparent discrepancy between State income and expenditure, but it should be remembered that in the conduct of public business, the two are ordinarily not exactly coincident or correlated. The discrepancy here is less than 2 per cent, a most excellent record.

Crediting general property tax with both State taxes and funds from counties, the total is 18.6 per cent. The items of Federal aid, forest funds, motor vehicle and gas tax, total 46 per cent, and State bonds 28.3, i. e., 73.7 per cent outside direct property taxes. The information is not available to divide the bond retirement and interest between property taxes and motor vehicle and gas taxes.

This is the real truth. The local roads are the cause of property taxes for this purpose being higher. This clamor about taxes is directed at the wrong cause.

These figures are for 1921, the increase in revenues from the motor vehicle and gas taxes are growing rapidly. The total 1921 revenues from this source, including Federal taxes, were more than $350,000,000, equal to 85 per cent of the income to State highways. It exceeds the entire tax bill of the railroads.

The Federal Government has received in taxes on the motor vehicle and repair parts more than double its entire expenditure for Federal aid.

The greatest danger we face in completing the Federal aid system or the State systems, are the drives against these funds for local roads, and even for purposes having not the most remote relation to highway improvement. The very life of the highway departments and major highway program depend upon these revenues.

This is the stern fight ahead. Property taxes can and should pay for the local program until the major one is complete, and if property taxes are too high the local program of new construction can be smaller for the time.

From this general discussion of the present situation, and from the experience in each State, the conclusion is certain that the improvement of the Federal aid highway system is the most important big task ahead, not because it is the Federal aid system, but because it comprises the most important inter-State and inter-county highways of the nation—the very frame work of the whole structure, and that with its improvement heavy traffic will more and more concentrate on it, thus relieving other roads. But that no matter how important this may be, there will be determined efforts to divert the necessary funds to roads of lesser traffic importance, but totaling a much larger aggregate mileage. Even though well begun, the big work of the State highway departments and the Bureau has only just begun. There must be established closer and more sympathetic understanding, and in this the Bureau desires to meet the States more than half way. The public is impatient. It is demanding increased highway service, and this service can only be rendered by better maintenance, by as large an annual program of construction of roads suited to the needs as the funds will permit, by better construction, and by reducing costs. These objectives can only be accomplished by more efficient administration and engineering, now made possible by the great advance in the science of highway engineering. Each State has its particular problems. If some States have larger available revenues, they too have the heaviest traffic problems. There are plenty of thorns with the roses in all the States.

Maintenance

Sometimes questions that come to me indicate a feeling that the Bureau is inclined to deal narrowly in approving Federal aid projects, but such is not the case. The Bureau desires to meet the States on the broad basis of faith that the expenditure of Federal appropriations for road purposes is an investment which will return many fold in measurable benefits. Objections are raised if the proposed construction appears unsuited for the traffic service demanded or that the maintenance will be difficult or impossible, and the costs will be unnecessarily high.

Under the law the Bureau cannot participate in the expense of maintenance. This expense ought to be met from the revenues from the motor vehicle license fees and the gas taxes imposed now by 36 States, i. e., the road user. Proper original construction will do more to decrease maintenance costs than any other factor, and the Bureau will meet the States to the fullest extent compatible with the law to secure such construction.

There are supplementary practices which we consider desirable, for example,

(Continued on page 18)

Cochetopa Range from Poncha Pass. Photo by H. R. Hay of Salida, courtesy U. S. Forest Service.

Official Outlines Road Policy

By WILLIAM WEISER,
Chairman, State Highway Advisory Board

SINCE most of my remarks will be prophetic in a measure, I shall not refer to any of the past accomplishments save to call attention to three of what I conceive to be outstanding features.

In the first place the State Highway Department is upon a cash basis. It is a heavy handicap to take over any business which is $600,000 worse off than nothing, and I trust that such a condition will never again be permitted to obtain in the department.

In the second place we now have a comprehensive and an effective system of maintenance, and we are grateful to Robt. H. Higgins for the inauguration of this system. Later I shall mention a few isolated instances which restrain me from declaring it to be 100% efficient.

Finally, we have undertaken and are trying to follow a definite policy of construction, and it is this policy to which I would direct attention.

The people of Colorado have a right to know what method, if any, the highway department is following in the allocation of funds for road construction; whether it is being done in a haphazard way, whether by lot or from the attempt to suit everybody as nearly as possible.

That is now the method which the department has followed, or which it intends to follow.

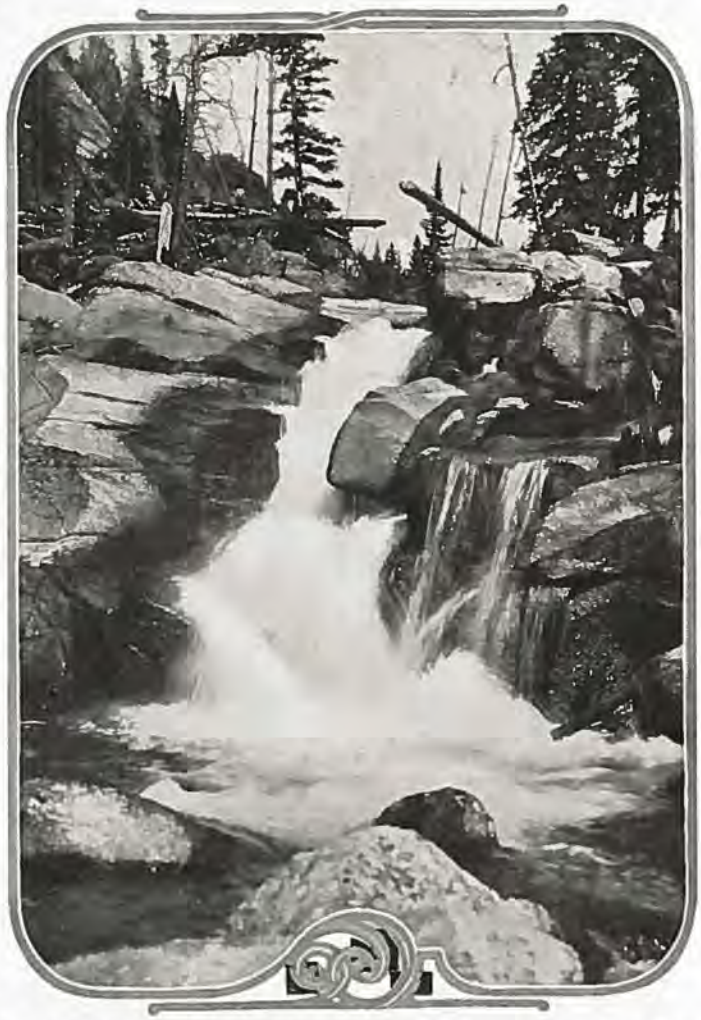
Now, I want to tell the people what the members of the board have had in mind, because it is the people's right to know, because I believe that when they do know and know that there is a definite plan, they may better understand the reason for some of the department's official acts.

Also we want everybody to know because we want their approval of what department officials regard as a progressive policy.

The necessity for a permanent policy in the judgment of the Advisory Board arose at the time that the law was passed by the Federal Congress, creating the 7% system of highways. We need not enter into a detailed discussion of the 7% system. Suffice it to say that when completed it will link state with state, and incidentally every town of any importance with every commonwealth in the United States.

It is true that by reason of topographic conditions a few counties find themselves off the 7% system. But the best evidence of the wisdom and the judgment exercised in selecting the roads which should be a part of this system is evidenced by the recent statement of Thos. H. McDonald, the Chief of the Bureau of Public Roads, when he stated that when once completed every city in the United States having a population of as low as 5,000 people will find itself upon this system, and, of course, it naturally follows that many other towns having a smaller population will also be located thereon.

The State Highway Advisory Board had scarcely started to function when the Federal Bureau of Roads submitted to us for our approval the 7% system as it now obtains in the State of Colorado.



Lincoln Gulch Falls in Pitkin County, on Independence Pass Road

Right then it became the unanimous opinion of the Board that the law inaugurated a system of highways not for the benefit of a city, a county or a district, but for the state, viewed from the standpoint of the law and the purpose of its creation or its adoption—inaugurated a system which must be statewide in its application if we were to get any good out of it.

Predicated upon that theory the last year, District No. 2 had to acknowledge its obligation to District No. 3. This year District No. 3 expresses its appreciation to District No. 1, Mr. Sommers of Denver. Likewise District No. 4 two years ago found itself to be careladen, and acknowledged its obligations to all the other districts in the state for flood time suffering.

Carried to its logical conclusion, we further determined that if we had progressive road building, we must do violence to the theories of some of the county officials to the effect that they were not receiving what has been called the county share or upon the demand that the state road money be divided upon a pro rata basis.

There can be no such a basis of division from the very nature of the creative act. In the first place, there can be no such thing as "my county's share or your county's share." There can be no division upon a pro rata basis because of the fact that it would result in a number of small disconnected Federal Aid projects, and that would be a waste of money. We have learned from experience that the greater the amount available for one single project, the more miles of road we will have constructed in that project at a great saving of overhead expense.

Furthermore, a division of the money upon a pro rata basis would result in the construction of a project in one county to the great detriment of the construction of a much needed project upon another place on the system. So if in the judgment of the commissioner his county does not receive its pro rata share in any current year, he should please bear in mind that construction may have been only postponed in that county.

Road officials might bear in mind further that the construction, permanent construction, of any link upon the system redounds to the immediate credit of the entire system.

Last November there came before the Highway Board a delegation from one of the richer counties in this state, demanding the lion's share of the money available to the representative from their district upon the express theory that the cycle had again come around to them. That may have been the mode of division in former years. If it was, there was something wrong with the cycle. It was either very erratic or else it was very slow in coming around to some of the counties, for if I may believe some of the county officials, it did not stop long enough at a lot of the counties to permit them to regale themselves even upon the crumbs which fell from the rich man's table.

The present Advisory Board refuses to countenance a theory of that kind, and

the people of the state might as well know it now.

These roads must be constructed for the benefit of the isolated districts and the congested districts alike, and neither one shall be permitted by force or artifice to deprive the other of their present just due.

Now, we will have to do violence to one other theory, and that is the theory so often expressed by so many people, that the amount allotted to each county is nowhere nearly equal to the amount of revenue that they pay into the state treasury. Of course, that argument could easily be answered, but I don't want to theorize upon that fact. I want to make a few plain observations.

Whence comes this idea that because the County of X pays into the state, let us say $100,000 per year in taxes, that therefore the State Highway Department should in turn allocate a road project to them for a like amount. Do not all departments of government, legislative, executive and judicial, alike benefit from that tax money? Why charge it all to the Highway Department?

I think that the time has come when ignorance should be educated upon this tax problem, and hypocrisy be unmasked. I contend that there is but one way of looking at it. I contend that by taking the county appropriations over a period of years, with its return allotments from the state, that these allotments are very nearly equal to what they have paid in to the state treasury for roads.

Furthermore, I contend that when correctly analyzed the counties have already been overpaid. I say irrespective of political arguments or anything else that from the correct standpoint the users of the roads are receiving too much for their money.

Let us have a clear conception of it. These roads cost the taxpayers, as far as the general levy is concerned, one-half mill on the dollar of valuation. But let us see where the money comes from which is being expended by the State Highway Department for roads. The trouble is that when a levy of 12% to 15% is included in your annual tax levy, the erroneous idea is permitted to prevail that the State Highway Department is the sole beneficiary to the extent of the full amount, when the truth of the matter is that all the department receives is the one-half mill levy from that general tax levy, and, in addition to that, the small amount which the counties levy to meet maintenance.

The revenues of the Highway Department are derived from five sources. The first of them is the Internal Improvement Tax, the second is the Federal Aid, the third is the motor vehicle tax, the fourth is the gasoline tax, and the fifth is the one-half mill levy.

The first two of them are gifts virtually from the United States government, derived in a large measure from the excise tax. The third and fourth are a privilege tax, a privilege tax which no right thinking user of the road can object to, and the source to which we must look more and more in the immediate future for quality construction if quality construction be demanded. So, then, the fifth, the one-half mill levy is the only direct tax which the State Highway Department derives.

State Road between Rifle and Meeker, showing effect of winter maintenance.

With 8,300 miles of roads in the state highway system and they give us, as far as the annual property tax is concerned, but one-half mill on the dollar. I contend that the benefits, direct and indirect, derived therefrom are out of all proportion to the amount paid therefor, and when I say that, let there be no misunderstanding, that I am referring just as much to the vehicle user as I am to the motor user.

In regard to maintenance, I must say that it is not yet perfect enough to satisfy the demands of the 7% highway law. The law makes it incumbent upon the State Highway Department to maintain the 7% system, and it penalizes us if we fail to do it. The government looks to the state to carry out this obligation, not the counties. This law gives the federal government the right to go in and to maintain, to charge the cost of mainten ance against our Federal Aid allotments, and, finally, when it does collect from the state it penalizes us to the point where it takes our money and throws it into the general pot for redistribution among all the other states.

We must avoid that, because we must not let loose of any Federal Aid money for highway construction. How will we avoid it?

It is my opinion that the interests of all concerned would best be served by the counties turning the maintenance of the 7% system over to the State Highway Department. Such a suggestion doesn't create much enthusiasm among some of the county officials. I have been told that such practice would make impossible the re-election of a county commissioner. Personally I don't believe it would have much bearing on the matter of elections.

At the same time let me suggest this for the consideration of the county officials, earnest or otherwise as they may determine; that the maintenance upon the 7% system be turned over to the state, and that the counties maintain the rest of the system. It might be possible that the state will look to the counties for some equipment. On the other hand, the counties might look to the state sometimes for financial assistance or for other things. It is my honest belief that such an arrangement would work out to the mutual benefit of both parties.

We all are engaged in the same task, the task of banishing isolation or attempting to make glad the waste places, and of developing just as fast as we can the resources of a very wonderful state.

For that reason I believe it should be handled on a basis of doing the most good for all of the people all of the time.

DENVER CONTRACTOR NAMED FOR HIGHWAY ADVISORY BOARD

Peter Seerie, well-known Denver contractor and builder, was named a member of the State Highway Advisory board by Gov. William E. Sweet on Feb. 28.

Mr. Seerie was not only named to fill the unexpired term of E. E. Sommers, but also for the full term of three years, beginning May 7, 1924. He will represent the First Highway District, which under the state highway law comprises only the city and county of Denver.

Altho Denver has not a foot of state roads within its confines, the position of representative of Highway District No. 1 is a very important one, due to the fact that the occupant has a good deal to say regarding the appropriation of that part of the highway fund paid into the state treasury in taxes by the property owners of Denver.

The appointment of Mr. Seerie brings into the service of the state a man whose experience as a contractor and builder eminently fits him for the position. Few men in Colorado have had greater experience in building operations of all sorts than Mr. Seerie. Among the larger contracts handled by him are the construction of Cheesman Dam—one of the country's largest structures of its kind—the famous Roosevelt Dam in Arizona, and the State Office building in Denver.

The esteem in which Mr. Seerie is held in Denver is evidenced by the fact that he is at present a member of the Board of Water Commissioners. As such he is largely in charge of the expenditure of nearly $7,000,000 for betterments and extension of the Denver water system.

Mr. Seerie has been a resident of Denver for many years, and is considered one of the capital city's most substantial citizens.

THE RATON PASS—The Scenic Highway between Trinidad, Colorado, and Raton, New Mexico. Photo by Trinidad Chamber of Commerce.

Good Roads Pay Big Dividends

BY CHAS. C. GATES.

Every dollar spent on Colorado good roads is an investment that pays enormous dividends direct to the man who uses those roads.

It is an investment in cheaper transportation—one of the wisest, surest investments that it is possible to make.

There is much discussion thruout the country today concerning reduction of national taxes. Soon, this sentiment is sure to find definite reflection in the popular mind within the borders of individual states. A demand for reduction of state taxes will be the result.

But in a budget of reduced taxes in the state of Colorado, the good roads item should be the very last one considered for slashing.

Critics of the present state policy of good roads extension and improvement may raise the cry that Colorado has "gone wild" on the subject. A single glance at a list of expenditures made on roads by states of size similar to our own will disprove this contention. In 1923, Colorado expended $5,500,000 on good roads. Iowa spent $31,500,000; Missouri spent $29,300,000, and North Carolina, $31,500,000.

My idea in this article is to present a balance sheet for Colorado roads. I present their actual cost for a year, as it is given in the reports of the state highway engineer. Against this cost, I have figured the actual dividends paid by such investment. The profits, surely, are highly capable of speaking for themselves.

I have considered only the economy in the cost of operation of Colorado automobiles in arriving at these figures. According to government statistics, 61 per cent of the costs of automobile operation are affected by the character of the roads over which the machines travel.

The four items in which economy is realized are: gasoline, tires, depreciation and maintenance.

It seems hardly necessary to point out that the dividends paid by Colorado's investment in cheaper transportation—your investment and mine—are less tangible dividends than the quarterly checks that arrive to swell the bank account of a stockholder in a paying corporation. Yet they are just as real.

I believe there should be less negative talk of tax payers in connection with good roads. We might better consider ourselves stockholders in a corporation founded for the purpose of saving gasoline, making tires wear longer, repair bills smaller and less frequent, and the life of our automobiles considerably longer.

Right now, in 1924, the state of Colorado has more than 180,000 automobiles. According to the figures of the Colorado state highway engineer, we have invested in Colorado roads since 1914, when the building of improved roads really started, the sum of $24,000,000.

Figuring the capital charges on this amount as interest of 6 per cent annually, the cost of that investment is $1,440,000 a year.

Added to this is $1,500,000 spent yearly on maintenance of the roads.

This gives us a total of $2,940,000 as the annual cost of good roads in Colorado.

We, as taxpayers, are investing that much annually in the Colorado roads system. What are we receiving in return?

In the year of 1923, Colorado automobiles used 75,000,000 gallons of gasoline at a cost of $15,000,000.

Experiments carried out by the United States government have shown that a test car that will cover 12 miles to the gallon over dirt roads, will travel 18 miles over gravel roads on the same quantity of gas and likewise 26 miles over hard surfaced concrete roads.

These official figures show that Colorado's hard surfaced roads earned for the motorists of this state a reduction in their gasoline bills of 1/3 of the annual expenditure and this applies whether the economy is figured as a saving between dirt roads and gravel roads, or gravel and concrete. With a gasoline bill of $15,000,000 last year, the economy from fuel alone is thus shown to be more than $5,000,000.

Exhaustive tests made by tire manufacturers show that a tire saving of 24% annually is made on concrete roads as compared to gravel roads. This represents a saving of $1,700,000 on Colorado's present annual tire bill of $7,000,000.

Depreciation—the cost of natural wear and tear in the life of a car—is 20 per cent less on improved roads. The ordinary depreciation is figured at 15 per cent per year. With an estimated total of $180,000,000 worth of automobiles in Colorado, the 15 per cent depreciation would amount to $27,000,000 annually. But when good roads save 20 per cent of such depreciation, Colorado motor car users are saved $5,400,000 every year!

Maintenance is not depreciation. It is figured as being the cost of repairs, replacements, etc.

Government tests show that hard-surfaced roads cut the cost of maintenance 20 per cent annually. If, without good roads, Colorado autoists paid $5,000,000 for maintenance each year, then a 20 per cent saving on this figure means that $1,000,000 remains unspent in the auto owners' pockets.

Summing up the foregoing items of economy for which good roads are directly responsible, we see:

Gasoline	$5,000,000
Tires	1,700,000
Depreciation	5,400,000
Maintenance	1,000,000
Total saved annually	$13,100,000

Against this, we have the annual expense of $2,940,000—the cost of the investment.

I believe that this makes it plain enough. Our annual investment in good roads pays a dividend of more than 400 per cent a year!

Furthermore, this profit is not one that returns in some mysterious way back into the coffers of the state treasury—it is a profit directly in the pocket of the citizen. Probably he doesn't realize it—for he gets it in a way that easily might escape notice. He still buys gas—but not so much. He still buys tires, but not so many. He still has repairs to make, but they are fewer. And, in the long run, he is making the discovery less frequently that his car has outlived its usefulness to him and must be replaced by a new one. A real profit, a huge one, it is, nevertheless.

In buying a bond, we say that our $100 is well-placed, for it brings us in return perhaps $6 or $7 a year. In investing in good roads, we should remember that $1 put in is bringing us returns many times greater than those brought by a first-class bond.

But the saving in car upkeep and operation is by no means the only economy worked by the magic of good roads.

The cost of upkeep of a square yard of dirt road is 16½ cents a year. For a gravel road, the annual upkeep cost per square yard is 8½ cents. And for a concrete road, the figure is reduced to an annual cost of but 1 cent a year.

Every time a square yard of dirt or gravel road is paved, 15½ cents is saved in maintenance.

Other good road economies are realized in the movement of farm crops. It is estimated that last year $1,500,000 was saved in the movement of Colorado's beet and potato crops alone.

Another economy is that of time. Time is money, and no one can say that the smooth, paved roads of Colorado do not save valuable hours for the business man who finds it necessary to use his automobile in getting from place to place in his daily work.

Also to be considered is the appeal to tourists made by good roads. The Denver Tourist Bureau estimates that 650,000 tourists and visitors to the state last year spent $45,000,000 while here. The same figures show that for each additional day they can be induced to stay, not less than $3,000,000 is left by the tourists in Colorado—more than enough to pay for the interest and upkeep of the state's roads for a whole year! Or assume that if good roads mean an increase of but 10 per cent in income from tourists that 10 per cent is considerably more than the cost for maintaining the roads.

Again, of the $1,500,000 we spend for road maintenance each year, all the money for labor, and 90 per cent of the money for materials, stays right here in the state.

Less than 10 per cent of the million and a half spent for maintenance goes out of the borders of Colorado while 90 per cent of the annual expenditure for good roads, whether for construction or maintenance makes a direct contribution to the prosperity of Colorado people.

Of $5,500,000 spent for road improvements—new construction, upkeep and all—in Colorado during 1923, $2,750,000 was paid as wages to labor and the remaining $2,250,000 for material.

More than 90% of the money invested in Colorado roads stays right here in the state. It is not a diversion of our working capital like most of the other investments that we make in stocks and bonds.

In the face of these facts and figures I cannot help but feel that the most conservative business man will admit that putting his money into roads is a sound investment which represents productive capital that will continue to earn for us most liberal dividend returns each year.

As business men we give hearty approval to any economically sound policy for tax reduction in Colorado and we are hearing much of this subject these days, but we must make sure that such tax economies are wisely applied and not allow them to curtail our investment in cheaper transportation, for good roads are nothing more or less than cheaper transportation.

There is a certain portion of the citizenship of every state that is inclined to look upon good roads—concrete highways—as a luxury, but can they call anything an extravagance or a luxury that pays a direct and personal dividend rate of more than 400% every year? No, surely not, it is an investment of the very best kind.

I believe we should hear less of protest about paying taxes for roads if we would give this subject just a little more thoughtful consideration and see it for what it is—a dividend paying investment in cheaper transportation.

It's a sound business proposition. It pays!

NEW MEXICO TO BUILD 379 MILES OF ROAD THIS YEAR

New Mexico's road construction program as outlined for 1924 consists of 43 projects, comprising 379 miles, and totaling $3,494,583.

Of this mileage some 25 miles will be of concrete and the balance gravel and crushed stone. Seven of the projects are for units ranging from 18 to 24 miles in length. All are Federal Aid projects. The government's participation is $2,355,757 and the State of New Mexico $1,338,825.

In Colorado's pioneer days, Creede, with its gold prospectors and dancing senoritas, outdid the present endurance dancers. They worked and danced for days at a time, giving rise to the phrase, "It's day all day in the daytime and there is no night in Creede."

Mt. Evans highway with winter coat. Photo courtesy U. S. Forest Service.

Road News, Views and Gossip

"Good roads are no laughing matter," says the Idaho Springs Gazette. "Road builders are laughing at an inventor who desires to interest capital in making a roadway of steel. The cost is estimated at $300,000 per mile. Twenty years ago the idea of paying $30,000 a mile for road was laughed at. Ten years ago people laughed at the idea of national highways. They don't laugh any more. The new idea is always laughed at. But laughter doesn't prove anything except the "stand-pat mind" of the laugher. The joke of yesterday is the fact of today."

Plans are now under full swing for opening of the Durango-Silverton-Ouray million dollar highway which affords an unexcelled scenic route to the Mesa Verde national park the middle of June.

Work on two projects between Ouray and Silverton has progressed nearly all winter. The contractors, Pickering Bros. and Johnson & Johnson, expected to be cleared up enough with their work by June 1 to allow traffic to go thru.

Commissioner Harry Flanders of Adams county has a crew of workmen regrading the road running directly north of Strasburg. It will be gravel surfaced for about five miles. Despite bad weather work on several county bridges were rushed to completion during March.

"When Harry Flanders isn't commissionering over at the county seat, he can generally be found somewhere along the highway, and when it comes to co-operating with the State Highway Department, he's there all over," says the Strasburg News.

A grading outfit owned by LaNier, Selander & White, Fort Morgan contractors, has established camp at Husted. This concern was awarded the contract for two miles of concrete paving between Breed and Husted by the State Highway Department on March 17. The cost of the project will be $84,000. Work will begin at Husted and extend south. The project which is known as F.A.P. No. 17-R, is a part of the north-south highway paving program.

It is announced that $50,000 is available for approved improvements on the Battlement Forest in 1924 in western Colorado. Of this sum $20,000 is set aside for the completion of a road to Alexander Lakes on the Grand Mesa, affording a shorter route from Grand Junction to the Battlement recreational areas. Officials announce that work will start early in the spring.

Peterson, Shirley & Gunther, Omaha contractors, who have done considerable road work for the state in Colorado, have been awarded the contract for the construction of railroad extending from Fort Collins north to the Wellington oil fields. Work has been started on the grading and officials announce that it will be carried forward as rapidly as possible. It is said the Union Pacific intends to ultimately extend this line into Laramie, Wyo.

Just a word of praise. For Doug Stewart of Douglas county and H. A. Cudger of El Paso county. The work of these two road supervisors in keeping the road between Denver and Colorado Springs free from snow during the week of March 10th merits the highest commendation. And the motorists who had occasion to travel on this section of the north-south highway during that period didn't fail to so express themselves. Cut yourself a piece of cake—

Concrete paver at work on Federal Aid project north of Colorado Springs, on State Road No. 1.

Approval has been given by the State Highway Department for the construction of the proposed Ophir Pass highway in San Miguel and San Juan counties. It is planned to complete the new road before the end of the coming season, according to L. D. Blauvelt, state highway engineer. It will connect with the D. S. O. highway near Silverton, and will prove of great importance to the citizens of Telluride, thru its connection with State Road No. 145 from Dolores to Placerville.

That the Pike's Peak highway from Cisco to the state line, usually a nightmare to motorists, is in splendid condition at this time, as the result of repair work recently done, is indicated by the following letter received last week by Chairman Mel Stewart of the Grand County (Utah) board of county commissioners from H. B. Lynch, representative of the Gates Rubber Company of Denver. Wiring from Price, after a trip over the highway from Grand Junction, Mr. Lynch says:

"Somebody is entitled to a word of congratulation over the condition of the road from Cisco to the Colorado line. This is the first time in my experience that the road has been in as good condition as it is today.

"You can now drive from Cisco to Grand Junction in two hours and thirty minutes without breaking any speed limits, springs or the Ten Commandments.

"Thanks."

Plans have been practically completed for the construction of the new Rainbow Route from Nederland to the Glacier region in Boulder county. This road will be 4½ miles in length and will cost $51,000, of which amount Boulder county will supply $12,000. The work will be done by the U. S. Forest Service, with F. J. Mendehall in charge of construction.

Arrangements have been made for the oiling of three miles of the Bear Creek Canon road from Morrison by the City and County of Denver. This oiling will be done as an experiment, according to F. J. Altvater, city highway commissioner. If the process proves successful several additional miles of the road will be treated to allay the dust.

Property owners of the town of Berthoud have signed a petition calling for the paving with concrete that portion of Main street not included in the 18-ft. strip which the state will pave thru the town this summer, as a part of the north-south highway from Fort Collins to Denver, according to Mayor Fairbairn.

Main highways of Colorado and practically all roads within the 15 national forests have been logged by the forest service, and are to be put in book form for distribution to the public. The individual road plots will also be made available to commercial organizations.

Delta county officials are making elaborate plans for a big picnic to be held in co-operation with Glenwood Springs road boosters on McClure Pass on June 22, according to James Beckley, commissioner of Delta. Major L. D. Blauvelt, state highway engineer, J. W. Johnson, director of the Bureau of Public Roads in Denver, and Col. A. S. Peck, of the forestry department are among the road officials who have accepted invitations to attend.

The Romance of Asphalt

Seemingly little that is romantic is associated with asphalt but on finding numerous references to it in history, we realize that it had a most important bearing on the destiny of man.

Asphalt in ancient times was called pitch and we read in the sixth chapter, 14th verse of the Book of Genesis that Noah built his ark and "pitched it within and without with pitch" to protect himself and family from the predicted flood. Asphalt was used in the construction of Ninevah and Babylon to cement together the bricks and slabs of alabaster, and was obtained from deposits in the regions near the Dead and Adriatic Seas.

Asphalt was employed by the ancient Greeks and Romans in road-building. Cleopatra, the famous vampire, and other beauties of her day used asphalt to blacken their eyebrows; so after all the 1923 flapper with her eyebrow pencil is hundreds of years behind the times.

Within the last half-century, asphalt has been widely used for paving city streets and country roads; used in the construction of built-up roofs and floors for office buildings, factories and industrial plants; used for water-proofing subways and reservoirs and also used in the manufacture of asphalt shingles and prepared floorings.

Among the sources of asphalt are the famous Asphalt Lake of Trinidad in the British West Indies, and also in the Bermudez Asphalt Lake in Venezuela. These lakes are nature's own laboratories. They are called lakes because they consist of great expanses of a more or less mobile character and resemble in many ways similar expanses of water.

World-wide attention has been focused on Trinidad because of its great natural wonder. At first glance there is nothing impressive about the Asphalt Lake. It has an almost circular area of 114 acres and consists of a series of great folds, separated by channels filled with rain water which prevent their coalescence. The edges of the lake are grassy, but vegetation is lacking near the center. Shrubs and trees, known as islands, occur in a few places, and move from place to place due to the displacement of the asphalt which is in constant motion. The Carib Indians whom Columbus found on the island have woven a fantastic legend to account for the existence of the lake; namely, that the part of the island which is now the lake, was inhabited many years ago by a fierce tribe of Indians who killed many of the humming birds which were held sacred and regarded as the spirits of the departed. The Great Spirit, according to the legend, became enraged and caused the village occupied by the Indians to boil into molten pitch and the inhabitants perished to the last man.

Scientists, however, attribute the origin of the asphalt lake to petroleum springs far beneath the surface of the lake. They say that the pitch worked its way upward centuries ago, and came in contact with a huge mass of volcanic matter; the chief component of which is clay in a collodial form and the asphalt resulted.

In 1915 the borings were made to ascertain the depth of the Trinidad Asphalt Lake, but the drill which was sent down was bent and rendered useless by the movement of the asphalt at a depth of 175 feet, and no one knows the actual depth of the lake.

The asphalt is dug from the lake by West Indian negroes armed with broad-faced picks. It breaks in large chunks, weighing from 40 to 50 pounds, and is carried by natives to small cars and distributed on a narrow gauge railroad to the refinery nearby or to the pier where it is shipped to the United States and other parts of the world. The railroad which runs over the surface of the lake is laid on palm tree ties; and because of the constant motion of the asphalt, the tracks become twisted and must be frequently inspected and straightened. When a quantity of asphalt is dug from the lake the cavity fills within a short time. It often occurs that the natives in a day's work make an excavation of approximately 700 cubic feet. However, on their return to work in the morning they find that the hole has disappeared and the space excavated has filled to approximately the level of the lake. In a few days all traces of the hole will have disappeared. At first it might seem as if this phenomenon might be due to new asphalt coming into the hole from some underground source, but we are told by geologists that the excavation is filled by the very slow settling or levelling of the entire surface of the lake. Since 1888, four million five hundred thousand tons of asphalt have been removed from the Trinidad Asphalt Lake, and the level of the lake has dropped several feet, but the supply of asphalt, nevertheless, is apparently inexhaustible.

Highway fifteen miles south of Alamosa, winter condition, showing drainage canal. Photo by Alamosa County Chamber of Commerce.

ADVISORY BOARD MEMBER APPEARS BEFORE U. S. ROADS COMMITTEE

J. A. Clay, member of the State Highway Advisory Board from the Third District, appeared before the House Roads Committee in Washington on March 17.

Cassius C. Dowell, of Iowa, is chairman. This committee has before it the important Colton Bill, which allows Western states, with unappropriated public lands and with a population not to exceed ten persons per square mile, to take up the full apportionment of Federal Aid funds for construction of primary roads, and lifts the limitation of $20,000 per mile.

Members of the committee appeared to be much impressed with the manner in which road building in the Western states is being handled, according to Mr. Clay. He said that several of the members of the committee expressed surprise at the amount of construction now being carried on in the sparsely settled communities of the west. They were outspoken in their opinion that the government should give increased aid in constructing trunk highways as a part of the 7% system thru these states.

Mr. Clay was the only representative of the West to appear before the committee up to the time he was in Washington.

It is the concensus of opinion that the perplexing matter of how to finance building of primary roads thru the sparsely settled states of the West will find a happy solution if Congress acts favorably on the Colton Bill.

Briefly, this measure permits the employment of Federal Aid allocations to 100 per cent of the cost of projects on the 7 per cent system in states having an average population of less than ten to the square mile. It contains, moreover, an amendment to the existing law removing the limitation of $20,000 per mile which the Federal government may spend for co-operative work with the states.

An analysis of the Federal Aid Highway Map demonstrates conclusively that a large percentage of the mileage on the 7 per cent system in Montana, Wyoming, Idaho, Utah, Nevada, New Mexico and Colorado will serve principally transcontinental traffic. On the theory that the nature of the traffic should determine the source of the revenues for road improvement, it is quite evident that the task of providing funds for this work is one that falls to all the states and not alone to the states through which main transcontinental highways are located.

REPORTS FROM THE DIVISIONS

DIVISION I.

HEADQUARTERS, DENVER.

JOHN P. DONOVAN, DIVISION ENGINEER.

Counties of Adams, Arapahoe, Boulder, Clear Creek, Gilpin and Jefferson.

Completion of the new 100-ft. steel bridge across Clear Creek near Arvada is expected by May 1st. This work has been under contract to the Colorado Bridge & Const. Co.

A steam power gravel plant has been constructed on the new paving project on the Denver-Morrison road, which will furnish materials for paving operations.

This project is five miles in length and will complete the ribbon of concrete between Denver and Morrison, connecting with the Mountain parks system thru Bear Creek canon.

Work on the pavement project north of Broomfield on State Road No. 1 showed very good progress during the past month, despite adverse weather conditions. R. M. Larsen, contractor, will be ready to pour concrete as soon as the weather permits.

From Morrison to Conifer the Kinney Const. Co., has a large force of men on a mountain grading project, which it is indicated will be completed by August 1.

J. Fred Roberts & Sons are waiting for the frost to go out of the ground before starting construction of one mile of paving on the Boulder road west from the 10-mile corner above Lafayette.

The contract on F.A.P. No. 257, calling for the construction of a new bridge over the Moffat tracks on the Brighton road, has been awarded to Carl Madsen, Denver contractor.

Construction of a $40,000 bridge over the Platte river west of Petersburg has been started by Chris O'Neil, contractor, who expects to complete the work this summer.

DIVISION II.

HEADQUARTERS, GRAND JUNCTION.

J. J. VANDERMOER, DIVISION ENGINEER.

Counties of Delta, Gunnison, Hindsdale, Mesa, Montrose, Ouray and San Miguel.

Construction work showed considerable progress during the past month. The frost is rapidly going out of the ground in the valleys.

K. V. Johnson is now in complete charge of the work on F.A.P. No. 102, which extends from Bear Creek Falls in Ouray county to Poughkeepsie Bridge, a distance of one mile. This contract was formerly held by Johnson & Johnson, contractors. A steam shovel, several teams and 15 men are at work. Practically all of the rock is moved.

Efforts are being made to open the Ouray-Silverton road about June 1 for the heavy summer traffic.

The steel arch bridge across the Lake Fork of the Gunnison at Sapinero is completed, except for painting and placing of the concrete floor. This is the highest bridge in the state. Winterburn & Lumsden are the contractors. H. T. Reno of Sapinero is the engineer in charge.

As soon as the weather breaks Hinman Bros. will start grading on 2.7 miles of new road and approaches to the Sapinero bridge.

H. T. Reno has completed surveys and plans for 7 miles of grading on State Road No. 6 west of Gunnison toward Iola. This project should be ready for advertising in the very near future.

Resident Engineer A. H. Batten and field party are working on plans for 9 miles of grading and gravel surfacing near Fruita.

The steam shovel crew under George Toupain have completed operations on Norwood Hill in San Miguel county. A very satisfactory job is reported from the field engineers.

Clear Creek Falls in Hinsdale county, on State Road No. 149.

DIVISION III.

HEADQUARTERS, DURANGO.

J. R. CHENEY, DIVISION ENGINEER.

Counties of Archuleta, Alamosa, Conejos, Costilla, Dolores, LaPlata, Mineral, Montezuma, Rio Grande, Saguache and San Juan.

Construction work on Cochetopa Pass, consisting of seven and one-half miles of grading and surfacing, should be finished June 1. This contract is now 90 per cent completed by Girardet-Hotchkiss Engr. Co.

A surfacing plant has been installed by Dale Hinman for three miles of surfacing between Durango and Bayfield.

J. Ed. Hansen has resumed work on five miles of surfacing and grading between Durango and Hesperus. The grading on the project is 85% complete.

Shields & Kyle, Pagosa Springs contractors, have started the construction of a bridge and 1½ miles of gravel surfacing between Bayfield and Pagosa Springs.

Work will be resumed on Wolf Creek pass project the middle of June. This work is being done by maintenance forces.

DIVISION IV.

HEADQUARTERS, PUEBLO.

JAMES D. BELL, DIVISION ENGINEER.

Counties of Baca, Bent, Crowley, Custer, Fremont, Huerfano, Kiowa, Las Animas, Otero, Prowers and Pueblo.

All drainage structures have been completed on the asphalt pavement project extending north of Trinidad under contract to the Stamey-Mackey Const. Co. The balance of the earthwork will be done with a large blade and scarifier. Sand for the cushion is now being hauled to stock piles. All heavy fills are finished. Traffic should be moving over this pavement by the latter part of the summer. The surface will be Warrenite Bitulithic.

Good progress is reported by H. M. Fox, who is constructing the new bridge over Beaver Creek, located 22 miles west of Pueblo. This project includes one mile of gravel surfacing.

Work has been resumed on the bridge over Six Mile Creek between Avondale and Vineland. This project was taken over by the bonding company, who let a contract to Arthur & Allen of Pueblo for completion. The latter will finish the grading and surfacing, while the Pueblo Bridge & Const. Co. will construct the bridge.

A large force of men have been employed by W. A. Colt & Son, in grading and surfacing 4½ miles of roadway west of Las Animas on the Santa Fe Trail. A shale binder is being used in the top course. Excellent progress has been made.

The survey for an extension of the asphalt paving north of Trinidad on State Road No. 1, toward Walsenburg, has been completed.

DIVISION V.

HEADQUARTERS, COLORADO SPRINGS.

ERNEST MONTGOMERY, DIVISION ENGINEER.

Counties of Chaffee, Cheyenne, Douglas, Elbert, El Paso, Kit Carson, Lake, Lincoln, Park and Teller.

All of the bridges thru Eleven Mile Canon on the new Midland route west of Colorado Springs have been completed and painted. About five and one-half miles of grading work must be done. It is expected that this improvement will be ready for part of the summer travel

over the Pikes Peak Ocean-to-Ocean highway. Work on the grading has been slow, but the Levy Const. Co., contractors, expect to speed up the project with the first break of spring.

The sum of $7,000 is available for improvements on State Road No. 4 in Elbert county, consisting of grading and surfacing. This work will start when weather permits under the supervision of H. R. Evans.

A grading camp has been established by LaNier, Selander & White, Fort Morgan contractors, at Husted. They have two and one-half miles of standard 18-ft. pavement to lay between Breed and Husted.

J. V. Stryker Const. Co. has resumed operations on four miles of gravel surfacing between Buena Vista and Leadville. E. E. Thornberg is resident engineer in charge.

Pouring of concrete on the connecting links in the new concrete pavement north of Colorado Springs will start when the weather permits. This stretch of pavement has several long fills which have been kept open thru the winter months to allow for settling.

The new alignment for the proposed concrete paving south of Colorado Springs, as finally approved by the State Highway Department, eliminates a bad railroad crossing.

Plans for three miles of paving north of Breed to connect with the present stretch of concrete extending from the city limits of Colorado Springs now are being drafted.

DIVISION VI.

HEADQUARTERS, GLENWOOD SPRINGS.
H. L. JENNESS, DIVISION ENGINEER.
Counties of Eagle, Garfield, Jackson, Moffat, Pitkin, Rio Blanco, Routt and Summit

Grading operations were carried forward on the Gypsum-Dotsero project in a most satisfactory manner, and as rapidly as could be expected considering the season of the year. A. L. Hockett, the contractor, has erected a crushing and screening plant. This project consists of five miles of gravel surfacing. W. A. Whitney has been assigned to the project as resident engineer.

Plans for grading of one mile of the Byers Canon road near Hot Sulphur Springs has been approved by the District Engineer of the U. S. Bureau of Public Roads. This proposed work consists of a change in alignment involving some very heavy rock work.

Work on a majority of projects in this division have been closed down since last Fall on account of winter weather.

Steel for the new bridge over the Blue river north of Dillon has arrived and work of erecting same will be started by Rogers & Pickard, contractors, at an early date. This consists of a 100-ft. span steel and concrete bridge.

More than 110,000 persons from practically every state of the United States and many foreign counties visited the San Isabel National Forest in southern Colorado during the 1923 tourist season.

Auto road, on Monarch Pass. Photo by H. R. Hay of Salida, courtesy U. S. Forest Service.

Two Counties will Improve Twenty-two Miles of Trunk Highway

By RALPH TAYLOR

Special Correspondent

Pueblo, Colo., March 31.—Twenty-two miles of road improvement will soon be under way in Baca and Bent counties on two different projects which will join. The Baca project, to be thru state funds, will be 11 miles of grading and drainage to cost about $15,000, the plans being prepared by Division Engineer James Bell.

The Bent county commissioners will spend probably a similar amount to do 11 miles of work in Bent county to connect up with the Baca county project. Thru the new road, the distance between Las Animas and Springfield will be shortened seven miles. The new road will eliminate many bad grades and sharp turns thru the old system of following section lines. The improvement will encourage more travel between the two counties.

Contracts for four small bridges in Prowers county have been let by the State Highway Department. The Pueblo Bridge and Construction company will build a 78-foot timber and concrete bridge over Willow Creek on the Springfield road at a cost of $3,498.85. H. H. McDowell, Lamar contractor, was the successful bidder on the other bridges as follows: 1 mile north of Holly, $2,726.91; north of Granada, $3,031.47 and $3,567.62.

The Otero county commissioners have purchased the Dahlgreen warehouse in La Junta to be used as a county storage building. The concrete and brick structure was purchased for $10,500 and will be used not only for storing piling, bridge timbers and other material, but also county road trucks, tractors and equipment.

Construction of the federal aid highway between Salida and Buena Vista will be under way early in April and will be one of the greatest improvements in the county, the Chaffee county officials assert.

There were 160 miles of road graded in Bent county during 1923, at a cost of $15 a mile. The total cost of all road work in the county during the year amounted to $8,800. In Bent county a temporary bridge over the Arkansas river was dismantled and the materials used in the construction of four new bridges, only one load of new lumber being used.

Contract for a 50-foot steel bridge over Cucharas river near Walsenburg in Huerfano county has been awarded by the county commissioners to the Pueblo Bridge and Construction company. Work will start in May upon the arrival of the steel.

Commissioner W. L. Rees of Pueblo county announces the purchase of 2,000 feet of "Hi-way Guard" fence to be used at dangerous approaches to bridges and culverts in Pueblo county. The Hi-way Guard is a newly invented device said to be most effective in preventing serious accidents.

A good road is not the end of all things desired, but it is often the means to that end.

KEEP RUTS FROM ROAD AND MAKE MOTORISTS HAPPY

It is ridiculous for a road patrolman to ride up and down the good portions of his road and scrape and blade these sections to perfection while mud holes and ruts mark up the other parts of his patrol section. It is not good practice to give bad sections of the road no more treatment than the good sections just because it might require turning the equipment around several times in order to put the bad stretch into shape. Turning around, it is admitted, is harder work than sitting on the machine and riding along comfortably from one end of the section to the other. It is service which the road builder and maintainer is paid to give to the traveling public. The traveling public is paying the bill in cash out of pocket and the man paying the bill for service wants that service for himself now and not tomorrow, next week, next month or next year. He is not paying for service for his children or those who come after him or even for service when he himself is ten or twelve years older. What the user of the highway wants today and now is a smooth surface to drive his car over. He wants the entire road smooth, not a rut or rutty section for every hundred or two hundred yards and then the road smooth as a billiard table for several miles. The only way he can get what he is paying for is for the man who is hired to maintain the road to go over and over the bad spots until they are in condition and approximately equal in driving surface to the balance of the road. It certainly is not good judgment or satisfactory service for the man in charge of a maintenance outfit to ride up and down the smooth parts of his patrol section utterly neglecting bad spots or at least giving them no more treatment than the sections which are already in good condition.

"WHEN WILL YOUR HIGHWAY BE COMPLETED?"

"When will your highway be completed?" was recently asked of Edward N. Hines, Chairman of the County Board of Commissioners of Wayne county, Michigan, the county in which Detroit is located and in which for seventeen years road improvement work has been carried out in accordance with a well prepared and prearranged program. The Wayne county primary system comprises 25% instead of 7% as in Iowa, of the entire highway mileage. Practically the same board of commissioners has been in charge of the work in this county from the start. Henry Ford was one of the three original members of the board but was replaced after one term of service. This county has been building its surfacing almost entirely of concrete, some of the concrete roads being thirteen and fourteen years old and still in service, many of them widened to modern widths and now part of the heaviest traveled main roads. With the completion of the present year's construction program, the surfacing of the entire primary system of this county will be complete and work will then be begun on the improvement of the secondary part of the county system. When asked recently, "When will the road system be complete?" Mr. Hines, Chairman of the Commission said: "It will not be done until every mile of road in the county is improved; until every bridge is made safe and adequate in width; until pedestrian paths are provided on the trunk lines; until all grades are separated; until the system is lighted; until all the ditches are closed; until public comfort stations are provided to take care of the traveling public in a sanitary way; until all our roads are planted; until we have numerous public parks and playgrounds; until all poles are off the highways and all wires are underground."

The State Highway Department is considering the elimination of several dangerous railroad crossings between Denver and Colorado Springs on the north-south highway. At the same time the engineers have in mind reducing the distance between these two points and the removal of the winter snow hazard near Greenland and Palmer Lake. Just what the new route will be has not been definitely decided.

Big Celebration Planned on Opening of Famed D. S. O. Road

The section of southwestern Colorado tributary to D. S. O. highway is in line for what may well be said to be the greatest event of a local nature in the history of the highway, and an event of far reaching importance to all of Colorado. The proposal by the Brooklyn Daily Eagle to dedicate the highway at the same time Mesa Verde National Park is dedicated during the early part of the 1924 tourist season should be eagerly accepted. What it will mean to the highway and Colorado cannot be estimated. The tours under direction of the Brooklyn Eagle are of national importance.

Proposal has been made that suitable dedicatory exercises be held by the members of the Brooklyn Eagle's party at the time of their visit to Mesa Verde and southwestern Colorado, and the event is of such vital importance that the section of the country served by the highway should respond to the offer and place every assistance at their disposal. Complete details of the proposed ceremony are yet to be worked out but it is safe at this time to say seventy-five or more people will be in the San Juan basin at the time of the dedication exercises who represent both a leading daily newspaper of the United States and a class of people highly appreciative of scenery and natural beauties.

The tours conducted by the Brooklyn Daily Eagle have been a regular and almost annual event for more than thirty years, and during this time have been made to many parts of the world. In 1922 a tour to Brazil was conducted by the newspaper; in 1921 a tour to the Hawaiian Islands; 1920 a National Park Dedication Tour and in 1919 the Grand Canyon National Park Dedication Tour. Advance estimates indicate a party of from seventy-five to one hundred and twenty-five persons will dedicate the Mesa Verde National Park, and will also conduct like exercises in placing D. S. O. Highway, "The Million Dollar Highway and Scenic Route to Mesa Verde," at the disposal of the American tourist and summer traveler.

Officials of the State Highway Department in co-operation with the Bureau of Public Roads are now doing everything possible to complete the D. S. O. highway in time for the dedicatory exercises. It is expected the road will be open for travel about June 1.

More than one million dollars of state, county and Federal funds have been expended to date on this highway, which when completed will provide a scenic route of par excellence.

SINGLE-TRACK ROAD SOLVES PROBLEMS

What is termed a single-track cement pavement has been laid by Nevada on the road from Reno to Lawton Springs. This is a concrete way nine feet wide, with a parallel compacted gravel road. This is the first single-track pavement in Nevada and came about because otherwise the mile cost would have been more than the Federal maximum of $40,000 per mile and the county would have had to meet the excess. The government would not have approved a road width less than 18 feet, so it was built half cement and half gravel, 18 feet across. Traffic uses the cement pavement until it is forced to turn out for traffic moving in opposite way. The resulting impact on the gravel road has been destructive. However, this is in part due to the fact that the gravel has not been wet down enough due to absence of rains. It is proposed to try the asphaltic penetration method as soon as the weather mod. erates. The experiment is being watched with interest as it may offer a practical means of stretching Federal Aid funds.

The F. D. Cummer & Son Company, Cleveland, Ohio, have issued a catalog giving complete information and specifications regarding the Cummer Portable Road Asphalt Plants and containing numerous illustrations of plants in operation.

The Gilbert Manufacturing Company of Aberdeen, South Dakota, has introduced in the western territory their line of one-man Fordson road maintainer, the Gilbert patented scraper shoe and the famous Gilbert dump wagon. An illustrated catalog describing this equipment in detail can be obtained by writing the factory direct. The Gilbert exhibit at the Chicago road show attracted wide attention, especially their maintainer, which is equipped with a Fordson power unit. This machine is so designed that the grader can be detached from the Fordson in less time than is required to hitch up a team.

Federal and State Policies in the Construction of the Federal Aid Highway System.

(Continued from page 5)

the seeding of embankments and side slopes of grades, and other work calculated to protect and thus decrease maintenance costs.

Stage Construction

The proper balance between maintenance and construction costs is one which each State may not always determine on its merits. Many States have been forced to build roads of lower types because of lack of funds and a demand for a larger mileage than is justifiable from the maintenance standpoint but necessary from the standpoint of traffic service to the public.

The stage construction policies of the Bureau seem not to be understood in some States. The Bureau is willing to approve stage construction and the most economical tppes or processes that it is possible to devise, whether these are regarded as standard or not. The stage construction policy is sound and practically all of the road work in the United States may be regarded on this basis now, since it has been definitely proven possible, assuming the original alignment and grades are adequate to build up existing types to meet increased traffic. We need to extend this policy and to develop new designs. Processes ought to be simplified, and we are ready to meet economies of this character even to the extent of extending project agreements to cover more than one construction season. For example, there are many roads which for lack of funds have been only graded and drained which would be greatly improved by the addition of sand where the traffic is not too heavy and where the soil is of the clay and gumbo types. There are many miles of such roads in the great agricultural States of the Mississippi Valley. This material could be applied in thin layers through say two construction seasons until a maintainable surface is built. The same policy could be followed in building gravel roads where the material is of the fine type and where water and rolling add undue expense. The stage construction policy must be carried out in good faith. The Bureau regards as real contracts the grading projects approved for later surfacing. There is a real danger in extending grading and draining too far ahead of the final construction, and already this situation exists to a limited extent. Lack of funds to build as original construction a suitable type for the traffic is the only possible reason for the use of the stage construction where the improvement does not extend beyond grading and draining unless there is difficult clearing or time is needed to allow the settlement of high fills. The greatest danger in stage construction lies in the possibility of not being able to secure funds for higher type surfacings where actually needed.

Increased production will come with an increased market, and the methods of transportation gauge them both.

HIGHWAY ENGINEERS START SURVEY ON NEW MERINO-FT. MORGAN ROUTE

Fort Morgan, Colo.—A thru trunk highway from Sterling, Colo., in the northeastern corner of the state, thru Brush and Fort Morgan, seems assured with the securing of the right of way for a paved road between Brush and Merino, the last remaining gap in the system between Sterling and Fort Morgan.

Paving will extend from Sterling to Merino soon. With the securing of the right of way for the road from Brush to Merino, thru Hillrose, and the expenditure this year of $93,000 on the right of way in Morgan, Washington, and Logan counties, the ribbon of concrete will be completed.

The perfected system contemplates a connection with the Greeley highway west of Fort Morgan and thus a paved road from Sterling to Denver looms.

The securing of the right of way from Brush to Merino has been the result of conferences between the county commissioners of Morgan, Washington, and Logan counties and the state highway officials.

The $93,000 was to have been expended for a road west from Fort Morgan, but inability to secure an acceptable right of way at the present time led to the money being switched to the Brush-Merino project. It is thought that the $93,000 will be sufficient to put the road bed in shape thru the three counties.

Engineers are now busy in making cross-sections of the accepted route.

COLORADO STATE HIGHWAY DEPARTMENT

COMBINED FINANCIAL STATEMENT FOR THE QUARTER ENDING FEB. 29, 1924

BALANCES DECEMBER 1, 1923:			
Highway Fund	$1,142,405.80		
Federal Aid Bond Fund	998,031.24		
County Bond Fund	123,687.14		
Total Balances		$2,264,124.18	
RECEIPTS:			
One Mill Levy	$ 162,900.78		
Gasoline Tax	193,401.16		
Internal Improvement	18,900.00		
Federal Aid	24,924.11		
County Aid	802.86		
Excess War Supplies	14,667.02		
Total Receipts		415,595.93	
Total Balances and Receipts			$2,679,720.11
DISBURSEMENTS:			
Federal Aid Projects	$ 301,121.89		
State Projects	125,908.80		
Maintenance	79,318.86		
Property and Equipment	36,764.67		
Administration, General Office	14,887.77		
Administration, Engineering	20,331.68		
Road Signs and Traffic Census	2,663.42		
Refund to Yuma County	128.50		
County Bond Projects	20,071.23		
Total Disbursements		$ 601,196.82	
BALANCES FEBRUARY 29, 1924:			
Highway Fund	$1,179,980.55		
Federal Aid Bond Fund	794,926.83		
County Bond Fund	103,615.91		
Total Balances		2,078,523.29	
Total Disbursements and Balances			$2,679,720.11

EQUIPMENT NEWS

The Austin-Western Road Machinery Company, represented in the rocky mountain territory by H. P. Wilson & Co., of Denver, has just issued its new No. 24 general catalog. This consists of a handsome 64-page edition, describing and illustrating the complete line of Austin-Western road machinery. This includes the Austin Blade Graders, Elevating Graders, Dump Wagons, Motor Road Rollers, Steam Road Rollers, "The Austin Pup," road scarifiers, gyratory crushers, portable crushing plants, sweepers—sprinkler and oilers, motor sweepers, Rip-snorters, road planers, "The Double Ender," culvers and the Western dump wagons, crushing and screening plants, drags, ditchers and back-slopers, wheelers and scrapers, grading and rooter plows, dump cars and industrial haulage equipment. Copies of this literature can be obtained from the Austin-Western Road Machinery Co., 400 North Michigan Ave., Chicago, or thru H. P. Wilson & Co., of Denver.

Eight machines—one overhead. That's what Paul Fitzgerald is saying about the P. & H. combination machine. And the eight machines out of one are: Shovel, skimmer, pile driver, dragline, backfiller, clamshell, crane and magnet. They are made up from the various boom attachments made by the P. & H. manufacturers. Every boom is designed for a specific purpose. A new bulletin is now being distributed by Fitzgerald describing these machines. One of them is yours for the asking.

Announcement is made that H. W. Moore & Co., Denver, are now distributors for the Chausse line of oil burning tool and surface heaters for repairing asphalt pavements. The Chausse tool heater is said to offer a rapid, economical and convenient method for heating tamping tools used in laying or repairing asphalt street pavements. The heater need not be started until the job is reached, taking less than five minutes to have it going at full blast. They burn kerosene or cheaper distillate. The Chausse concern also manufacture a kerosene torch widely used by road builders.

Three Osgood steam shovels are making the dirt fly on two "sections" of the Pueblo conservancy project, according to Barney Miller, intermountain Osgood representative. Two of the machines were purchased by the Union Construction Co., and the other is owned by A. S.. Hall & Son.

An improved back-sloper is announced by the Buckeye Traction Ditcher Co., of Findlay, Ohio, who are represented in this territory by H. P. Wilson & Co. New literature showing various installations is now being distributed upon request.

A fifteen and twenty-five ton trailer designed to cut time in moving contractor's equipment such as pavers and shovels or cranes has just been put on the market by the Koehring Company of Milwaukee. Bulletins describing these trailers now are being mailed by H. P. Wilson & Co., Denver, distributors for the Koehring line in the intermountain territory. Constructed of heavy steel frame of three point suspension type, the Koehring trailer is designed to allow the movement of heavy equipment thru city streets. It is equipped with rubber tired wheels. A runway may be attached to the platform when required. Steering is accomplished thru an automatic steering knuckle. The rear wheels may be equipped with external contracting band brakes operating on the hub.

Agency for the products of the Northern Conveyor & Mfg. Co. in Colorado has been placed in the hands of Paul Fitzgerald, Denver. The Northern line includes portable conveyors in three sizes, portable steel hoppers, portable bag cleaners and measuring hoppers.

Monarch Tractors, Inc., have introduced in the intermountain territory a twin rotary snow plow thru W. W. Griswold, Denver, distributor. It is designed in combination with the Monarch 10-ton tractor. This plow is said to be especially effective on mountain highways.

"How to build modern roads" is the title of one of the most interesting booklets ever issued for distribution to road builders. It is published by J. D. Adams & Co., of Indianapolis. Methods of using the Adams leaning wheel graders are described in detail. A supply of these booklets have just been received by Thomas J. Fair, Denver, distributor. Every owner of a grader should have one.

CONTRACTS AWARDED

Proj. No.	Location	Length	Type	Successful Bidder	Bid Price
17R	Breed-Husted	2.339 mi.	Concrete Pavement	LaNier, Selander & White, Ft. Morgan	$81,399.23
257	No. of Denver		Concrete Viaduct	C. C. Madsen, Denver, Colo.	12,178.40

PROJECTS ADVERTISED FOR BIDS

Proj. No.	Location	Length	Type	Bids Opened
246B	Vineland-Pueblo	0.787 mi.	Concrete Paving	April 8, 1924
254A	Byers Canon	1.057 mi.	Grading	April 8, 1924
255B	Brush, West	2.944 mi.	Concrete Paving	April 8, 1924
888	Black Hawk	370 ft.	Flume	April 8, 1924

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

116B	Breed-Colorado Springs	0.892 mi.	Concrete Paving
248A	Buena Vista-Salida	12.048 mi.	Graded and Gravel Surfaced
266A	Durango-New Mexico State Line	3.030 mi.	Gravel Surfaced

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

116C	North of Breed	3.22 mi.	Paving
242	Grand Junction-Fruita	3.5 mi.	Gravel Surfacing
258A	West of Gunnison	5. mi.	Gravel Surfacing
262A	West of Walsenburg	2.5 mi.	Gravel Surfacing
273A	East of Lamar	4.5 mi.	Gravel Surfacing
275A	Wolhurst-Castle Rock	10. mi.	Paving
283A	Loveland-Berthoud	2.5 mi.	Paving

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1923

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
2-R	Trinidad, north	3 mi.	Asphalt Pavemt.	Strange-Maguire Const. Co.	$121,934	8	2-R
102	Ouray-Red Mountain	1.06 mi.	Mtn. Grading	Johnson & Johnson	58,972	73	102
116-A	Colorado Springs paving	4.18 mi.	Conc. Paving	Standard Engr. & Constr. Co.	238,944	73	116-A
119-B	Cochetopa Pass	7.5 mi.	Grad. & Surf.	Girardet-Hotchkiss Engr. Co.	53,709	92	119-B
125	Sapinero-Cimarron	11.3 mi.	Grav. Surf.	Dale Hinman	36,797	43	125
125	Sapinero-Cimarron		Steel Bridge	Winterburn & Lumsden	53,072	80	125
135	Denver-Morrison	5.3 mi.	Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	25	135
157-B	Buena Vista-Leadville	4.20 mi.	Grading	J. V. Stryker Const. Co.	65,715	70	157-B
168-B	Lamar-Hasty	6.86 mi.	Gravel Surf.	Standard Engr. Co.	60,194	70	168-B
174	Red Mountain	3.03 mi.	Mtn. Grading	Pickering Bros.	82,071	84	174
190	Summit County Bridge and Road	1.45 mi.	Grad. & Bridge	Colo. Bridge & Constr. Co.	40,154	89	190
207	Dillon-Kremmling	100 ft.	Truss Bridge	Rogers & Pickard	28,831	39	207
208-C	Grand Junction-Palisade	4.75 mi.	Gravel Surf.	Northwestern Const. Co.	46,627.35	60	208-C
213-B	Durango-Hesperus	5.26 mi.	Grav. Surf.	J. Edd. Hansen	72,960	52	213-B
214	Durango-Bayfield	3 mi.	Gravel Surf.	Dale Hinman	53,411.05	60	214
221	Loveland, north	4.05 mi.	Conc. Paving	Fred C. Dreher Constr. Co.	142,125	98	221
222-C	Broomfield-Lafayette	2.82 mi.	Conc. Pavement	R. M. Larsen	134,933	14	222-C
223-A	Kremmling-Rabbit Ear	2.88 mi.	Grav. Surf.	Henry Shore	30,565	51	223-A
224	Morrison-Baileys	5 mi.	Grading	M. J. Kenney Const. Co.	59,781	36	224
225	Fitzsimons Hospital road	1.00 mi.	Bit. Paving	Miller, Douglas & Hanes	36,618	80	225
226-A	Brighton-Ft. Lupton	8.23 mi.	Conc. Paving	White & Johnson	241,133	85	226-A
226-B	Brighton-Greeley	2.86 mi.	Conc. Paving	White & Johnson	89,993	52	226-B
226-C	Platteville-Greeley	4.4 mi.	Conc. Paving	Engr. Constr. Corp.	120,114	28	226-C
229	Pueblo-Florence	1 mi.	Grav. Surf. & Bridge	H. M. Fox	34,646.50	85	229
230-A	Wolhurst, south	0.852 mi.	Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	26	230-A
230-B	Wolhurst, south	3.99 mi.	Conc. Pavement	Brodie & Anderson	153,971	23	230-B
231	Six Mile Creek Bridge	0.45 mi.	Steel Bridge	McCormick & Brockaway	25,165	83	231
240	Gypsum-Dotsero	5.185 mi.	Gravel Surf.	O. L. Hackett	66,178	28	240
241	Gunnison River, North of Delta	600 ft.	Steel Bridge	Winterburn & Lumsden	99,309	74	241
245-A	Las Animas-Hadley	4.54 mi.	Gravel Surf.	W. A. Colt & Son	42,786	73	245-A
246-A	East of Pueblo	2.537 mi.	Conc. Paving	R. A. White	78,431	15	246-A
255-A	Ft. Morgan-Brush	2.70 mi.	Conc. Paving	Colo. Bridge & Constr. Co.	85,763	66	255-A

TO STUDY U. S. HIGHWAYS

Forty representatives from twenty Latin American countries will make an intensive field study of highways and highway transport in the United States early this summer as guests of the Highway Education Board.

Among the national organizations that will be active in support of the board in its endeavor are the American Association of State Highway Officials, The American Road Builders' Association, The Asphalt Association, The Motor and Accessory Manufacturers' Association, the National Automoble Chamber of Commerce, the Portland Cement Association, the Society of Automotive Engineers, and the Society for the Promotion of Engineering Education.

The countries from which representatives will be chosen include Argentine, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Salvador, Uruguay and Venezuela.

A minimum of one delegate from each country will be present while two or three representatives will be sought from several of the larger republics. They will, it is said, be the unofficial representatives of their governments.

The main trunk roads of Colorado are opening up in unusually good condition this spring; according to reports received from the district maintenance supervisors. Good roads are reported from practically all parts of the state.

An early start is being made by Highway Patrol forces. The patrolmen on the 6,000 mile state system are opening drainage and hurrying the drying of roads after spring thaws. A concerted effort has been made all winter to keep the main highways free from snow. Officials figure that it is cheaper to remove snow than to build new roads.

"Evil communications corrupt good manners." Don't associate with a flivverboob.

KOEHRING

Gasoline Shovel

Crowds Beyond End of Boom

WITH the short boom, and long sticks it can work in close quarters with low headroom, long reach and high lift. Likewise it racks way in—giving an extraordinary range of dipper travel.

The Koehring crowding action is absolutely independent of any other function—is accomplished by cables attached to opposite sides of reversing forward drum on the machine, leading down around fleeting sheaves at boom axis point and then to opposite sides of drum on skipper shaft. Automatic adjustment keeps cables taut at all times. Boom may be raised or lowered without tightening or loosening cables.

Heavy Duty! A Big Koehring Value.

Not a phrase or a slogan, but an extra margin of strength—reliability in every detail. It means trouble-free operation—less depreciation, and longest service life.

The Koehring shovel is not merely a steam machine powered with a gasoline engine, it is strictly designed for internal combustion engines, which means greater efficiency and durability.

Write for Koehring Gasoline Shovel Bulletin No. 15

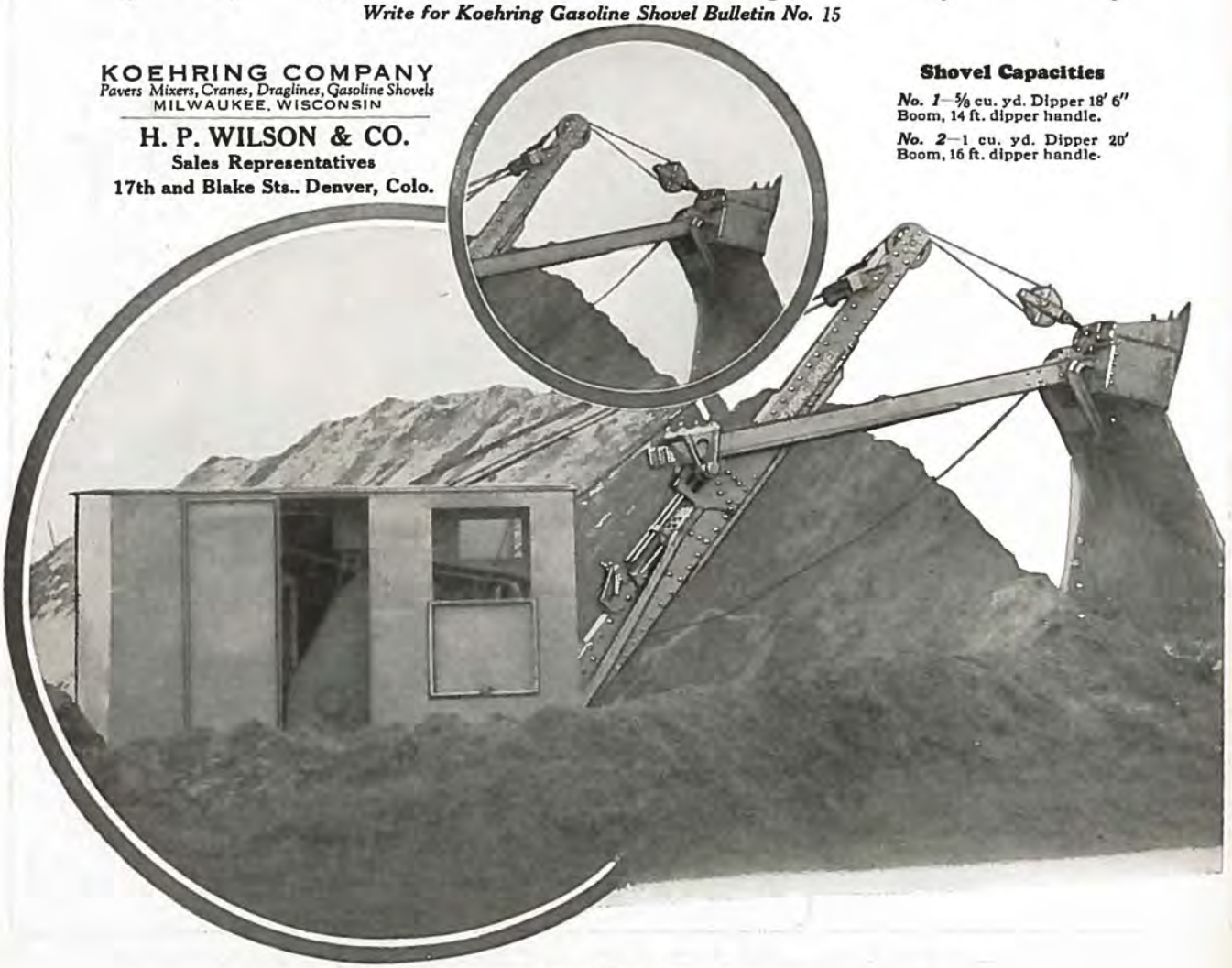
KOEHRING COMPANY
Pavers Mixers, Cranes, Draglines, Gasoline Shovels
MILWAUKEE, WISCONSIN

H. P. WILSON & CO.
Sales Representatives
17th and Blake Sts.. Denver, Colo.

Shovel Capacities

No. 1—⅝ cu. yd. Dipper 18' 6" Boom, 14 ft. dipper handle.

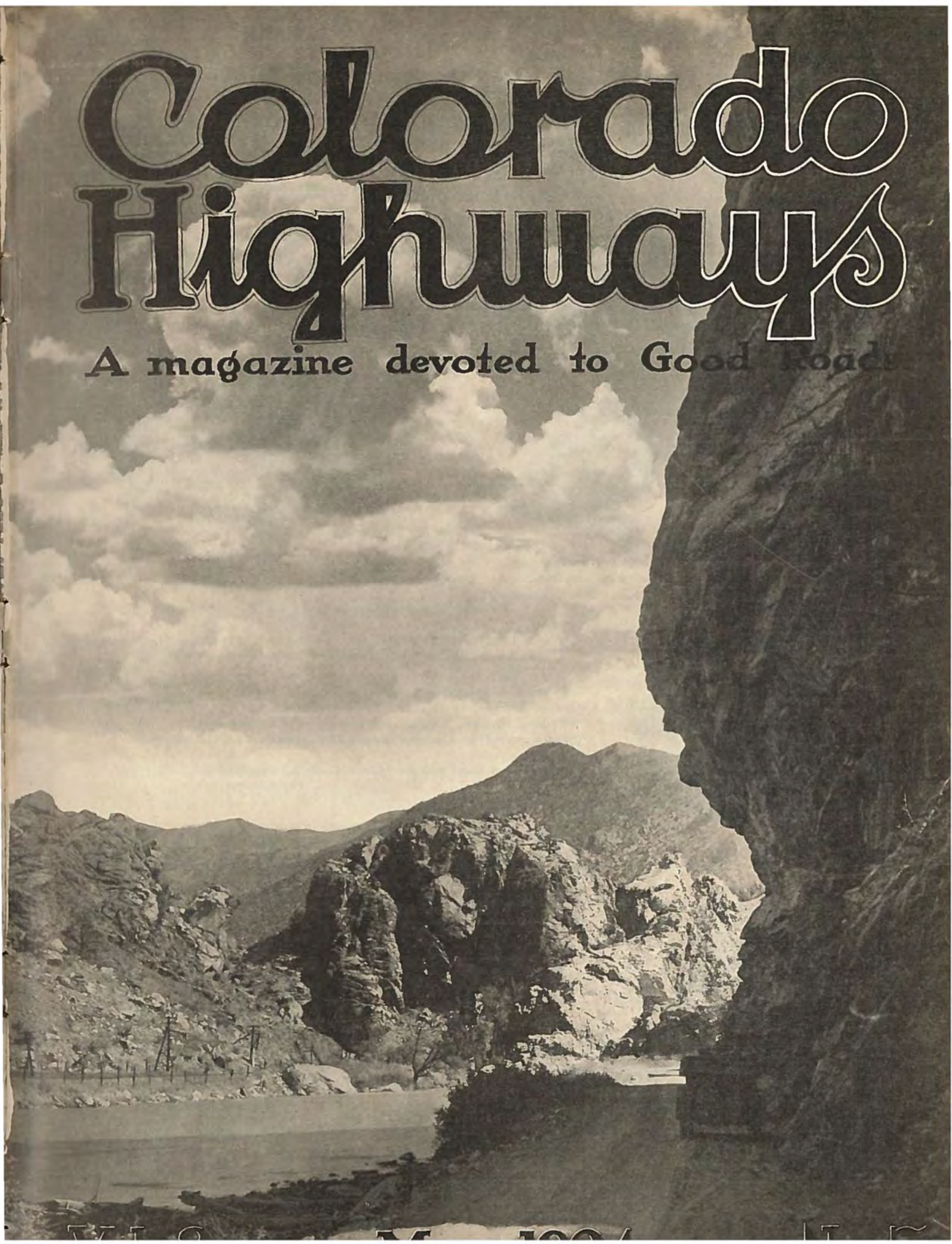
No. 2—1 cu. yd. Dipper 20' Boom, 16 ft. dipper handle.



THE BRADFORD-ROBINSON PTG. CO., DENVER

Colorado Highways

A magazine devoted to Good Roads



Colorado Highways

"BETTER ROADS"

Official Publication of the
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

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Articles on the subject of road building and highway development in the West are solicited. Manuscripts should be addressed to the Editor, with return postage. Photographs should accompany articles whenever possible. Manuscripts not found available will be returned promptly.

10 CENTS A COPY. **$1.00 A YEAR.**

OUR COVER PICTURE

The photograph on the front page of this month's issue of Colorado Highways shows the "Pinnacle Rock" on the upper Arkansas river, located near Salida. This picture gives a striking example of the many beauty spots to be found thruout Colorado. By this permanent highway, preserved and improved by constant maintenance, hundreds of tourists each year are brought in close touch with the wonderful scenic beauties of this state. It would be hard to estimate the actual financial benefits derived by the people by improved roads such as is pictured on our cover this month.

Colorado Highways
"BETTER ROADS"
VOLUME III. MAY, 1924. NUMBER 5.

Fourteen Road Contracts Awarded

FOURTEEN contracts have been let by the State Highway Department since Jan. 1, reaching a total of $914,628.

Six of these contracts were for concrete paving in various parts of the state. These projects include fourteen and one-half miles of standard 18 ft. pavement.

Four of the contracts embrace thirty-one and a half miles of gravel surfacing.

The largest contract let calls for the construction of six and one-third miles of pavement between LaSalle and Gilcrest in Weld county. This project was awarded to J. Fred Roberts and Son, Denver, the contractors agreeing to complete the work for $175,647.

When this pavement is opened to traffic, which is expected the latter part of the summer, there will be a continuous ribbon of concrete between Denver and Greeley, a distance of 54 miles. The Roberts contract is located on what is known as the LaSalle "cutoff." The grading for this piece of roadway was completed in the fall of 1923. Since that time it has been used by traffic and the contractor will be required to build only the sub-grade.

In locating the road on a new line between Gilcrest and LaSalle the highway engineers reduce the distance between Greeley and Denver about two miles and also eliminate a very crooked and dangerous piece of the old road which traversed the river bottoms near LaSalle.

Work on the project will start just as soon as weather permits. The contractor will put a large force of men and equipment on the work in order to rush same to completion as early as possible.

A contract for six and one-half miles of gravel surfacing west of Steamboat Springs on the Victory Highway was let on Feb. 26 to the Northwestern Construction Co. on their bid of $126,374. In point of money involved, this was the second most important project let by the department.

Between Buena Vista and Salida, in Chaffee county, the Western Construction Corporation of Denver will construct this summer twelve miles of gravel surfacing, for $93,533. Completion of this project will mark the elimination of one of the worst pieces of roadway on the Pikes Peak Ocean-to-Ocean Highway in Colorado. The contractor has already moved his outfit on the job and promises to use every means to complete the work before the next winter sets in. In years past this road has been rendered almost impassable to cars during the winter months, causing considerable loss to ranchers and motorists.

Major L. D. Blauvelt, state highway engineer, announces that strenuous efforts will be made to finish contracts on schedule time, and it is anticipated that work this year will far surpass the record of 1923. Orders have been issued by him to speed up work on plans in order that contracts may be let as early as possible. A large force of draftsmen now are employed on this phase of the work.

It is expected that contracts for more than sixty miles of concrete paving will be let this year. About an equal number of miles of paving will be completed during the year. Included in this mileage will be several projects which were started late last year.

Improvements contemplated this year which remain to be placed under contract will cost more than $3,000,000, according to advance estimates by highway engineers. Proposed projects are located in nearly every section of the state on heavily traveled main highways.

The fourteen projects placed under contract are as follows:

F. A. P. 116-B — Contract awarded April 19, to J. L. Busselle & Co., Colorado Springs, on bid of $51,000, for construction of 0.892 mi. concrete pavement and bridge, located about 5 mi. north of Colorado Springs.

F. A. P. 248-A—Contract awarded April 19 to Western Construction Corp., Denver, on bid of $93,533, for construction of 12 miles of gravel surfacing in Chaffee county, beginning south of Buena Vista and ending at Salida.

F. A. P. 255-B—Contract awarded April 19 to W. F. Pigg & Son, Denver, on bid of $92,486, for construction of 2.944 mi. concrete paving in Morgan county, extending westerly from Brush.

F. A. P. 246-B—Contract awarded April 19, to W. A. Colt & Son, Las Animas, on bid of $29,453, for construction of 0.787 mi. concrete pavement located east of Pueblo, near Vineland in Pueblo county.

F. A. P. 254-A—Contract awarded April 19, to Pioneer Const. & Engr. Corp., Denver, on bid of $72,408 for construction of one mile of heavy mountain grading and excavation, extending southwesterly in Byers canon from Hot Sulphur Springs, in Grand county.

F. A. P. 257—Contract awarded March 19 to Carl C. Madsen, Denver, on bid of $12,178 for construction of concrete via-

(Continued on page 18)

Picturesque in the extreme is the State Highway running thru the Big Thompson Canon, leading to the Rocky Mountain National Park.

Boulder county is justly proud of its road in the South St. Vrain Canon, which has been practically completed to Allens Park. The above picture is a glimpse of the road four miles above Lyons. Photo by H. E. Link, Longmont.

County Road Funds Slightly Reduced

NOTHING illustrates the interest taken by the people of Colorado in their highways better than their willingness to tax themselves freely for roads. Reports from county treasurers of the sixty-two counties of the state having highways within their boundaries—that is, every county except Denver—show that during 1924 the people of the state will pay the respectable sum of $3,158,534.26 for road purposes, in addition to about $750,000 which they pay into the state treasury for expenditure by the state highway department.

The average county road levy is 2.69 mills. The average taxpayer, outside of Denver, pays $2.69 for every $1,000 worth of taxable property, to keep the roads, other than state highways, in good condition and improve them so that they are able to take care of the present-day traffic. Figures are not available from other states regarding county road levies, but it is safe to say, affirm road officials who are familiar with taxation, that few states there are in the Union, the counties of which set aside amounts as liberal as the counties making up this great state of ours.

It is interesting to note what financial sacrifices some counties in Colorado are willing to make to get good roads connecting all parts of the county up with the state highways. These sacrifices are all the more remarkable in view of the fact that the farming and livestock industries have been hard hit in Colorado. The only explanation is that more and more the people are beginning to realize the value of good highways and that money spent on roads is an investment which in dollars and cents yields high returns—returns out of all proportion to the sums invested.

Eagle county leads all the counties of the state in the willingness of its people to tax themselves so that its roads may be improved. Its county road levy is 8 mills. In other words, the property owners of Eagle county will this year pay at the rate of $8.00 per $1,000 valuation. As pointed out, the average for the entire state is $2.69, so that Eagle county's rate is practically three times the average rate.

Next in order, together with their levies, are Montezuma county with 7 mills, Dolores with 6, Garfield with 5.86 and Moffat with 5.50.

Chaffee county levies the lowest county road tax. Its levy is only 0.75 mills. Chaffee county is followed, in order, by Phillips with 0.90 mills, Morgan 0.93, and San Juan, with 1.00. Hinsdale county, from the standpoint of assessed value the smallest county in the state, has levied a county road tax of 4 mills.

The entire amount of road tax raised by the counties will be devoted to the upkeep and construction of county highways and bridges, with the exception of about $760,000—the amount pledged by the counties to meet a like amount of state highway funds for maintaining the state highways.

A comparison with the amount of county road taxes raised in this state during the past nine years discloses that the sum to be expended by the counties has been exceeded during the previous four years. The decrease is chiefly accounted for by the fact that during the previous four years many counties raised money to assist the state highway department in meeting federal aid appropriations for state highway construction and also by the completion of many county roads and bridges, thus permitting the counties to "slow up" to some degree.

The following table shows the amount of county road tax raised in the state during the past nine years:

1924	$3,158,534.26
1923	3,219,870.14
1922	3,750,328.25
1921	4,380,701.75
1920	3,653,637.70
1919	2,667,914.63
1918	2,276,876.33
1917	1,683,518.86
1916	1,605,519.82

The showing for 1924 is also remarkable in view of the fact that there has been a considerable shrinkage in the valuation of the taxable property since 1921 and 1922.

The following table shows the levy in mills and the amount of money raised in each of the counties of the state. Den-

ver is not included in the list because Denver does not impose a road levy. It has a levy for park purposes, part of the proceeds of which are devoted to keep the roads in the Denver mountain parks —part of the state highway system—in repair, but no specific amount is set aside for this purpose.

County	Levy in Mills	Revenue
Adams	2.75	$ 89,356.49
Alamosa	1.75	16,177.50
Arapahoe	1.75	36,778.40
Archuleta	2.90	13,790.81
Baca	2.00	20,930.00
Bent	2.00	28,019.80
Boulder	3.25	152,966.36
Chaffee	0.75	7,931.11
Cheyenne	1.25	24,654.18
Clear Creek	4.00	22,193.66
Conejos	3.00	26,152.55
Costilla	3.50	19,833.24
Crowley	2.44	24,033.24
Custer	2.50	7,778.13
Delta	3.79	64,462.54
Denver	...	.....
Dolores	6.00	10,471.37
Douglas	3.25	37,586.66
Eagle	8.00	52,410.03
Elbert	4.00	75,068.46
El Paso	2.70	190,292.03
Fremont	2.95	63,650.16
Garfield	5.86	102,716.40
Gilpin	3.50	9,949.47
Gunnison	2.60	41,609.04
Grand	5.00	23,373.78
Hinsdale	4.00	3,729.08
Huerfano	2.50	39,764.67
Jackson	1.00	4,254.19
Jefferson	3.12	76,719.61
Kiowa	1.20	17,282.21
Kit Carson	2.25	63,887.62
Lake	1.55	12,537.01
Logan	2.00	80,495.08
La Plata	4.00	60,728.64
Larimer	2.75	144,286.29
Las Animas	3.00	130,772.36
Lincoln	2.65	62,303.61
Mesa	3.65	108,124.94
Mineral	3.50	4,784.97
Moffat	5.50	34,608.86
Montezuma	7.00	44,218.79
Montrose	3.13	45,210.34
Morgan	0.93	27,223.30
Otero	2.90	97,734.47
Ouray	5.00	22,660.25
Park	3.00	26,552.78
Phillips	0.90	15,557.85
Pitkin	1.88	8,668.33
Prowers	2.25	52,178.38
Pueblo	2.95	215,367.72
Rio Blanco	3.32	18,047.52
Rio Grande	2.50	28,805.69
Routt	2.25	33,461.80
Saguache	3.00	34,252.35
San Juan	1.00	3,259.99
San Miguel	4.00	30,807.00
Sedgwick	2.94	31,659.90
Summit	3.00	15,799.84
Teller	2.50	17,341.23
Washington	1.50	40,308.40
Weld	2.46	279,706.60
Yuma	2.50	63,247.18
Total		$37,158,534.26

FOOLS AND CARS

Blinks—They used to say the Lord took care of fools and drunks.

Jinks—That was before fools and drunks began to drive motor cars.—Cincinnati Enquirer.

Plateau Canon scene on highway near Grand Junction, leading to Grand Mesa, world's largest flat top mountain; paradise of fishermen, hunter and camper. Highways are traveled the entire year. Photo courtesy Grand Junction Chamber of Commerce.

"ROAD POLITICS" IS NOT COUNTENANCED

Road building during the last few years has changed considerable, due mainly to changes in road-building policies as a result of unusual demand for better roads which came with the unprecedented use of highways.

Yesterday, the average trip was to your neighbor's place or at the farthest to the nearest town. Today, the arevarge person using the highways does not think it unusual to make a "little trip" of 100 or 200 miles.

Yesterday, the man of influence in a community worked to have the road from his place to the railroad station or to his shopping center built and properly maintained. Today, this same man, because he makes trips from county to county and from state to state, demands that road building be handled on a basis of "getting somewhere," not merely a road which would serve a small community.

Yesterday, the county politician used every cunning trick that he could to swing the biggest appropriations possible to the section from which he procured the most votes. Today, the county politician works out a plan of road construction which will not merely give one section a good road while the section just a little distance away has to wallow in mud, but which will enable the entire population of the county to get to whatever destination in the county they desire to visit—and also to connect up with roads leading to other counties and states so that intercourse between counties and states is made easier.

Yesterday, the writer remembers a politician being elected because he was known to be able to "get more road money than any other county in the state." Today, the same politician can not get any more than his county deserves under a well-planned road-building policy which aims at a system of highways which will serve all the people of the state, not merely a handful in one section. This politician will have to conjure up another appeal in the future to hoodwink the voters. —Grand Junction News.

Little Details *of* Road Construction

BY ROY J. RANDALL
Office Engineer, State Highway Department

WITH THE passing of time, the developments in highway transportation have made necessary great changes in methods and ideas of highway construction. In the days gone by the gay Lothario hitched up the "old grey mare" to the new buggy on a Sunday afternoon in June and drove over to Nancy's house, where, after passing the time of day with Nancy's "pa," the G. L. invited Nancy to go for a drive and Nancy blushingly accepted. They went out the south road which meandered through the farms along the river. This was considered a good road at the time in spite of the fact that in places the grade and alignment followed up and down and in and out, beside the fields and meadows. Drainage structures were simply constructed of timber or stone, according to which was most available, and the edges of the road was overgrown with underbrush, flowers and weeds. The "old grey mare" had been well fed and stepped along nicely at a gait of eight miles per hour. At this speed no great difficulty was encountered in negotiating the right angled corner just beyond Robinson's place. There were many of these angles in the road but they caused no great inconvenience to the drivers and no thought was given to them.

Time has changed the picture. Gay Lothario has long since splashed into the turbulent seas of matrimony and the "old grey mare" is one of the tender recollections they have as they roll smoothly over the south road in a shining new sedan.

This road has been paved now as far as Pepville and another contract has been let beyond this place to Southampton. The old drainage structures have been replaced with new culverts and bridges and outside the shoulders the ditches have been cleaned and the brush and weeds are now cleaned out.

The corner just beyond Robinson's place has been changed so that now the road follows a circular curve at this point. To accomplish this result it was necessary for the county commissioners to buy some land from Old Man Robinson for the new right of way. He objected at first but after it had been explained that the road would not be safe for travel unless the sharp turn was eased up by a curve, he was persuaded to sell.

The engineers from the State Highway Department laid out the curve and it was built on the arc of a circle and yet G. L. and Nancy feel that they must drive very carefully around this point to avoid an accident. The pavement was laid around the curve just the same as along the straight stretches, with no superelevation provided and G. L. feels the effect of centrifugal force on the sedan as he rounds the curve. This is the place where Bud Peagler skidded in the snow off the road last winter and turned his flivver over in the ditch.

This view of the Denver-Colorado Springs concrete highway exemplifies the "spiral curve."

There are many curves on the highways of the country just like this one. The tremendous advance in the production and improvement of the automobile has taxed the energies of the road builders to keep up with the demand for better highways. Bond issues have been voted by the people to provide funds for road improvements and the engineers have been hard pressed, making surveys and plans for new improvements and at the same time give their attention to inspection and supervision of construction work under contract.

Where curves were necessary, they were laid out and built as simple arcs of circles joining the straight portions and no serious consideration was given to such matters as tipping up the pavement around the curve or widening at the curve.

Railroad engineers have long recognized the necessity of elevating the outer rail above the inner to compensate for the centrifugal force caused by trains traveling at high speed around curves. Text books and handbooks of Railroad Engineering treat the subject fully and the amount of superelevation to be used on a given degree of curve and a specified maximum train speed has been worked out on a mathematical basis. It is obvious that all the above conditions cannot be satisfied at the point where straight track joins a circular curve. In other words the two rails cannot be level across and at the same time have the outer rail elevated. It has become the best practice in railroad work to accomplish this result by introducing an approach from the straight track (called tangent) to the circular curve consisting of a curve of varying radius, in order to allow the train to pass gradually from the tangent to the circular curve. This approach curve is called the "spiral easement."

Some of the Highway Departments have developed and are using a widened section of paving on curves, varying from two to eight feet extra width, depending on the sharpness of the curve, and the prevalent opinion in the particular state. This is based on the idea that cars and trucks need more room on a curve than on a straight road.

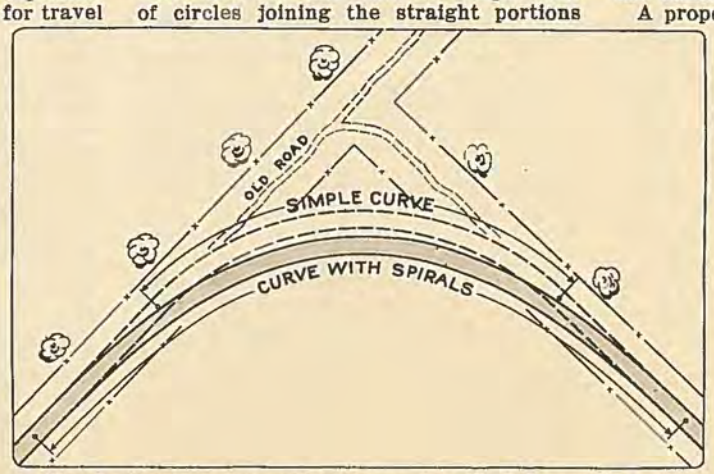
The amount of superelevation to be used and the details of finishing the surface have received attention, but the practice has not been standardized. The units of highway traffic are widely varied. They run the full gamut of vehicles from the Stutz Bearcat traveling far in excess of the legal speed limit, to a topheavy five-ton truck, carrying loads greatly in excess of their rated capacity, and horse drawn wagons loaded with hay, etc.

It is obvious that superelevation to fully compensate for the centrifugal force caused by curvature is not desirable and that much dependence must be placed on the stability of the vehicle and tires to hold to the road. A conservative amount of superelevation should be provided for the comfort and safety of passengers.

A properly designed highway curve involves the use of appropriate spiral easement approaches and superelevation, starting at the beginning of the spiral and reaching a maximum at the junction with the circular portion of the curve. The spiral must have sufficient length to fully serve the purpose for which it was intended, that is to avoid a sudden change in direction of travel. It will effect a saving in cost of construction in that the line will be shortened and also that this type of curve largely does away with the necessity of widening curve sections.

We have computed a set of tables for spirals to meet conditions of highway work

(Continued on page 18)



Sketch showing contrast between modern "spiral curve" as recently adopted by the State Highway Department, and the old-style "simple curve."

A fine example of modern road construction is the Gunbarrel road. Scene is looking north from Monte Vista, showing gravel surfacing after completion of Federal Aid Project. Photo by Bureau of Public Roads.

Roads of The San Luis Valley

THE Gunbarrel is the principal highway running north and south thru the San Luis Valley, and, as its name implies, is a perfectly straight road, starting at Saguache at the north and running more than sixty-five miles straight south to an old Spanish settlement in Conejos county—Capulin.

Running east and west, at nearly every section line thru the agricultural district, are cross roads in good condition. The Gunbarrel has been greatly improved during recent years. One of the first Federal Aid projects constructed in the state was on this road. It was No. 68 and involved an expenditure of $80,000 in 1922, by government, state and county.

This improvement consisted of regrading and gravel surfacing of that part of it running directly north of Monte Vista twelve miles in Rio Grande county to the Saguache county line, which is the heavy traffic part of the road. Since then the road has been kept in excellent condition thru constant patrol maintenance.

The principal road running east and west through the valley is the road known as the Spanish Trail, now an auxiliary summer route of the National Old Trails Ocean to Ocean Highway. This road shortens the route from the East to California and from California east several hundred miles, but is available for overland traffic in and out of the valley during the summer months only, because during the winter months the mountain passes are filled with heavy snow. This road enters the valley at Fort Garland and from there west through Alamosa, Monte Vista, Del Norte and South Fork and then over Wolfe Creek Pass, one of the most scenic drives in the whole mountain district in the United States, crossing the Continental Divide at the top, and from there on to Pagosa Springs in the San Juan Basin, Durango and Mesa Verde National Parks, perhaps the smallest National Parks in the United States and also the most interesting, with its historic ruins of the Cliff Dwellers, etc., all less than 200 miles from Monte Vista, with good roads and wonderful scenery all the way.

There are six passes into the Valley that are passable for automobile and several others passable for wagons; the passes in the south end of the Valley lead to Trinidad to the south and east and to Taos in New Mexico and on to Santa Fe and Albuquerque. Taos is claimed by some to be the oldest settlement in the United States, and there is at this time many historical and interesting ruins to be seen there. One pass, Poncha, at the north, leads to Salida and on to Denver, and the other, at the north, leads to the western slope, Montrose, Grand Junction, etc. On the west is the Wolfe Creek Pass into the San Juan Basin and on to California. There will soon be another automobile pass completed into the Valley from the northwest, from Pueblo, and which will shorten the distance from Monte Vista to Pueblo about 38 miles. This is known as Mosca Pass and was traveled by Fremont and his party of explorers in 1858, when they came into the Valley for the Government.

The mountain streams comprising the Rio Grande, Alamosa, Conejos and La Para Rivers are all well stocked with mountain trout of the different varieties, and any of these streams can be reached in an hour or two by automobile.

Among the scenic attractions are the Poncha and La Veta passes leading into the valley over state and transcontinental highways. And the Wolf Creek Pass, over the Continental Divide, first opened in 1917, offers to the tourist one of the grandest scenic attractions in the state. The mountains are full of beautiful valleys, through which flow the cold and clear mountain streams, well stocked with trout and affording a truly ideal opportunity for outing and camping parties.

HIGHWAY ENGINEERS EXAMINED BY STATE CIVIL SERVICE COMMISSION

Civil service examinations for the positions of rodman, instrumentmen and resident engineer in the Highway Department were held by the State Civil Service Commission during the first week in April. More than 200 men took the examinations, the results of which will be announced some time this month.

Applicants for the positions were examined in Denver, Pueblo, Grand Junction, Durango and Steamboat Springs. In the last named two cities the examinations were conducted by the county superintendent of schools. The Civil Service Commission, at the last moment, decided to hold examinations at Durango and Steamboat Springs, because snow blockades made it impossible for applicants to make the trip to either Denver, Pueblo or Grand Junction.

Twenty-three Crossings Eliminated

TWENTY-THREE railroad grade crossings on state highways were eliminated by the State Highway Department in 1923: sixteen on main lines of railroads, six on branch lines and one on a narrow-gauge line. Every one of these death traps was eliminated thru a simple change in the alignment of the highways. Not one dollar was expended in bridging over or tunnelling under the railroad tracks. Incidentally, in quite a few cases, realignment of the highways resulted not only in the doing away with dangerous railroad crossings but in shortening of the highways by considerable distances, to the great saving of the road-using public.

Elimination of railroad grade crossings is considered by Major L. D. Blauvelt, state highway engineer, one of the most important tasks confronting the State HighwayDepartment. More people losing their lives in automobile accidents are killed by automobiles being struck at railroad crossings than in any other form of accident. As is perhaps well known, the United States Bureau of Roads insists upon the elimination of grade crossings on all highways in the construction of which the federal government participates. Major Blauvelt and the Highway Advisory Board unhesitatingly recognize the correctness of the government's attitude and they are doing everything in their power to co-operate with the bureau of roads.

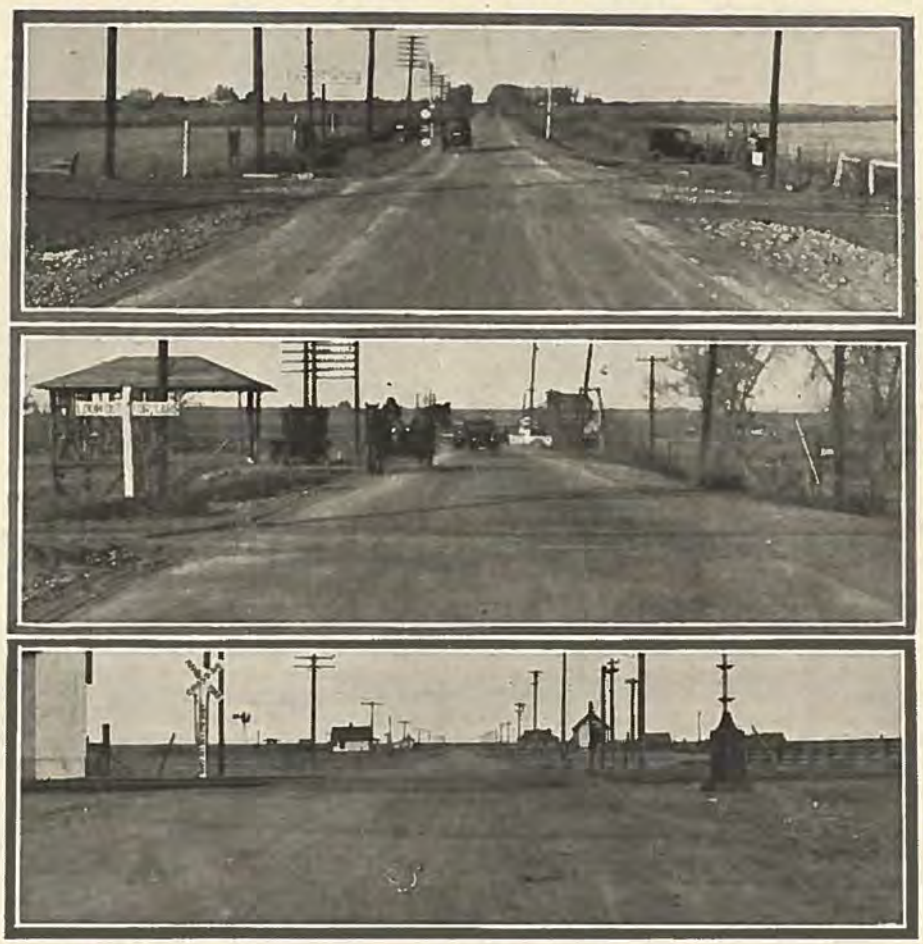
In the elimination of grade crossings the state and government have had, and are still having, the hearty co-operation and assistance of the railroads themselves. The heads of the large railroad systems operating in Colorado do not wish the terrible grade crossing accidents which the daily newspapers report almost daily, any more than anyone else wishes them. Grade crossing accidents are, to say nothing of the loss of life, very expensive to the railroads. Any plan that will help to reduce the number of accidents or eliminate them entirely is welcomed by the railroad managements.

There are three ways in which a railroad grade crossing may be eliminated: 1, By relocating a highway; 2, by constructing an overhead crossing, and, 3, by tunnelling under the railroad tracks. Last year only the first method was employed but this year will witness the construction of both overhead and under crossings. The latter methods are being employed only when a relocation of a highway is not feasible, either as the result of construction difficulties or in case the relocated road should result in great inconvenience to the traveling public.

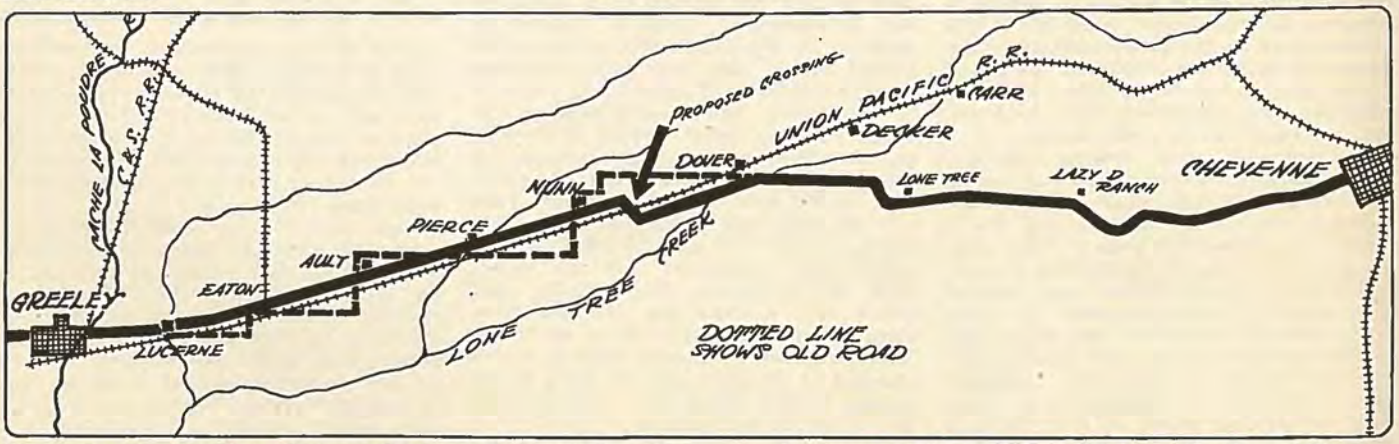
Overhead and under crossings are expensive. They cost a good deal of money and the highway department, mindful of its duty to make its money go as far as possible, will not build them unless a new road alignment is out of the question.

The North and South Highway, between Greeley and the Colorado-Wyoming line, is a shining example of what may be accomplished to make the highways safer for the traveling public when there is co-operation between all parties concerned

The Greeley-Cheyenne road has for many years been one of the most heavily traveled stretches of highway in the state. At the same time there has been none that, tho in level country and with few steep grades, has



Types of railroad crossings which are gradually being eliminated on the main highways of Colorado.



Sketch showing how State Highway Engineers eliminated six grade crossings by change of alignment in road between Greeley and Cheyenne, thus reducing the distance between these two points seven miles.

been as dangerous, due to the fact that between Greeley and the state line the automobilist encounters no less than seven grade crossings. At almost every town north of Greeley the highway crossed the Union Pacific railroad tracks. Accidents, resulting often in death and serious injury, were reported from this road time and time again.

A plan to eliminate these dangerous crossings was worked out by engineers of the highway department. A study of the country traversed by the railroad showed that six of the seven crossings could easily be eliminated by a relocation of the highway to the west side of the railroad track and running it parallel to the railroad to a point a little south of the town of Dover. The only trouble with this plan was that the land alongside the tracks belonged to the Union Pacific railroad.

It was then that the demonstration of what co-operation can and will do took place. Major Blauvelt, accompanied by the commissioners of Weld county and the late Russell Fleming, attorney general for the state, went to Omaha, the headquarters for the Union Pacific railroad, told Carl W. Gray, president of the railroad, about their plan of eliminating the grade crossings, and a few days later, went home with the railroad's permission to use the railroad's land for a new road. Not many months later the death dealing crossings were things of the past.

At the present time only one of the seven old crossings remains, the one near Dover, and that will be eliminated before the end of the present year. Elimination of this crossing thru a line change not being feasible, the highway department is now working on plans for an overhead crossing. The advisory board, in its 1924 budget, set aside funds sufficient to cover the cost of construction.

This same Greeley-Cheyenne highway offers also an excellent example of shortening the highway between given points by simple line changes. Coloradoans who have traveled this highway in the past remember the right-angle turns made by the highway in every town touched by it. First there would be a turn into a town and then another out of it. All of these turns are now gone, along with the crossings. The net result has been a shortening of the highway distance between Greeley and the state line from 48 to 41.1 miles, a saving of practically 7 miles, a big saving, when time, cost of operation of a motor vehicle and cost of maintenance are considered.

Following is a table of grade crossings eliminated by the state highway department during 1923:

Broomfield-Lafayette	2
Sapinero	1
Greeley-Dover	6
Briggsdale, south	4
Arapahoe (Cornish)	1
Crook	2
Wray (East)	2
Hyde	1
Otis	2
Haxtun	2
Total	28

It may be mentioned that the Sapinero crossing was not eliminated until this year, tho the major portion of the work was done in 1923.

The coming year will witness the elimination of another large number of crossings, notably on the main North and South highway, between Denver and Colorado Springs. Already a large force of men is working on an undercrossing at Wolhurst in Douglas county, which will do away with the dangerous double crossing of both Santa Fe and Denver & Rio Grande roadbeds. Another underpass has been provided for at Breed, five miles north of Colorado Springs, and engineers are now working on plans which will eventually result in the elimination of the remaining thirteen crossings on this, the most heavily traveled highway in the state.

Just how the elimination will be made has not been decided. It is possible that there will be a change in the road alignment in several localities but, no matter what plan is adopted, several under or overhead crossings will have to be constructed. Hand in hand with the elimination of crossings, will go the elimination of turns and a straightening-out of the highway, tho care will be taken that no important interests will be neglected or overlooked.

Upper view shows 10-ton Caterpillar tractor used in breaking thru snow on the Blue Mesa in Gunnison county. Archie Miller, road supervisor of Gunnison county (lower picture), inspecting road on the Cimarron-Blue stretch of the Rainbow route.

ADVERTISING ALONG THE HIGHWAY

Large and conspicuous advertising signs have been pretty well removed from along the main highways of the state. The immense signs which have marred the beauty of the landscape, or obstructed the view of the motorist, are rapidly giving way to standard signs and the use of advertising only on small signs that have a service value to the traveler. With the great amount of traffic now found upon the important roads, road signs should afford guidance and caution at night, as well as by day. Most of the states, as well as the Federal Bureau of Public Roads, are adopting standard signs and are exercising control over the placing of advertising upon and along the highway. So long as advertising methods or devices do not disfigure the road or destroy the landscape effect, they are not regarded as objectionable. State, county and township road authorities should not only be required to provide adequate signs and markings on all highways under their care, but should likewise have control over the erection of all signs and advertising.

FORMER ADVISORY BOARD MEMBER SURPRISES FRIENDS BY MARRIAGE

Friends of Elmer E. Sommers, until recently the Denver representative on the State Highway Advisory Board, were surprised to learn last month, that he and Miss Mayme Criley had been married secretly in San Diego, Calif., on March 6th.

The marriage was the culmination of a romance which had its inception many years ago, when Mr. Sommers was city clerk of Denver and Miss Criley his chief deputy.

Colorado Highways extends its best wishes to the newlyweds.

A splendid view of the world-famous Pikes Peak highway, showing broad, easy curves which have made this road popular with motorists. Special equipment was recently employed in removing the snow from the road preparatory to the opening for summer traffic.

Touching Skyland in Colorado

By WARREN E. BOYER,
Publicity Director, Denver Tourist Bureau.

PLANNING a trip?

Magic words, these, when vacation time comes. But they ring with delightful anticipation only after the family decides where and how to enjoy a week, two weeks or a month. Until that decision has been made, anxious hours are spent in studying literature and road maps. Colorado, through the lure of snow-capped peaks, offers many unusual experiences. Its invitation to "Come Up!" holds a western welcome that is just as hearty as the accustomed greeting heard back home. But there's an added touch of expectancy in it all.

What happens when June rolls 'round? Warm days and hugging an ice cooler! Sunhsine seems unnecessary. And then the red-letter day on the calendar. Vacation time. Overnight, almost, the family is transported over smooth highways to pine-clad heights of the Rocky Mountains where winter snow banks are sheltered seemingly for the comfort of the city dwellers. Strange enough, here the sunshine is inviting, in the coolness of dizzy heights. It's skyland, with a log fire in the cabin or resort hotel, and the story-telling hour at dusk.

After a day of short automobile trips, climbing, fishing or just idling away the hours in the shade of a balsam-scented pine, there is the realization of an increasing appetite, then the welcome, enticing meal, and the roaring, spitting spruce log in the great fire-place. There is a touch of fairyland in it all. Strange as it may seem, vacationists are wearing the extra wraps that seemed so obviously in the way at the outset. Parties are formed for a moonlight ramble, horseback riding or climbing a peak. There are informal dances and popcorn is toasted. Then a good sleep under covers in July!

Rustic cabins predominate in the Rockies. There are twenty-three hotels and resorts in the Estes Park region, and most of them radiate the spirit of the West. Side trips to romantic Grand Lake, with its rustic cottage plan, at the western entrance to Rocky Mountain National Park, may be taken from Estes Park, or, continuing the journey, re-cross the Rockies over Berthoud Pass and reach Denver through the Denver Mountain Parks system. This 240 mile circle trip out of Denver can be made in two days.

Many charming spots in the Poudre Canyon out of Fort Collins, the St. Vrain, Boulder, Clear Creek, Bear Creek and South Platte Canyons, hold tiny settlements of rustic cabins, cottages or hotels. There are fully 2,500 in all, some privately owned, others subject to rental for short or long periods.

In this type of resort the traveler receives exceptional service at prices ranging from $3.50 to $5.00 a day. As a general rule, hotels throughout the Rockies are conducted on the American plan, and most of them have specially quoted weekly rates.

Bear Creek is included in a part of the 65-mile circle trip by automobile through Denver's Mountain Parks. There is also an opportunity to pause at the grave of Buffalo Bill and to see the municipal mountain golf course at Evergreen, at an elevation of 7,000 feet, and the Park of the Red Rocks, gigantic sandstone formations near Morrison. This trip requires four hours. The return trip of 105 miles to Echo Lake by automobile, completed in about eight hours, and taking the traveler from an altitude of 5,280 feet, in Denver, to 10,600 feet, is unsurpassed in that more peaks over 13,000 feet may be seen here than at any other spot in America. Denver was the first to establish, through act of the legislature, a system of mountain park areas numbering fifteen thus far and aggregating 5,018 acres, outside its municipal boundaries. The system begins fifteen miles west of Denver, and $1,000,000 has already been expended for drives, some of which have been widened from old Ute Indian trails.

In the Pike's Peak region there are countless attractions, not the least of which is the thrill and scenic feast of reaching the top of this celebrated peak, either by rail or auto. It's an unusual ride that requires an ascent of a mile-and-a-half to reach the summit at an elevation of 14,109 feet. There are innumerable scenic drives, and the curative springs at Manitou attract the thousands, just as they did the Indians years ago.

Out of Pueblo is the San Isabel National Forest, a region where new resorts are springing up in canyons that hold spirit caves, marble quarries and hidden waterfalls. Here in the Sangre de Cristos are marvelous sand dunes and snow-crested sentinels. The Spanish Peaks, in the Trinidad region, still have traces of conquering Spaniards of Coronado's time, while the ruins of antiquated habitations in the sandstone cliff caves of the Mesa

Verde region, and the mysteries of these ancient Cliff Dwellers are engaging the attention of scientists. It's like stepping back into the pages of history and visualizing those eagle-like nests of humans—caves now in solemn stillness that once reverberated with weird chants and ringing laughter. The Silverton-Ouray region has scenic wonders that remind one of Switzerland, while the hanging lakes of the Grand Mesa on the Western Slope are distinctive of the scenic West.

So that, all in all, the spell of the primitive hangs over the vacationist for days after the Colorado Rockies have been left behind. There is an appeal of some sort in the long list of scenic and historic wonders and spots for each member of the family. It brings reassurance to the most enthusiastic among them that the way to enjoy a delightful vacation is to "Come Up to Colorado."

ROAD BUILDING IN CHINA

The unique methods of building roads in China were recently told by J. C. Knight, engineer formerly with the Asian Development company of Shantung, China, in an address before the Pueblo Engineers' Society.

In China the modern road building instruments and equipment are little known. A straight line from one village to the next is followed in staking out a road by sighting on some prominent object in the village which is many miles distant in most cases. Instead of using stakes, the line is indicated by small piles of earth.

The coolies work with picks and shovels and carry the earth in baskets. The coolies work in gangs of about 30 and elect their own foreman who contracts work for his gang, as work is done by the piece. When once shown how to do a task, the Chinese are very painstaking workmen.

Bridges are usually built of stone masonry and in one instance one 85-foot arch was completely cut out before being set in place, but when constructed and put together, each piece fitted perfectly, according to Knight.

Steam rollers are unknown. The service of rollers are replaced by tamping by hand and rolling with stone rollers, three feet in length and two feet in diameter. The same type roller is used to roll and grind grain by the Chinese agriculturist. When completed, however, the roads are very durable and serviceable.

Fourteen cents, American money, is the cost per 100 cubic feet for excavation in China, Knight states. He was engaged by the American Red Cross to build 30 miles of roadway in Shantung during the recent famine. This was the method used to help the natives, giving them employment on a project that would be of lasting benefit, while at the same time supplying them with food.

The famines are largely due to the crude means of transportation and poor roads. It requires many days to go from one province to another, the principal means of transportation being coolie propelled wheelbarrows. While China is a rich country, if the crops fail in one locality, transportation and roads are not available to supply food from other provinces.

Phantom Canon, showing how old railroad bridge and tunnel have been converted into a modern scenic highway, forming a link in one of the most beautiful and interesting circle tours in Colorado. Photo courtesy of Colorado Springs Chamber of Commerce.

"Never Again Club" For Speeders Is Organized By Pueblo County Officials

By RALPH C. TAYLOR

Pueblo.—Speeding upon the highways of Pueblo county has decreased since the installation of Thomas I. Jarrard as traffic officer. His salary and expenses are paid by the county, altho his work is also under the direction of the secretary of state. The first two weeks Jarrard was on the job he obtained 51 members to the "Never Again Club." Members are admitted to the club only after duly qualifying by violating the motor vehicle law. In most instances they pay $10 fine or membership fee and $12.50 court costs or initiation fees. Non-resident fees are usually not as much. Altho no persons have qualified for higher degrees, it is generally believed that second convictions, which are necessary for higher degrees, will result in initiatory exercises in the Never Again club house which is operated by the county. Jarrard uses both motorcycle and car which he provides himself. To date there have been approximately 75 arrests, in a month's time, and convictions in every case.

Las Animas and Otero counties are also having results in decreasing speeding by use of traffic officers.

Grading and preliminary work on the $115,000, three-mile paving job north of Trinidad is almost completed by Stamey and Mackey, Trinidad contractors, and pouring of concrete is expected to start as soon as the weather permits.

The survey plans for the $140,000 paving job, to join the Stamey-Mackey work, have been completed by State Highway District Engineer James Bell and have been forwarded to the Denver office. This project calls for about three miles of paving and a subway under the railroad tracks.

The installation of electric lights on the large five-span concrete bridge over the Huerfano river on the Santa Fe Trail, 20 miles east of Pueblo, is being considered by the county authorities. The bridge is one of the most beautiful in southern Colorado. The valley electric line runs across the bridge, making electricity easily available.

Pueblo county road crews have finished shaling a two-mile stretch of road on the South Vineland road, leading south from Roselawn cemtery. The road is subjected to much travel, three main travel roads centering upon it in the two-mile distance.

Four small bridges on the Pueblo-Siloam state highway have been completed by H. H. McDowell, Lamar contractor. Shale surfacing over the fills has also been finished. The work cost about $16,000. The bridges are over Rock, Boggs, Rush and Taylor creeks.

W. L. Rees, chairman, O. G. Smith and Hurb H. Wilson, Pueblo county commissioners, have written the Public Utilities Commission requesting that no charters or franchises be granted any of the four truck lines operating into Pueblo, all of which have applied for such. The commissioners state that under the present statutes they will not favor any such action. They claim that the heavily loaded trucks damage the highways more than any other type of traffic and while the truck lines operate at a profit on a commercial basis, the operators pay no more taxes than the ordinary vehicle owner.

Road News, Views and Gossip

HOW TIMES DO CHANGE

Yesterday—When some village cut-up got rockless and whipped up the old nag to a gait of 10 miles an hour right down the main street of the village on Sunday afternoon with the village queen by his side, the natives would run in the yard and latch the gate, the chickens would fly over the fence, the dogs would run under the house, the kids would climb the trees, the constable would shake his fist and "Gol Durn" him, and you could hear good old sister Sarah say, "What's this world coming to, the end certainly can't be far off—such reckless speed endangering the whole community," and the village queen would say, "Oh, Billie, **please** don't drive so fast, I'm so frightened I feel fainty."

Today—The town sheik makes 45 miles an hour right down the Boulevard, one hand on the steering wheel and the other around some girl—the dogs snap at the tires, the chickens ride the bumper. Sweet Mama says, "Step on it, Daddy. Who was that just passed in that Ford?"

"That was Aunt Sarah."

"What did she say?"

She said, "Scuse my dust."

Yesterday—You could buy a tin cup full of good red whiskey for a nickel.

Today—You pay $20.00 a quart for corn whiskey 1-3 gasoline and 1-3 tobacco juice. Ain't times changed! The bootleggers sho' must have paid Volstead a hole lot to raise the price.

Yesterday—Girls rode on side saddles.

Today—You see two girls and two boys in a Ford Coupe. Transportation sho' is Revolutionizing.

Yesterday—Ladies dresses reached from her neck to her heel.

Today—What's the difference? **None.**

Yesterday—Men made the same wife do a life time.

Today—A few of them haven't changed.

SPECIFICATIONS MUST BE FOLLOWED CLOSELY TO SECURE GOOD SAND CLAY ROADS

How many engineers realize the necessity of following closely the specifications in constructing a sand-clay or top-soil surfaced road? How many even feel it of sufficient importance to write a specification on such a road? It is very difficult to impress an engineer with the necessity of skill and care in the construction of this cheap type of road surface. Not until he is charged with the responsibility of maintaining this type of road or has closely observed the greater stability and serviceability of a road of this type when properly constructed, will he realize that if successful results are to be obtained, it is absolutely essential that the same care be given in following the specifications in the construction of this type of road as in the higher and much more expensive pavements.

CARE FOR THE MAJORITY

The great majority of our roads will always be without a hard surface; therefore, the study of the most effective and most economical method for maintenance of dirt roads is most important. In the end the maintenance of this class of road will be the big problem, even overshadowing the construction. A combination of the so-called patrol and gang system of maintenance is best. Proper maintenance is the most effective and immediate way to serve traffic.—The American City Magazine.

A Cad cuts some capers and catapults on Colorado Springs road. A case of too much speed, but luckily nobody injured.

WHAT IS A GOOD ROAD

A good road, in the strictly modern sense, is one over which all legitimate classes of modern highway traffic can run rapidly, without interruption, and in safety, in any kind of weather, in any season of the year, and at any hour of the day or night.

Many roads are called good, by the motorist, if they are good part of the time and under certain favorable conditions. These same roads at other times may be very far from satisfactory. A road that is excellent today and bad a week from now is not a good road.

In the public mind the "good" road is often taken to include any road which is not hopelessly bad, or any road that is somewhat improved, or a road that under some circumstances is quite satisfactory. With standards rising higher all the time it is well to emphasize that a road is not worthy of the name "good" unless it functions properly at all times. The difference in first cost between such a road and one that is satisfactory only part of the time is not great, especially when maintenance costs are considered, for it is a well-known fact that the cost of maintaining a fair road is much greater than the cost of maintaining a good one.—Indiana Highways and Motors.

"HE THAT BUILDETH A GOOD ROAD"

North Carolina Highway Bulletin

We hear much about the "dignity of labor." Many other professions and callings have their own particular graces and embellishments. But what about the dignity of the road builder? We seldom hear such an expression in the ordinary transmission of thoughts and ideals which govern the everyday information of the world. Nevertheless when mentioned, the road builder enjoys dignity of no low degree. Centuries ago the inhabitants of Thebes wished to disgrace Epaminondas because he had failed in an attempt to capture the City of Corinth, so they elected him telearch, or street cleaner. Thereupon Epaminondas rebuilt, ornamented, and beautified the streets until he raised the position of telearch from one of ill repute to that of the highest dignity in the city. H. G. Wells selected the six greatest men in the history of the world, and one of the reasons he gave for leaving the name of Alexander the Great off the list, was because with all his great conquests and brilliant victories, he had failed to establish any good roads. John Tyler at his retirement from the presidency of the United States, had fallen so low in the scale of popularity that his neighbors elected him road overseer in his home precinct. The law at that time empowered the overseer to call out the farmers to work the roads whenever he saw fit. To the surprise of all, Tyler accepted the job, and worked the roads with such frequency and energy that he developed the best roads in the county. Two years ago a great American statesman said in speaking to the young men of Lincoln, that the safest, sanest, strongest and soundest principle for a politician to advocate was this, "A hard road to every farmer's door in America." So it is that he that buildeth a good road is greater than he that taketh a city.

HIGHWAY PUBLICATIONS

Twenty-five states now get out monthly or weekly publications in the interest of highways. Arkansas, California, Florida and Utah have recently added interesting publications to the monthly list. All states are beginning to realize the urgent need for a publication of this kind in order that the people may be kept informed with accurate and reliable information regarding the activities of the State Highway Department.

A GOOD TRIP

Another advantage of crossing crossings carefully is that you get on the other side.—Dallas News.

Bureau of Public Roads Report

THE report of the Chief of the Bureau of Public Roads, Thomas H. MacDonald, for the year ending June 30th, 1923, and dated October 15th, was ready for distribution by the Department of Agriculture about December 15th. This is a summary in 32 pages of the work done by the Bureau, of which about 16 pages are devoted to highway matters and the other 16 to farm drainage and irrigation.

The report states that 8,820 miles of roads of all types receiving federal aid had been completed during the fiscal year, which brought the total of completed projects up to 26,536 miles. Of this total, 1,860 miles had been only graded and drained. Of the remaining 6,960 miles, 3,815 were gravel roads, 749 miles were sand-clay, 1,440 miles were concrete, 530 miles were bituminous (concrete or macadam), 79 were brick and 11 were bridges.

In reading the report, we notice that, although the gravel roads constituted more than 50% of all of those constructed with anything further than grading and draining, only one other mention is made of gravel or gravel roads in the report, viz., that the laboratory tests and examinations of materials made by the Bureau, included 177 samples of gravel.

"Researches in the physical field designed to supply scientific data for use in road design have become one of the most important and useful activities of the Bureau. The investigations which have attracted the greatest amount of attention are the tests of effect of impact on road slabs and the tests of bituminous pavements of various composition to determine their relative stability under traffic. The phenomenon that is being observed in the latter investigation is the formation of the familiar 'washboard' wrinkles which appear in the surface of bituminous roads under traffic." During the year, 120 special road slabs were constructed for impact tests.

In connection with these tests and researches, the Bureau has found it necessary to devise special measuring instruments, which has delayed the investigation and taken up much of the time of the investigators, but is considered well worth while. Among these have been a strain gauge for recording graphically the instantaneous deformation due to impact, and an accelerometer to determine the force of impact by measuring the deceleration of truck wheels on contact with the road.

The tests of the relative stability of bituminous pavements were completed, but it remained to study them in order to correctly interpret them. A study of the relative wear of 62 sections of experimental concrete pavement by an especially designed machine, carrying four wheels with solid rubber tires, was completed, the machine having made approximately 50,000 trips at a speed of 22 miles an hour. The results do not warrant drawing any definite conclusion except that under rubber-tired traffic without impact, surface wear is exceptionally slow.

Studies were made regarding effect of alkali upon the strength of concrete; concerning the use of water gas tar and paraffin as protective agents, and concerning the suitability of blast furnace slags as concrete aggregate, indicating their suitability and that the strength is equal to the strength of concrete using other acceptable aggregates. Tests also were made of samples taken from asphaltic pavements in a number of cities and on toughness and adhesiveness of bituminous mixtures, and work on the tests of bituminous materials in cooperation with the American Association of State Highway Officials and the American Society for Testing Materials.

During the year an autographic traffic counter was devised which, when installed in a road, will record the number and weight of all vehicles passing the point of installation, which is expected to make possible a precise knowledge of volume of traffic and weight of vehicular units with a minimum expenditure of effort and money.

The Bureau also cooperated in researches of various kinds with the Engineering Experiment Stations of Purdue University, Iowa State College, University of Texas and Kansas State Agrcultural College, and with the University of Georgia, University of Maryland and the Massachusetts Institute of Technology; with the State Highway Departments of Georgia, New Hampshire, Maryland, North Carolina, California and Illinois, the last two in connection with the test roads at Pittsburg, California, and the Bates road in Illinois. The subjects investigated in cooperation with these states and colleges included: The testing of concrete and concrete aggregates, the life of sand-clay and similar roads, resistance of various kinds of road surfaces to traction, effect of impact on highway bridges, investigation of wind resistance to motor vehicles, cause of the disintegration of concrete roads in New York State, and effect of moisture on volume change in soils.

The Department announced that the value of surplus war materials suitable for road work delivered to state highway departments during the year exceeded $58,000,000, while the total volume of all material delivered up to the end of the fiscal year exceeded $208,000,000. The states receiving the largest amounts up to date were: Texas, $11,855,000; New York, $11,199,000, and Illinois, $9,255,000. The smallest amount was that delivered to Delaware, $494,000, with Rhode Island second and New Hampshire third. Although New Hampshire received a small amount, it is referred to in the report as one that has benefited materially thereby. The state received not only 22 touring cars and 134 trucks, but surplus war equipment has been used in fitting out a repair shop, machine shop, carpenter shop and testing laboratory, and the department is now able to make new parts and thus eliminate delays and reduce repair charges. The North Carolina Highway Department received a large amount of rough castings for spare parts of the motor trucks that were badly rusted and for which the War Department had received an offer of 1c a pound, which parts the State Department, by means of machinery also received from the War Department, finished for its own use, when they were considered as worth 75c a pound.

A considerable part of the report is devoted to a description of investigations made in highway economics, observations from the Connecticut transportation survey and motor truck transportation in New England, and a study of methods of highway finance and of the influence of highway improvement on rural land values.

Modern gravel surfaced all-year highway lacated in Eastern Colorado, constructed with State and County bond funds. Roads such as this attract thousands of tourists to Colorado each summer, adding tremendously to the wealth of the state.

REPORTS FROM THE DIVISIONS

DIVISION I.

HEADQUARTERS, DENVER.

JOHN P. DONOVAN, DIVISION ENGINEER.

Counties of Adams, Arapahoe, Boulder, Clear Creek, Gilpin and Jefferson.

R. M. Larson, contractor on the Broomfield-Lafayette paving, has practically completed the bridge over Rock Creek. A steam shovel is being operated by Monaghan & Cunningham, sub-contractors on the grading, in removing rock from the big cut north of "Horseshoe" hill. The contractor has purchased a new paver for pouring the concrete, which should start the latter part of May.

The contract held by J. Fred Roberts Const. Co. for construction of one mile of paving on the Boulder road west from 10-mile corner, has been assigned to Giggey & Hanes, who started work in March.

Construction of a concrete viaduct over the Moffat railroad tracks on the Brighton road is showing splendid progress.

A survey is being made by Resident Engineer J. W. Miller of an extension to the new road through Turkey Creek, through Conifer towards Shaffer's Crossing. Good progress was made by Contractor M. J. Kinney on the four miles of grading in Turkey Creek canon during the month. Present indications this project will be completed on schedule time, August 1.

Plans are being made for the paving on Highway No. 8, from Knox Court to a connection with the Morrison paving. Preliminary plans for paving northwest and south of Lafayette have been submitted to the Bureau of Public Roads.

DIVISION II.

HEADQUARTERS, GRAND JUNCTION.

J. J. VANDERMOER, DIVISION ENGINEER.

Counties of Delta, Gunnison, Hinsdale, Mesa, Montrose, Ouray and San Miguel.

Weather in this division has been unusually stormy during the past two months, and for this reason progress on highway projects under construction has been considerably retarded. Nevertheless, it has been possible to keep more construction work going during this winter season than any previous year for some time past.

In fact four Federal Aid projects have all been kept going clear through the entire winter. Splendid progress has been made on all of them.

Dangerous snow slides resulting from heavy snows caused considerable delay on the project above Ouray near Bear Creek Falls. K. V. Johnson, the contractor, has the project 80% complete. He is now engaged in trimming up and finishing. J. A. Cavanaugh is in charge of the engineering on this job.

The concrete floor of the new Sapinero bridge will be poured when weather will permit. Winterburn & Lumsden have completed the steel part of the structure, reports H. T. Reno, resident engineer. A big celebration is planned for the opening of this bridge the middle of June. It is the highest highway structure in the state.

Two dangerous main line railroad crossings are eliminated by the new work between Clifton and Palisades. It consists of five miles of grading and gravel surfacing. A. H. Batten, resident engineer, reports the grading 83% complete.

Satisfactory progress is being made by Winterburn & Lumsden on the 600 foot steel arch bridge over the Gunnison river north of Delta. It is in four spans, all of which have been riveted. This bridge will cost $100,000 when completed.

Preliminary plans have been completed for eight miles of grading and graveling between Grand Junction and Fruita on the Midland Trail. Engineer Reno has completed field surveys and plans for 7 miles of proposed grading and drainage work, beginning at Gunnison and extending west.

A force of nine men and six teams are employed grading the Fruita-Rangely road. About seven miles of grading was completed last month.

Three bridges have been constructed by a county force under Alva Adams, in Broad Canon, in the west end of Montrose county on State Project No. 840. Considerable grading also is being done.

DIVISION III.

HEADQUARTERS, DURANGO.

J. R. CHENEY, DIVISION ENGINEER.

Counties of Archuleta, Alamosa, Conejos, Costilla, Dolores, LaPlata, Mineral, Montezuma, Rio Grande, Saguache and San Juan.

Heavy snows that fell in March seriously delayed the work in this division, and operations did not get under way until the middle of April. Work was reopened on the Cochetopa Pass project the first of May. It should be completed in 30 days.

J. Edd Hansen has resumed operations on five miles of gravel surfacing between Durango and Hesperus.

A gravel screening plant has been erected by Dale Hinman on the project between Durango and Bayfield to complete three miles of gravel surfacing. Plans have been submitted to the Bureau of Public Roads on three miles of gravel surfacing between Durango and the New Mexico state line.

Work on surveys for both State and Federal Aid projects are proceeding rapidly. Plans are being completed for six major projects, which will be put under contract this summer.

Arrangements are being made by the citizens of Durango for a big celebration on the occasion of the opening of the Durango-Silverton-Ouray "million dollar" highway, set for the middle of June.

The highway will be dedicated by the Brooklyn Eagle party, which will visit the Mesa Verde national park this year.

DIVISION IV.

HEADQUARTERS, PUEBLO.

JAMES D. BELL, DIVISION ENGINEER.

Counties of Baca, Bent, Crowley, Custer, Fremont, Huerfano, Kiowa, Las Animas, Otero, Prowers and Pueblo.

Four of the five bridges contracted in Otero county by the Pueblo Bridge & Const. Co. have been completed. These bridges span Benton, Crooked Arroya, Timpas and Lone Tree creeks on State Road No. 12. Total cost is $15,496. Entire project should be completed the middle of May.

Rapid progress is now being made by J. Finger & Son on one and one-half miles of paving on the Santa Fe Trail, east of Pueblo. A new four-bag mixer has been purchased by the contractor for paving, which is now in operation. He is using 1000 linear feet of 6-inch steel forms. This project is scheduled to be completed July 1.

While greatly delayed on account of inclement weather, W. A. Colt & Son are showing good progress on four and one-half miles of grading and gravel surfacing west of Las Animas, extending toward Hadley. Considerable extra work has been done to reshape the surfacing after traffic had cut it badly due to snow. However, it is now in good shape.

The new steel bridge over Beaver Creek, 22 miles west of Pueblo, is reported completed by H. M. Fox, contractor. The old bridge was washed out during the floods of 1921.

Work has been resumed on the Warrenite Bitulithic pavement north of Trinidad. This project consists of three miles of pavement. Stamey-Mackey Construction Co. have the contract.

DIVISION V.

HEADQUARTERS, COLORADO SPRINGS.

ERNEST MONTGOMERY, DIVISION ENGINEER.

Counties of Chaffee, Cheyenne, Douglas, Elbert, El Paso, Kit Carson, Lake, Lincoln, Park and Teller.

On April 18th, LaNier, Selander & White started work on two miles of pavement between Husted and Breed, north of Colorado Springs. A large crew of men have been put on the job, which will be rushed to completion. An effort will be made to open this pavement for traffic next fall.

Arrangements have been made whereby J. H. Buscelle will complete the pavement project directly north of Colorado Springs. He will pour the concrete on the six fills, which were left open during the past winter for settling. Buscelle was superintendent for the Standard Engineering Co. before this work was taken over by the bonding company. Pouring of concrete will be started about June 1. The work should be completed by the middle of the summer.

DIVISION VI.

HEADQUARTERS, GLENWOOD SPRINGS.
H. L. JENNESS, DIVISION ENGINEER.
Counties of Eagle, Garfield, Jackson, Moffat, Pitkin, Rio Blanco, Routt and Summit.

A large force of men have been employed by Rogers & Pickard, contractors, for the completion of the 100-foot span steel and concrete bridge across the Blue river north of Dillon. Steel for this structure was hauled fourteen miles from Dillon to the site of the project. Work on the project, which was shut down during the winter, was resumed on March 5, and rapid progress has been made since.

With the completion of a crushing and screening plant, work has been resumed on the project between Dotsero and Gypsum. Progress has been slow on account of adverse weather conditions. This project eliminates a very bad piece of roadway, and will be a very welcome improvement to motorists.

An outfit is being assembled by the Pioneer Construction Co. to start work on the Byers Canon project near Hot Sulphur Springs, which will eliminate one of the worst pieces of highway between Denver and Glenwood Springs. This piece of roadway will be blasted from solid rock. It cuts out a heavy grade and will reduce the distance to Glenwood Springs several miles when the new road is entirely completed.

Engineer P. C. Thurmond is completing plans for a new gravel road between Rifle and Debeque.

Plans are nearly completed for a new bridge over the Bear river south of Craig.

Bond fund work has been completed in the following counties: Eagle, Garfield, Grand, Jackson, Moffat, Pitkin, and Rio Blanco counties.

DIVISION VII.

HEADQUARTERS, GREELEY.
A. B. COLLINS, DIVISION ENGINEER.
Counties of Larimer, Logan, Morgan, Phillips, Sedgwick, Washington and Yuma.

Work by convicts on the Poudre Canon road between Water Works Hill, east toward Fort Collins, will be suspended on May 15th, when the appropriation for this project will be exhausted. Remaining dirt work to complete from Fort Collins to Chambers Lake will be handled with Larimer county road forces. Work performed under the project has been satisfactory. The section of road improved is in excellent condition.

Regrading and gravel surfacing seven miles of State Road No. 16, east from Loveland to the Weld County line, was started on April 29th, county equipment, tractor, elevating grader and graders being used in conjunction with local farm teams. The surfacing is being done on a yard mile basis, with the customary price of 25 cents per yard mile haul and 15 cents per yard for loading being in effect. On completion of this project, State Road No. 16, between Greeley and Loveland, will be in excellent condition.

On April 23, work was started on the North St. Vrain road from the Boulder county line to Estes Park in Larimer county. The sum of $12,000 is to be expended in regrading, widening and surfacing twelve miles of this road. State and county forces are doing the work.

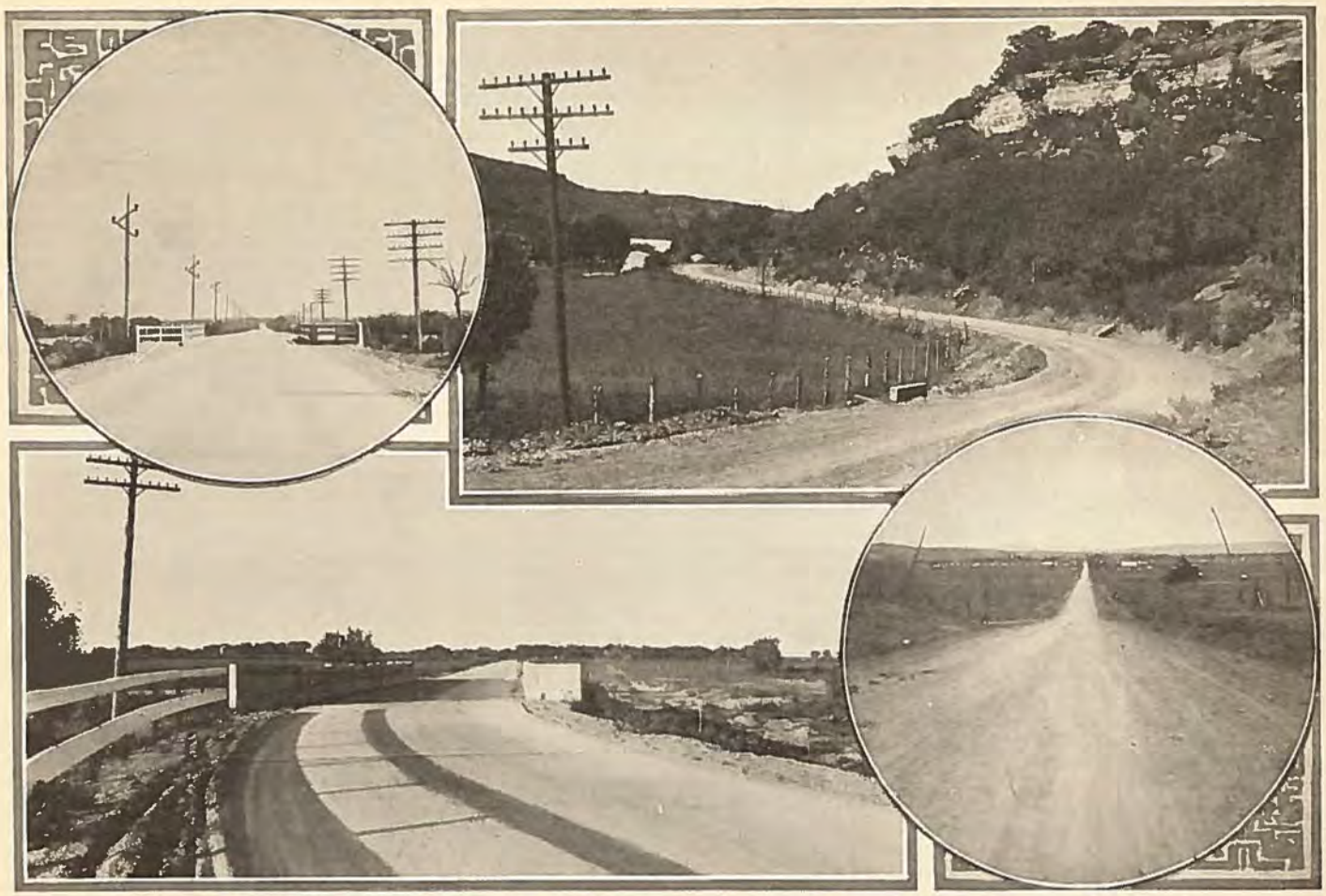
A. R. Mackey has been awarded a contract for the construction of eleven 19-ft. spans creosoted pile bridge with concrete deck, across a channel of the Platte river south of Atwood. Contract calls for completion before June 10th.

Contract for a creosoted pile bridge, with timber deck and steel traffic strips, consisting of eighty-five 19-ft. spans, across the Platte River at Sedgwick on State Road No. 59, was awarded May 1st, to B. F. Bollen, contractor.

Since resuming operations on F. A. P. No. 226-C, Paving Division One, the Engineers Construction Corp. has laid an average of 360 ft. of paving per day. The first pavement of the season in this Division was poured on April 23 on this project. With weather permitting, the contractors expect to complete this project by June 15. It is located north of Platteville. The traffic should be moving over the new pavement about July 1.

An elaborate plant has been installed by J. Fred Roberts & Sons for constructing 6.335 miles of concrete pavement between LaSalle and Gilcrest, which adjoins the above project on the north. Pouring of concrete on this project has started. Indications are this project will be completed before next winter.

There remains 3,900 feet of paving to complete the concrete project between Fort Morgan and Brush, which the Colorado Bridge and Const. Co. have under contract. It is anticipated that paving will be resumed the latter part of May.



Types of concrete and gravel-surfaced roads constructed as a part of Colorado's State highway system.

Highway Smileage

"What," we asked of an honest automobile dealer, "is a complete overhauling?"

"Well, in the case of a used car taken in on trade," answered the honest dealer, "it means turning back the speedometer."

The only time pedestrians have the right-of-way is when the ambulance is taking them to the hospital.—Chickasha Star.

A lightning bug is about the only one that can get along with just a tail light.

Better put a fence at the top of a precipice than a hospital below.—ReTappet.

No matter where you tour or roam,
The best old road is the road to home.
—Exchange.

The car stood in the muddy road
Spinning wheels but moved no load.
The driver yanked, tore out the clutch,
And now the wheels don't spin so much.

Some fiend for figures discovers women own only 5 per cent of all the cars. Yes, but they tell the men how to drive the other 95 per cent.

BUILD GOOD ROADS

Gone are the days when "any road" would do,
Gone are the days when oxen pulled 'em thru,
Gone are the days when devilish Fords were few,
I hear those voices loudly calling:
"Build GOOD Roads."

We're coming, we're coming to the day of modern loads.
I hear those voices loudly calling:
"Build GOOD Roads."

Gone are days when mud was right in style,
Gone are the days when three hours meant a mile,
Gone are the days when "highways" were on trial,
I hear those voices loudly calling:
"Build GOOD Roads."
—Georgia Highways.

"Well, if we can't get a house we'll live in our sedan."

"Don't be foolish, George. We could not receive guests in our sedan."

"You won't miss the social atmosphere. Plenty of cops will leave cards."—Louisville Courier-Journal.

How would you like to sit at St. Peter's right hand when he passes judgment on the road hogs and whisper the name of the place where he ought to send every one of them to?

They met on the bridge at midnight,
They'll never meet again;
She was an eastbound heifer,
And he a westbound train.

Big cement company went broke in New York. Let this be a concrete example of bad management.—Little Rock Daily News.

What many automobiles need is not four-wheel brakes, but fore-sighted drivers.—Omaha Bee.

Bill Hawkins: "I'm a little stiff from driving."

Stranger: "Where did you say you were from?"

Milly: "I wouldn't marry you if you were the last man in the world."

Billy: "Of course not. You'd be killed in the rush."

An example of lowliness—the trailer that follows a Flivver.—Illinois Motorist.

Fourteen Road Contracts Awarded

(Continued from page 3)

duct over the Moffat railroad tracks on the Denver-Brighton road, in Adams county.

F. A. P. 17-R—Contract awarded March 19, to LaNier, Selander & White, Fort Morgan, on bid of $81,399 for construction of 2.339 mi. concrete pavement between Breed and Husted, on Colorado Springs-Denver road, in El Paso county.

F. A. P. 256-B—Contract awarded Feb. 26, to W. F. Pigg & Son, Denver, on bid of $53,702, for construction of 2 miles of concrete pavement, northeast of Merino, being an extension of paving south of Sterling.

F. A. P. 253-A—Contract awarded Feb. 26, to Northwestern Const. Corp., Craig, on bid of $126,374, for 6.50 miles of gravel surfacing west of Steamboat Springs.

F. A. P. 243-A—Contract awarded Feb. 26, to Shields & Kyle, Pagosa Springs, on bid of $48,311, for construction of 1.613 mi. of gravel surfacing and steel truss bridge over Piedra river near the town of Piedra, located between Durango and Pagosa Springs in Archuleta county.

F. A. P. 226-C—Contract awarded Feb. 26, to J. Fred Roberts & Sons, Denver, on bid of $175,647, for construction of 6.335 mi. of concrete pavement between La-Salle and Gilcrest in Weld county.

State Project No. 811—Contract awarded Feb. 26, to Switzer & Dillon, Denver, on bid of $28,117, for construction of steel truss bridge over Rio Grande Del Norte river near La Sauses on Costilla-Conejos county line.

State Project No. 904—Contract awarded Feb. 26, to Chris O'Neill, Platteville, on bid of $44,049, for construction of three 100 ft. spans of steel truss bridge over the Platte river, between Petersburg and Fort Logan in Arapahoe county.

State Project No. 888—Contract awarded April 19, to D. S. Reid Const. Co., Denver, on bid of $5,970, for construction of 370 ft. of flume at Black Hawk in Gilpin county.

Little Details of Road Construction

(Continued from page 6)

and these have been used on three curves of paving near Denver and from all reports they are very satisfactory.

The sketch accompanying this article shows the old country road as it was before improvement was started. The dotted lines show a simple 20° curve joining the tangents, as has been constructed in many places. The heavy lines show the curve as laid out with spiral easement approaches, consisting of eleven 30-foot chords, making the total spiral length equal to 330 feet on each end of the circular portion. This throws the curve inward at the mid-point approximately 26 feet and has the same effect as widening the pavement that amount.

Starting with both edges of the pavement level across at the beginning of the spiral and tipping the outer edge up one-tenth foot per chord length, the maximum superelevation of one and one-tenth feet would be accomplished at the point where the spiral joins the circular portion of the curve. This same amount is carried thru this portion of the curve and then flattens off again.

This is an example of a combination of curve and spiral, which, used with moderate superelevation, is designed to promote ease of control of cars and give greater comfort and safety to the users of the highways. It should lessen danger of skidding and in a measure reduce the temptation of a certain class of drivers to "cut corners."

It is another example of the efforts of Highway Engineers throughout the land to improve the little details of construction so that in future years when G. L. and Nancy go out the south road, now carrying a heavy traffic of cars and trucks, they may enjoy to the fullest the beauties of the country, with their minds relieved of impending dangers.

Following Instructions

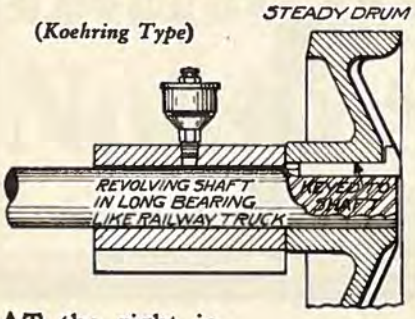
"A woman stopped here the other morning and asked for permission to blow up her tires. When she had put in 110 pounds, I said:

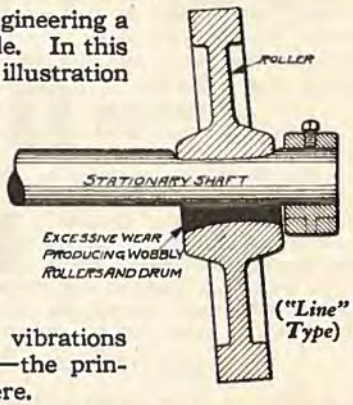
" 'Lady, you are putting in too much air. You will blow out your tires.' "

" 'Oh, no, I won't,' she replied, 'my husband told me to put in 60 pounds a week, and we are going away for three weeks.' "

KOEHRING

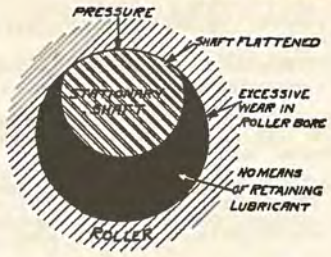
THE illustration at the right shows what is called in mechanical engineering a "line bearing"—one in which the revolving unit turns on a *fixed* axle. In this instance, the revolving drum roller turns on a fixed axle. The illustration shows the characteristic wear of this type of bearing as applied to drum rollers. The down thrust of the heavy drum brings all the wear on the top side of the fixed axle, flattening it. The end-to-end thrust of materials tumbling inside the drum wears the outside edges of the roller openings. Only a little wear causes rollers to wabble, causing disalignments, pounding vibrations and strains throughout the mixer—the principle causes of breakages everywhere.

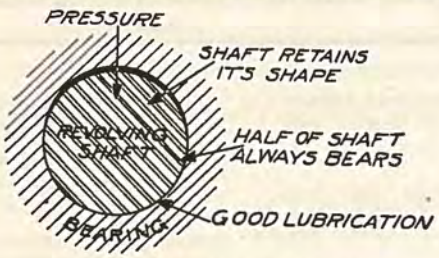




The illustration just at the left above shows the Koehring type of bearing—the roller *fixed to the shaft and the shaft turning in oversize adjustable shimmed bearings accessible on the main frame.*

AT the right is shown how the wear of the "line bearings" prevents lubrication. Enlargement of the roller opening soon leaves a considerable space between the lower side of the fixed shaft and the roller. Lubrication is pocketed. The heavy downthrust of the roller on the top side of the shaft prevents adequate lubrication between fixed axle and revolving roller. Illustration immediately below shows how the Koehring revolving shaft always carries the load on the full face of the fully lubricated bearing.





BEARINGS FIRST!

WORN bearings mean vibration—crystallization—disalignments, strains and breakages in *every part of the whole machine.*

The service life of any machine is first of all in the bearings—especially so in the drum rollers of a concrete mixer, which get continuous service under heavy, shifting loads. Bearings must be right in principle or they can not be right in practice.

The Koehring drum roller bearing is the type accepted by mechanical engineering as the best for heavy duty service.

This is the same type as used on freight car trucks. And then, Koehring heavy duty construction makes them liberally—generously—oversize. This is one fundamental reason for Koehring long service life and remarkable freedom from breakdowns and delays.

MIXER CAPACITIES

Pavers—7, 10, 21, 34 cubic feet mixed concrete. Steam, gasoline or electric power. Can be mounted either on regular steel rim wheels or solid rubber tires, half length multiplane or full length multiplane. Boom and bucket or spout distribution. Derrick arrangement—double adjustable derrick on 21E and auxiliary water tank on 21E and 32E if desired. Batch meter.

Construction Mixers—14, 21, 28 cubic feet mixed concrete. Steam, gasoline or electric power. Mounted on trucks or skids. Rubber tires optional. Equipped with power charging skip. Charging chute or batch hopper.

Dandie—4 and 7 cubic feet mixed concrete. Can be equipped with charging skip or low charging platform and hopper. Light duty hoist. Rubber tires with disc wheels or flanged wheels for railroad work. Mixes mortar as well as concrete

KOEHRING COMPANY
PAVERS, MIXERS, CRANES, DRAGLINES, GASOLINE SHOVELS
MILWAUKEE, WISCONSIN
Sales Offices, service warehouses in principal cities

H. P. WILSON & CO., Sales Representatives
17th and Blake Sts. Denver, Colo.

Contractors' Column

Ed. Honen, contractor on the Mt. Evans highway, will have a force of 100 men on this job this summer. He has two miles of roadway to finish on his contract. It is all pick and shovel work. This project is located at an altitude of 13,200 feet. At present he is working four steam shovels, two Eries and two Osgoods, on seven miles of ditching for the Denver Water Works.

James Stryker is the head of a new contracting firm organized under the name of the Western Construction Corporation. General offices are located at 33rd and Blake streets, Denver. This concern was low bidder on twelve miles of gravel surfacing between Buena Vista and Salida, known as Federal Aid Project No. 248-A. Bids were opened on April 22. The Western price for the job was $93,533.

Carl Madsen is busy constructing a concrete viaduct for the State Highway department over the Moffat railroad tracks on the Brighton road north of Denver. Total cost of the project is $12,178. Traffic is being diverted over a detour south of the work. This is the heaviest traveled highway in the state.

Dan Reid of Littleton has his first Highway job in a 370-foot flume being constructed at Black Hawk. Dan's forte is water works and sewer projects. He recently completed a big piece of work at Limon, Colo.

LaNier, Selander & White, of Fort Morgan, have moved their outfit on the job at Husted. They have a contract for 2.339 miles of concrete paving.

James Collier has two surfacing jobs for the City of Denver, totalling over $100,000. He has two big outfits working and expects to finish this summer.

Winterburn & Lumsden, contractors on the Sapinero state highway bridge, have started moving 300,000 yards of dirt on a drainage project near Grand Junction. They recently purchased a big Northwest dragline for this work. The Sapinero bridge will be completed June 20th.

Brodie & Anderson have started pouring concrete on four miles of paving south of Wolhurst. This is a $153,000 project, on State Highway No. 1.

Richard W. McQueary has completed the State road project between Lawson and Empire. Two railroad and creek crossings are eliminated by this new work.

W. F. Pigg & Son are getting an outfit ready to lay five miles of paving near Fort Morgan. A new Rex paver was purchased for concrete mixing.

The Pioneer Construction Co. was low bidder on the Byers Canon project. Their price was $72,000. There were seven other bidders. This is the biggest piece of rock work let by the Highway Department in several years. It is located near Hot Sulphur Springs.

Fred Dreher Construction Co. have completed four miles of concrete pavement north of Loveland.

Minneapolis Steel & Const. Co. have a contract for six steel bridges in Fremont county.

SHAKESPEARE HELPED TO SOLVE PARKING PROBLEMS

William Shakespeare, four of whose plays were produced on Broadway last winter, was engaged in the parking business before he made a reputation as a dramatist.

Biographers report that when he first went up to London from Stratford, there was a demand for boys to hold the horses of the gentry while the latter were at the theatre. Will engaged in this line of business which gave him the funds for beefsteak and suet pudding until some enterprising manager decided that the lad had dramatic talent.

THE ROAD HOG

The road hog went his merry way
And he was going west.
To crowd 'em over and crowd 'em off
He did his level best.

Another road hog hove in sight
And he was coming east,
To crowd 'em over and crowd 'em off
He cared not in the least.

They met—two piles of junk lay by;
Ha ha! we laughed—and then,
Out crawled the charmed degenerates
To hog the road again.

—A. S. G.

CARRY LIGHTS FORE AND AFT

The man who lights a match to discover how much gas there is in the motor tank is a very thoughtful and careful individual compared with the one who now ventures forth on a dark night on a highway without lights on his vehicle fore and aft.—Ellendale (Nevada) Eagle.

At any rate, Jesse James never raised a hood and tightened a spark plug and charged $3.85.—Portland Telegram.

Comparison of Money Spent by States and Federal Government

Statistics compiled by the Bureau of Public Roads, Department of Agriculture, show that in 1921 the various states spent $1,036,587,772 in road work. The amount spent by each state, including Federal and state appropriation, follows:

Maine, $8,701,911
New Hampshire, $3,699,421
Vermont, $2,150,484
Massachusetts, $19,535,631.
Rhode Island, $2,828,234
Connecticut, $8,445,716
New York, $57,025,011
New Jersey, $28,096,070
Pennsylvania, $75,349,553
Ohio, $76,579,987
Indiana, $54,502,332
Illinois, $39,019,448
Michigan, $55,572,618
Wisconsin, $41,713,768
Minnesota, $38,779,560
Iowa, $39,324,553
Missouri, $16,127,659
North Dakota, $7,347,231
South Dakota, $14,188,967
Nebraska, $10,527,609
Kansas, $22,670,107
Delaware, $6,035,037
Maryland, $10,298,136
Virginia, $15,485,392
West Virginia, $10,060,073
North Carolina, $29,323,700
South Carolina, $10,049,281
Georgia, $15,816,594
Florida, $9,588,133
Kentucky, $12,622,663
Tennessee, $12,697,447
Alabama, $5,607,835
Mississippi, $20,308,289
Arkansas, $21,211,014
Louisiana, $14,022,003
Oklahoma, $14,679,891
Texas, $53,907,271
Montana, $10,383,157
Idaho, $11,807,383
Wyoming, $4,725,412
Colorado, $9,048,821
New Mexico, $4,259,005
Arizona, $10,648,485
Utah, $5,174,714
Nevada, $2,110,952
Washington, $24,238,729
Oregon, $27,968,913
California, $41,822,972

The amounts that have been spent by each state in Federal-aid money up to and including the fiscal year 1923, follow:

Alabama, $3,404,110
Arizona, $3,089,345
Arkansas, $4,508,883
California, $6,843,428
Colorado, $3,998,663
Connecticut, $1,201,400
Delaware, $780,389
Florida, $2,016,553
Georgia, $8,108,719
Idaho, $3,756,737
Illinois, $11,857,711
Indiana, $3,657,423
Iowa, $8,278,385
Kansas, $7,133,161
Kentucky, $4,413,444
Louisiana, $3,758,390
Maine, $2,827,665
Maryland, $2,938,613
Massachusetts, $3,804,880
Michigan, $5,938,450
Minnesota, $6,778,318
Mississippi, $3,869,392
Missouri, $4,830,607
Montana, $4,215,089
Nebraska, $4,450,844
Nevada, $3,365,871
New Hampshire, $1,325,558
New Jersey, $2,433,644
New Mexico, $3,270,205
New York, $7,271,434
North Carolina, $6,175,747
North Dakota, $3,588,435
Ohio, $10,303,858
Oklahoma, $5,626,828
Oregon, $5,234,218
Pennsylvania, $14,910,874
Rhode Island, $647,634
South Carolina, $4,042,527
South Dakota, $3,741,954
Tennessee, $4,875,490
Texas, $15,480,637
Utah, $2,425,202
Vermont, $868,358
Virginia, $4,574,513
Washington, $5,030,670
West Virginia, $3,070,845
Wisconsin, $6,486,603
Wyoming, $3,040,230

GOOD ROADS AND THE FARMER

"The farmer between whose farm and town is an all-the-year three-ton road realizes more on every pound of products he sells than does the farmer whose products must be hauled over occasional roads to the destruction of both vehicles and horses, not counting his own needless time spent between home and town, and lack of ability to take quick advantage of favorable market conditions." — Fort Smith Southwest-American.

The Bulletin Board

C. H. & E. CATALOG

One of the finest pieces of equipment literature to come into the hands of contractors and builders in recent months is the illustrated catalog showing the entire line of the C. H. & E. Manufacturing Co. of Milwaukee. The C. H. & E. line includes various sizes of pumps, hoists, material elevators and saw rigs.

To each piece of equipment there is devoted five pages, giving a description of the equipment, typical application, a two-page closeup of the machine and full specifications.

Anyone interested in equipment of this type would be amply repaid by writing for one of the C. H. & E. booklets. H. P. Wilson & Co. are Denver distributors.

BOSS MIXERS

The American Cement Machine Company, Keokuk, Iowa, has issued a catalog describing and illustrating the various types of Boss Mixers. The company also has issued for distribution folders describing and illustrating the construction and operating features of the Boss One-Bagger, the Boss Tilter Batch-A-Minute Mixer, and the Boss 2-In-1 Building and Paving Mixer for alleys, streets, foundations, walks, floors, curbs, etc.

The Hendrie & Bolthoff Co., are Denver distributors for Boss mixers.

BUCKEYE AUXILIARY CUTTER

A new rotary auxiliary cutter has been designed for Buckeye Ditchers. It consists of two shafts, one on each side of the boom. Each shaft is fitted with steel cutting teeth. As the shafts revolve these teeth dig into the trench side walls outside the buckets. The shaft supports are adjustable, permitting variation of cutting widths. Power is transmitted by a heavy steel roller chain operating from the shaft that drives the digging buckets. No increased horsepower is necessary. The auxiliary is attachable to any Model C Buckeye machine.

THE OSGOOD COMPANY ISSUES NEW CIRCULARS

The Osgood Company of Marion, Ohio, just issued two new circulars, No. 237 and 243, describing their well known line of Steam Shovels, Clamshells Draglines and Cranes. Circular No. 237 contains numerous illustrations showing the adaptation of their shovel to various lines of work and gives some figures of the operating characteristics. Circular No. 243 describes more particularly the ¾-yd. Heavy Duty Clamshells and Draglines, and presents in concise form some data concerning the working ranges of this equipment.

SULLIVAN AIR COMPRESSORS

662. The Sullivan Machinery Company of Chicago issues a new catalogue describing its portable gasoline engine-driven air compressor, WK-311, and its angle compound belt-driven air compressor, WJ-3. 10 pages, 8½x11.

1-MAN ROAD GRADER AND MAINTAINER

A new 1-man road grader and maintainer, perfected this season by the Gilbert Manufacturing Co., Aberdeen, S. D., is illustrated. The machine has a wheelbase of 16 feet and weighs 4,200 pounds; with wheels weighted for road building the weight is 8,000 pounds. It is stated that the tractor can be taken out or connected up in less than 5 minutes by the operator, and as no mechanism is added to or taken from the tractor, it can be used for other purposes than power for the maintainer. It is stated also that on account of the power being at the rear the machine makes a very successful snow plow. The position of the blade ahead of the power likewise, it is claimed, makes it a good bull dozer or hole filler, as it can be run forward or backward readily. The machine can be furnished with a 6 foot or 8 foot mouldboard.

NEW 1924 MODEL KEYSTONE SHOVEL

A new and distinctive feature of the 1924 model of the Keystone shovel made by the Keystone Driller Co., Beaver Falls, Pa., is a half caterpillar mounting. The Model 4-24 weighs 15 tons as a wheel traction and 16 tons mounted on front crawlers. It is regularly equipped with a 40x86 in. boiler, either vertical fire tube or cross tubular type. On the front crawler machine the sills are extended 22 in. to accommodate the steering wheels at the boiler end. The machine can be furnished with electric motor or gas engine drive when so desired. It can be equipped with a drop-bottom pull-stroke ditcher bucket or a skimmer bucket. The bottom of the first mentioned bucket is hinged at the teeth and latched at the outer end. when the bottom is dropped it swings far enough on its hinge-axis to aid in expelling any material that may be stuck in the bucket and in cleaning the sides. The bucket is made in seven widths: 14, 18, 24, 30, 36, 42 and 54 in. wide. Even the narrowest widths are self-cleaning in sticky materials. The ⅝ yd. skimmer bucket has an exceptionally long horizontal crowd—14 ft., which renders it peculiarly adaptable to street and road excavation. It is possible to change from one bucket to the other in a few minutes time. By the use of a boom-extension, the machine can be arranged to handle a ½ yd. clamshell bucket. The crawler tread is mounted under the digging end of the machine, which of course, is subject to the greatest weights, strains and digging stresses. So equipped the machine can be navigated over any material of sufficient stability to carry a caterpillar traction.

P. & H. SHOVEL AS A WADER

The versatility of the P. & H. shovel was illustrated recently at Eau Claire, Wisconsin, where the Dello Paper & Pulp Company is building a new dam. The company had purchased a ¾-yard gasoline Pawling & Harnischfeger shovel, but as there was a bluff on each side of the river at the dam site, they were in a quandary as to how to get the machine down to the river bed where it was to be used in excavating. The P. & H. Company, however, sent one of its engineers, and he found that the machine could run into the river ¼ mile below the dam and travel up the bed of the river to the location of the work. The river bed was rocky and full of deep holes and ledges, and the machine at times almost stood on end, but in 4½ hours it reached the cofferdam and in another hour had crawled up over it and down on the other side over planking and supports that were laid on the dam to carry it. The company is now moving the shovel from site to site in the riverbed by running it through the water as freely as though it were on land.

METAFORM ROAD FORMS

"Engineered To Endure" is the slogan of the "Metaform" road rail manufacturers and salesmen, and upon investigating the construction of this recent development of road building equipment it is evident that the road rail is designed for strength and durability with some added advantages.

During a recent loading test this form was loaded as a beam supported 9′ 4″ between bearing points. The rail was then loaded with a concentrated load of 2,000 pounds on top of the rail at center between the bearing points. Under this load the rail showed a deflection of only 1-16 of an inch. The load was then increased to 5,200 pounds and showed a beam deflection of ¾ of an inch. The load was then released and the rail resumed its original shape with no damage to the rail section. Contractors and engineers have for the past several years given consideration to the form question and no doubt will be interested in the description of this form and the results of these tests.

Announcement is made that Fink & Sharber have taken over the agency in Colorado for the Huber 10-ton four cylinder road roller. This firm also are now distributors in this territory for the Spearwell material loader. This loader has caterpillar traction. It also can be furnished with Fordson attachment. Power is furnished by a 35 h. p. four cylinder motor. The Fordson unit is detachable. It is designed for economical handling of aggregates, sand, gravel and crushed rock from stock piles.

VIBROLITHIC CATALOG

Numerous illustrations of Vibrolithic pavements, complete information about the methods of applying the Vibrolithic process, etc., is given in a catalogue issued by the American Vibrolithic Corporation of Des Moines, Iowa.

CONTRACTS AWARDED

Proj. No.	Location	Length	Type	Successful Bidder	Bid Price
116B	5 mi. North of Colorado Springs	0.892 mi.	Concrete Paving	J. L. Busselle & Co., Colo. Spgs., Colo.	$51,001.43
246B	Vineland—Pueblo	0.787 mi.	Concrete Paving	W. A. Colt & Son, Las Animas, Colo.	29,453.90
248A	Buena Vista—Salida	12.046 mi.	Grading and Surfacing	Western Constr. Corp., Denver, Colo.	93,533.50
254A	Byers Canon	1.057 mi.	Grading	Pioneer Constr. & Engr. Co., Denver, Colo.	72,408.50
255B	Brush, West	2.944 mi.	Concrete Paving	W. F. Pigg & Son., Denver, Colo.	92,486.29
266A	Durango—State Line South	3.03 mi.	Gravel Surfacing	Mishou, Engler & Teyssier	22,233.10
283A	Loveland—Berthoud	2.530 mi.	Paving	F. C. Dreher Const. Co., Loveland	84,829.74
888	Black Hawk	370 ft.	Flume	D. S. Reid Constr. Co., Denver, Colo.	5,970.00
912	South of Sedgwick	1,615 ft.	Pile Bridge	B. F. Bollen, Greeley	5,380.00

PROJECTS ADVERTISED FOR BIDS

Proj. No.	Location	Length	Type	Bids Opened
248A	(Br.) Arkansas River, North of Salida	212.5 ft.	Steel Bridge	Bids opened May 15, 1924
909	East of Holyoke	69 ft.	Timber Bridge	Bids opened at Holyoke, May 14, 1924

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

116C	North of Breed	3.163 mi.	Paving
242A	Grand Junction—Fruita	7.703 mi.	Gravel Surfacing
258A	West of Gunnison	3.617 mi.	Gravel Surfacing
262A	West of Walsenburg	2.059 mi.	Gravel Surfacing

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

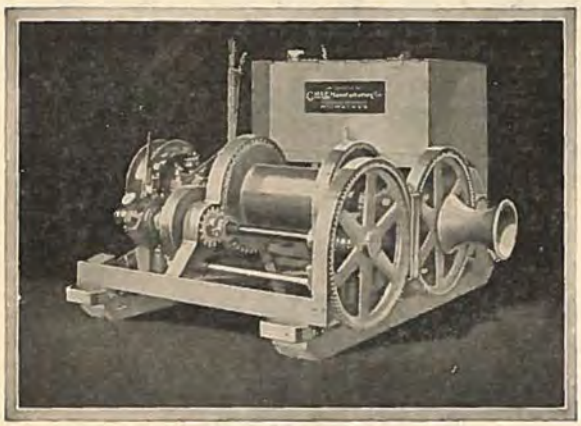
213A	Hesperus—Mancos	3 mi.	Grading and Surfacing
245B	Hadley, East	2.71 mi.	Grading
262B	Alamosa, East	.2 mi.	Bridge
269A	Cortez, East and North	2.172 mi.	Surfacing
272A	Apishipa	.2 mi.	Steel Bridge
272B	Otero-Pueblo County Line, West	8 mi.	Surfacing
273A	East of Lamar	4.5 mi.	Gravel Surfacing
275A	Wolhurst—Castle Rock	10 mi.	Paving
275B	North of Colorado Springs	.2 mi.	Overhead R. R. Crossing
281A	Lafayette, South	1.2 mi.	Paving
281B	South of Longmont	3.5 mi.	Paving
286A	Between Nunn and Dover	.2 mi.	R. R. Grade separation

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1923

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
2-R	Trinidad, north	3 mi.	Asphalt Pavemt.	Strange-Maguire Const. Co.	$121,934	13	2-R
17-R	Breed-Husted	2.339 mi.	Conc. Paving	LaNier, Selander & White	81,399	0	17-R
102	Ouray-Red Mountain	1.06 mi.	Mtn. Grading	Johnson & Johnson	58,972	73	102
116-A	Colorado Springs paving	4.18 mi.	Conc. Paving	Standard Engr. & Constr. Co.	238,944	73	116-A
119-B	Cochetopa Pass	7.5 mi.	Grad. & Surf.	Girardet-Hotchkiss Engr. Co.	53,709	95	119-B
125	Sapinero-Cimarron	11.3 mi.	Grav. Surf.	Dale Hinman	36,797	43	125
125	Sapinero-Cimarron		Steel Bridge	Winterburn & Lumsden	53,072	80	125
135	Denver-Morrison	5.3 mi.	Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	26	135
157-B	Buena Vista-Leadville	4.20 mi.	Grading	J. V. Stryker Const. Co.	65,715	92	157-B
168-B	Lamar-Hasty	6.86 mi.	Gravel Surf.	Standard Engr. Co.	60,194	72	168-B
174	Red Mountain	3.03 mi.	Mtn. Grading	Pickering Bros.	82,071	84	174
190	Summit County Bridge and Road	1.45 mi.	Grad. & Bridge	Colo. Bridge & Constr. Co.	40,154	89	190
207	Dillon-Kremmling	100 ft.	Truss Bridge	Rogers & Pickard	28,831	50	207
208-C	Grand Junction-Palisade	4.75 mi.	Gravel Surf.	Northwestern Const. Co.	46,627.35	60	208-C
213-B	Durango-Hesperus	5.26 mi.	Grav. Surf.	J. Edd. Hansen	72,960	52	213-B
214	Durango-Bayfield	3 mi.	Gravel Surf.	Dale Hinman	53,411.05	68	214
221	Loveland, north	4.05 mi.	Conc. Paving	Fred C. Dreher Constr. Co.	142,125	98	221
222-C	Broomfield-Lafayette	2.82 mi.	Conc. Pavement	R. M. Larsen	134,933	17	222-C
223-A	Kremmling-Rabbit Ear	2.88 mi.	Grav. Surf.	Henry Shore	30,565	51	223-A
224	Morrison-Baileys	5 mi.	Grading	M. J. Kenney Const. Co.	59,781	40	224
225	Fitzsimons Hospital road	1.00 mi.	Bit. Paving	Miller, Douglas & Hanes	36,618	80	225
226-A	Brighton-Ft. Lupton	8.23 mi.	Conc. Paving	White & Johnson	241,133	85	226-A
226-B	Brighton-Greeley	2.86 mi.	Conc. Paving	White & Johnson	89,993	53	226-B
226-C	Platteville-Greeley (Div. 1)	4.4 mi.	Conc. Paving	Engr. Const. Corp	120,114	28	226-C
226-C	Platteville-Greeley (Div. 2)	6.335 mi.	Conc. Paving	J. Fred Roberts & Sons	175,647	1	226-C
226-C	Platteville-Greeley	4.4 mi.	Conc. Paving	Engr. Constr. Corp.	120,114	28	226-C
229	Pueblo-Florence	1 mi.	Grav. Surf. & Bridge	H. M. Fox	34,646.50	85	229
230-A	Wolhurst, south	0.852 mi.	Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	34	230-A
230-B	Wolhurst, south	3.99 mi.	Conc. Pavement	Brodie & Anderson	153,971	25	230-B
231	Six Mile Creek Bridge	0.45 mi.	Steel Bridge	McCormick & Brockaway	25,165	83	231
240	Gypsum-Dotsero	5.185 mi.	Gravel Surf.	O. L. Hackett	66,178	35	240
241	Gunnison River, North of Delta	600 ft.	Steel Bridge	Winterburn & Lumsden	99,309	84	241
243-A	Bayfield-Pagosa Springs	1.6- mi.	Gravel Surf.	Shields & Kyle	48,311	1	243-A
245-A	Las Animas-Hadley	4.54 mi.	Gravel Surf.	W. A. Colt & Son	42,786	92	245-A
246-A	East of Pueblo	2.537 mi.	Conc. Paving	R. A. White	78,431	17	246-A
247-A	Rocky Ford-Swink	1.329 mi.	Conc. Paving	J. Finger & Son	41,369	11	247-A
251	Lafayette-Boulder	1.1 mi.	Conc. Paving	J. Fred Roberts & Sons	32,670	1	251
252	Loveland-Berthoud	3.2 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,676	13	252
253-A	Steamboat Springs, west	6.50 mi.	Gravel Surf.	Northwestern Cons. Co.	126,374	1	253-A
257	North of Denver		Conc. Viaduct	C. C. Madsen	12,178	1	257
255-A	Ft. Morgan-Brush	2.70 mi.	Conc. Paving	Colo. Bridge & Constr. Co.	85,768	66	255-A
256-B	Merino, northeast	2 mi.	Conc. Paving	W. F. Pigg & Son	53,702	0	256-B

C. H. & E. M'F'G. CO.

CONSTRUCTION EQUIPMENT OF QUALITY



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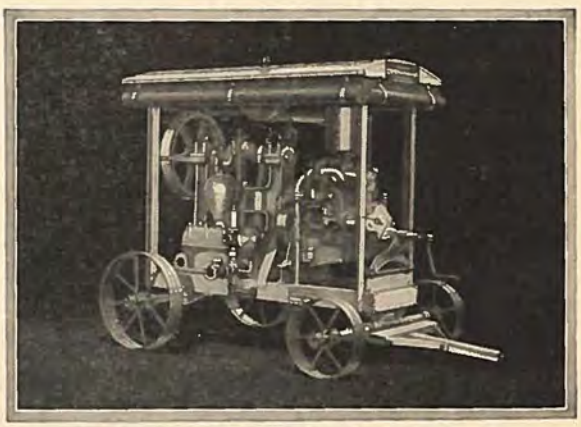

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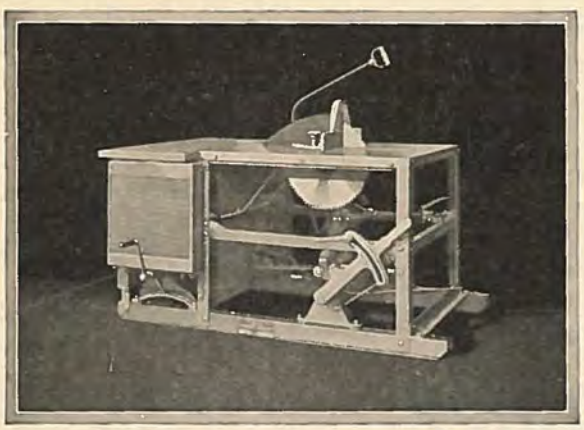

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Colorado Highways

A magazine devoted to Good Roads

V. 1, 3 June 1924 No. 6

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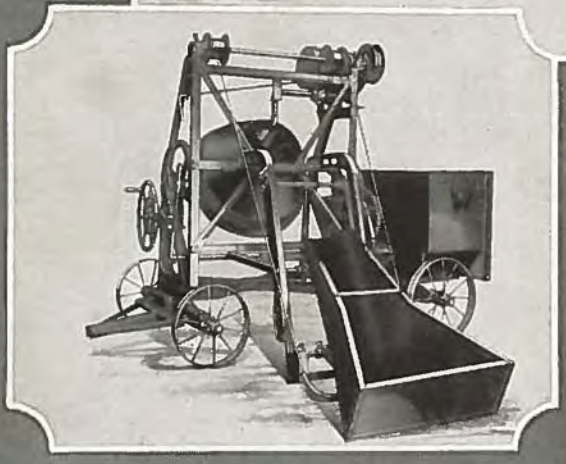

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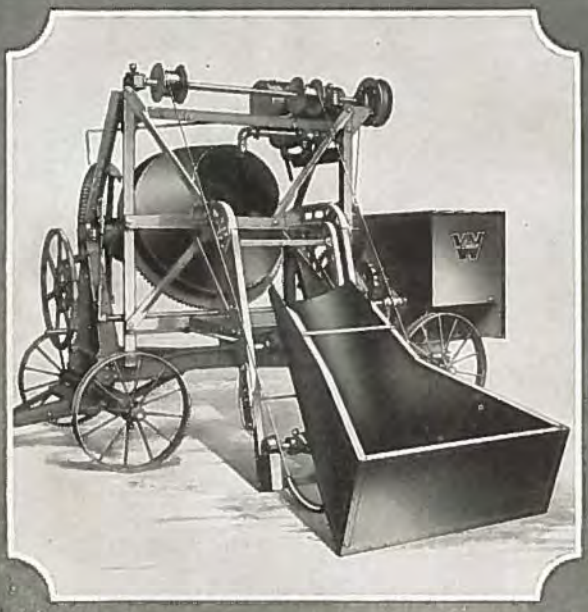

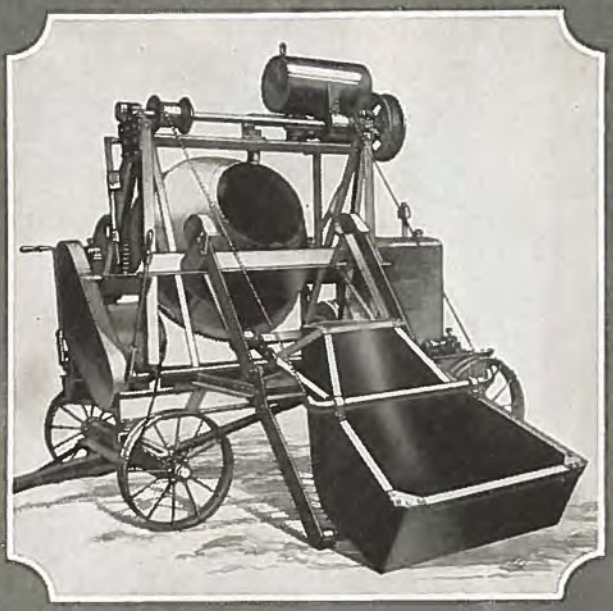

Colorado Highways

"BETTER ROADS"

Official Publication of the
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

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OUR COVER PICTURE

On the front page of Colorado Highways is a photo showing a beautiful strip of the paved highway between Fort Collins and Denver. This road leads to the unsurpassed scenic attractions of the Boulder and Estes Park regions. During the summer months it is travelled by thousands of tourists from all parts of the globe. It also passes through one of Colorado's richest agricultural sections. A five mile extension of the road pictured will be completed early in the fall.

Colorado Highways
"BETTER ROADS"
VOLUME III. JUNE, 1924. NUMBER 6.

The Sapinero Arch

By HORACE T. RENO,
Resident Engineer.

THE completion this summer of a new bridge across the Lake Fork of the Gunnison, at the entrance to the Black Canon will mean one more problem solved in the task of turning over mountain roads into highways.

The canon itself was conquered for a distance of twelve miles by the Rio Grande Railway, at a cost of almost a million dollars. The lower end of the canon is said to have been seen in its entirety by only two men. Rising two thousand feet on either side of this canon and cut by numerous steep side canons are two lava-capped mesas known as the Black and the Blue.

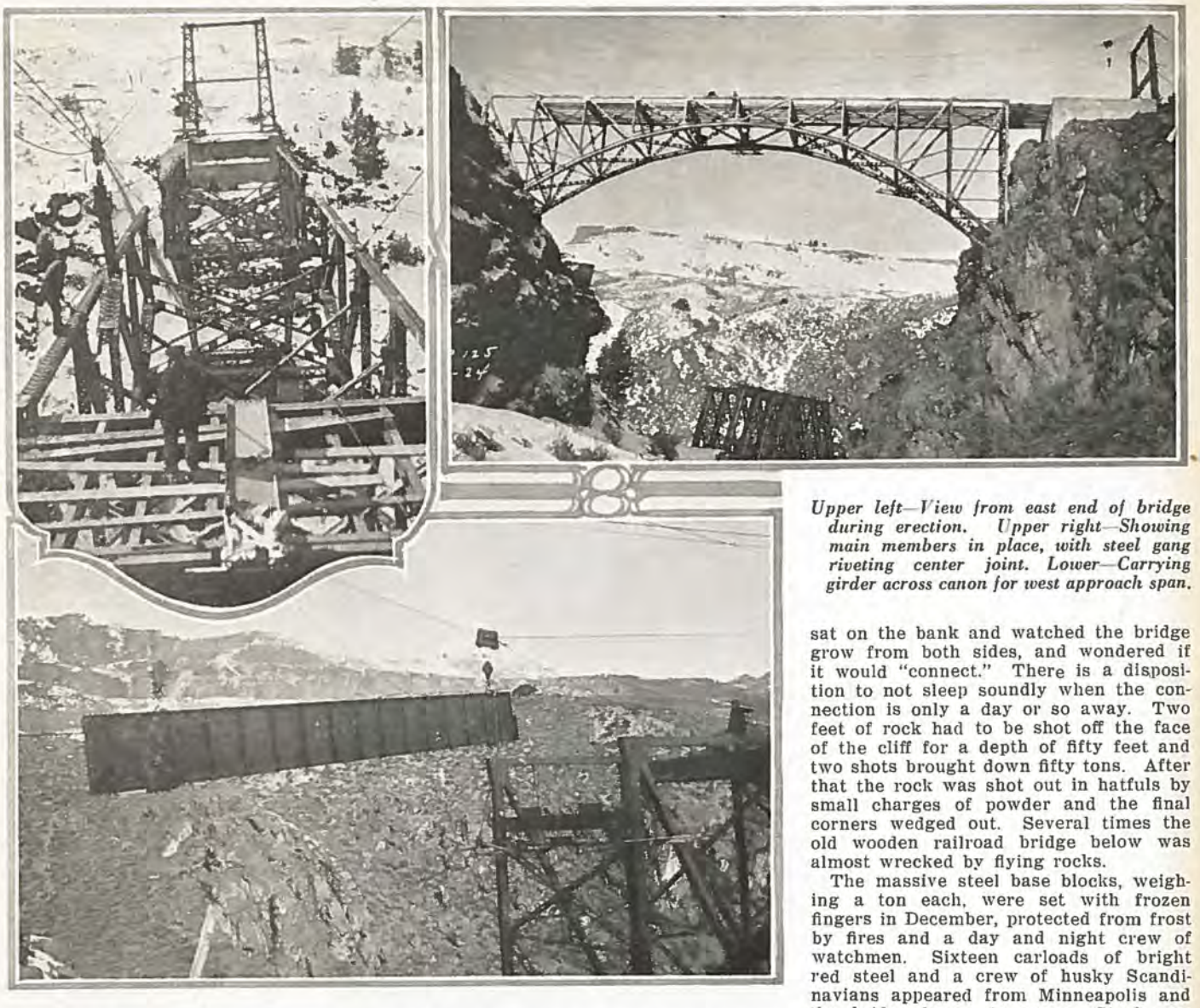
The rush of travel which followed the discovery of the mining camps of Ouray, Telluride and Rico found these mesas an almost insurmountable barrier. Roads over Monarch and Cochetopa passes instead of following down the Gunnison turned south and crossed the Lake Fork almost half way to Lake City, where they joined Otto Mear's famous toll road from Lake City and painfully climbed up the mesa. However, a band of Mormon emigrants crossed the Lake Fork and fought their way on to the promised land. It is also said that an occasional enterprising freighter, anxious to beat Uncle Otto out of the toll and perhaps gain a few days' time, sometimes worked his way down off the Blue and used the Mormon Crossing. These roads are vanishing as the Indian trails before them and are marked only by gulches on the hillsides, where an occasional ox shoe can be found.

The rapid settlement of land under the Gunnison Tunnel brought a demand for a new road east from Montrose. In 1910 to 1913 the old Highway Department in conjunction with the counties built a road east over Cerro Summit down the Cimarron and over the Cimarron-Blue Divide. Then, instead of following the old road, they climbed out of the Blue Canon, and, keeping below the rim of the mesa, dropped down to the Lake Fork with a hair-raising hill, crossed at the mouth and followed up the canon a mile to Sapinero. This hill was completed in 1913 and the first two women over the road had their names with the date carved on a tree to commemorate the occasion. With the rebuilding of Monarch Pass this road became a part of the Rainbow Route.

The part of this hill along the canon is only about a half mile long and averages eight per cent but has three fifteen-foot radius curves of one hundred and eighty degrees in succession. It is a one-way road, with passing points every fifty yards, but is known and dreaded by tourists from one end of the country to the other. It is not uncommon to find a car standing at the top of the hill with the driver sick from nervous strain and unable to continue. The bones of two cars are scattered along the hillside and in the river below and at the usual evening experience meetings in the tourist camps the man who had the last word was the one who said, "wait until you hit the Sapinero Hill."

It was quickly realized that this stretch of road would have to be rebuilt to handle motor traffic

Upper picture—Steep cliff on which east arch rests, and cableway tower. Lower picture—Showing railroad and wagon bridges and new Sapinero arch. Colorado's most picturesque highway bridge.



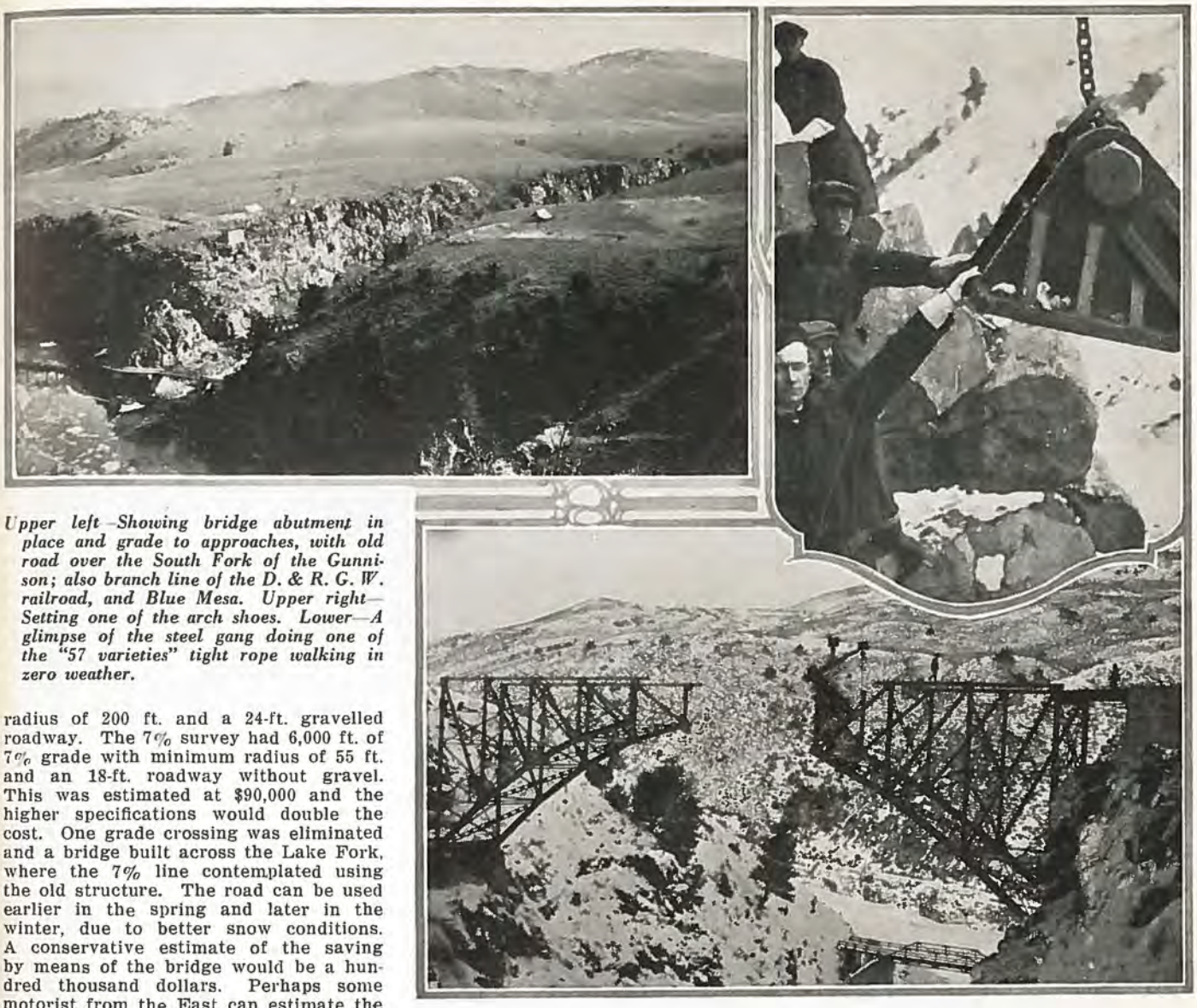
Upper left—View from east end of bridge during erection. Upper right—Showing main members in place, with steel gang riveting center joint. Lower—Carrying girder across canon for west approach span.

and in 1920 the Highway Commission and Gunnison County appropriated $45,000, to be matched with an equal amount of Federal Aid to rebuild the three miles west from Sapinero. Thus F. A. P. No. 125 was inaugurated. Engineers of the department were given this problem: Given $90,000 to build three miles of road where $150,000 is needed. What is the answer? A party was sent out and surveys were made. It was soon found that a six per cent line along the canon would not solve the problem. By introducing six thousand feet of seven per cent grade the road left the canon more quickly and costs could be kept within the limit. Tales were told of a bridge across the Lake Fork at some point above the mouth, and measurements were taken, but the idea given up as impracticable. Plans were finally prepared with the 7 per cent line, but the Bureau of Public Roads would not approve. A second party was sent out and spent all of one fall and winter testing out every possible line up the canon, wading in snow to their waists in 30 below zero weather and having a lovely time, but not getting any acceptable line. The 7 per cent grade was finally reduced to two thousand feet, at the cost of a hairpin turn with 35 feet radius and a 35-foot cut, but still the Big Chief and the Bureau said "No." Orders were given to make another search for a high bridge site. The canon of the Lake Fork had been studied for possible bridge sites from below. We determined to go on top and study each available site from the mouth up. As it happened, we never got above the mouth of the canon to run a line. Standing on a ledge of rock on the east side, a projecting ledge on the west caught the eye and a possible bridge site was seen. Hasty preliminaries were run and submitted with recommendations, and the result is the Sapinero Arch.

The design of the bridge was finished too late for the 1922 season and the line of the road revised so that we again fought snow before a contract was let in the spring of 1923. In the actual construction the contractor has the larger share. We hung on ropes to make the final survey and measured the distance across the canon to a "gnat's heel" with a tape standardized in Washington, then sat on the bank and watched the bridge grow from both sides, and wondered if it would "connect." There is a disposition to not sleep soundly when the connection is only a day or so away. Two feet of rock had to be shot off the face of the cliff for a depth of fifty feet and two shots brought down fifty tons. After that the rock was shot out in hatfuls by small charges of powder and the final corners wedged out. Several times the old wooden railroad bridge below was almost wrecked by flying rocks.

The massive steel base blocks, weighing a ton each, were set with frozen fingers in December, protected from frost by fires and a day and night crew of watchmen. Sixteen carloads of bright red steel and a crew of husky Scandinavians appeared from Minneapolis and the bridge began to grow. Steel was carried back and forth on cables by means of trolleys and the arch hung on other cables running back to "dead men" buried in the rock and water poured in to freeze after the holes were filled. Inspection by engineers was made very cautiously and it is reported that one engineer left his finger prints in the steel all the way out to the center. The authority for this tale offers to take anybody doubting it out to the center and prove it. Connection was made in February and we differed by three-eights of an inch. The ten thousand rivets were driven and the nice red steel given an equally nice coat of shining black paint. The crew of Scandinavians moved on to work other wonders and the concrete floor is now in process of construction. There is talk of a big dance to be given in the summer on the bridge floor and an old-fashioned christening.

How completely the problem is solved can only be told by one who has driven a car over the old and the new routes. but a few statistics may help. The 2 8 miles of road, with the arch bridge will cost $90,000, maximum grade being 4,000 ft. of 6% grade, with minimum curve



Upper left—Showing bridge abutment in place and grade to approaches, with old road over the South Fork of the Gunnison; also branch line of the D. & R. G. W. railroad, and Blue Mesa. Upper right—Setting one of the arch shoes. Lower—A glimpse of the steel gang doing one of the "57 varieties" tight rope walking in zero weather.

radius of 200 ft. and a 24-ft. gravelled roadway. The 7% survey had 6,000 ft. of 7% grade with minimum radius of 55 ft. and an 18-ft. roadway without gravel. This was estimated at $90,000 and the higher specifications would double the cost. One grade crossing was eliminated and a bridge built across the Lake Fork, where the 7% line contemplated using the old structure. The road can be used earlier in the spring and later in the winter, due to better snow conditions. A conservative estimate of the saving by means of the bridge would be a hundred thousand dollars. Perhaps some motorist from the East can estimate the saving in mental anguish due to not having to drive the hill.

The completed bridge is 249 ft. long, with a central span of 180 ft. and approach spans of 15 ft. and 54 ft. It is 135 ft. from the bottom of the canon to the floor of the bridge. The bridge was built by Winterburn and Lumsden as General Contractors, the steel fabrication and erection by the Minneapolis Steel and Machinery Co., with the writer in charge of surveys and construction, with Division Engineer J. J. Vandemoer. R. S. Dubois is the Bridge Engineer under whose direction the design was made by N. D. Morgan.

COUNTY DISPLAYS HAVE APPEAL FOR TOURIST CAMPERS

Displays of county resources are a big attraction this summer at Overland Park. Thus far fifty-seven of the sixty-three counties in Colorado have representation or have signified their intention of installing exhibits in the Exposition Building, made possible through the efforts of the Denver Tourist Bureau and the courtesy of the City and County of Denver.

The display space is free. The only expense is the nominal cost of installing the exhibit, which, before the end of the vacation season, should be seen by approximately 75,000 visitors and residents. Already 4,000 overland motorists have registered at Overland camp grounds. County Commissioners, working through the state association and co-operating with chambers of commerce and clubs, are familiar with the details. The movement seeks to more fully inform motorists of the delights and commercial pursuits of the respective counties, with the suggestion that they also visit other sections of the state.

Cheyenne, Otero, Larimer, Douglas, El Paso, Logan, Elbert, Boulder, Jefferson, Sedgwick and Rio Grande counties already have splendid exhibits in place, while Moffat, Routt, Grand, Rio Blanca, Jackson, Montrose, Pueblo, Fremont, Las Animas, Huerfano, and five counties in the San Luis Valley are arranging final details.

All haste possible by those counties that have not yet sent in their exhibits is urged by the Denver Tourist Bureau. Freeman H. Talbot has been engaged as managing director of the displays and to supervise the free illustrated lectures on scenic and commercial Colorado.

Still other displays include complete exhibits from the national parks, national forests, Colorado-Made Goods Club and the City of Denver.

DELTA HIGHWAY BRIDGE OPENED FOR TRAFFIC WITH CEREMONY

This magnificent new bridge over the Gunnison River at Delta was opened for traffic May 28. It consists of four spans, each of which is 150 feet in length. The structure consumed 735,095 pounds of structural steel, 136,235 pounds of reinforced steel, 1,084 cubic yards of concrete, 6,844 lineal feet of timber piling. Its total cost was $98,400. Construction work was done by Winterburn & Lumsden, contractors, under the supervision of W. C. Peterson, state highway engineer in charge, with Oliver B. Cook, resident engineer, assisting.

Formal dedication of the bridge took place on Memorial Day. Members of Harry A. White post of the American Legion had charge of the exercises.

View of Lake San Christobal, in Hinsdale County, on State Road No. 49.

Good Roads Lower Costs

By WILLIAM E. SWEET
Governor of Colorado

THE manufacture of automobiles and allied trades form one of the greatest industries of the country, which is increasing in magnitude. The use of the automobile has required the construction of better roads and more of them, not only through the states, but across the country as well. It brought about the passage of the Federal Aid bill a few years ago. By means of this legislation the construction of good roads has become of national interest, and all of our transcontinental highways are part of a thoroughly considered and comprehensive plan.

Because the automobile has become so widely used for business and pleasure, good roads are an absolute necessity for the state and become a very valuable asset. Permanent highways banish isolation, for city dwellers are enabled to reach the country quickly, while those living in the country can just as readily reach the city. Quick transportation brings the interests of the country and the city very close together and enables the agriculturist to market his products in the city at very much less expense. In 1919 eighteen per cent of the milk supply of the city of Baltimore was marketed by the use of trucks, while at the present time thirty-six per cent is transported to the city by trucks. This is a demonstration of the effect of good roads upon the economic life, not only of the country dweller, but the city dweller as well.

Transportation by truck has a very great effect upon the income of the railroad, and is causing not a little apprehension among railroad owners. It is impossible to forecast the solution of this problem, for this is one of the evolutionary processes which go on from decade to decade in transportation. The railroad superseded the stage coach, and while it is not thought that the auto truck will supersede the railroad, nevertheless its use has a very vital effect upon railroad transportation.

The problem of the construction of suitable highways in a sparsely settled country is increased by the enormous expense involved with so few property owners and tax payers to meet the cost. For instance, New Mexico and Arizona find it difficult to lay down as good highways as Kansas and Nebraska can afford, with their larger populations. Personally, I feel that the southwestern states are deserving of great credit for their substantial highways, for which the tourists who use them so largely pay very little, except a nominal license.

Our best road engineers consider that the most substantial road is cheapest in the long run and that our main highways, east and west, should be thoroughly well constructed, even though they might have to be rebuilt after fifteen or twenty years. By that time it is to be hoped that there would be a greatly increased population to help bear the cost.

Good roads are not only an asset to a community in economic results and in lending greater variety to the enjoyment of life, but they also bring large numbers of people from the east into our states. Colorado, in company with many other states of the southwest, is spending many millions of dollars on roads, and automobile license plates from every state in the Union are seen during our tourist season.

One of the pleasures of foreign travel is to motor over the beautiful, well-kept roads that are found throughout Europe. In France the old men are constantly employed on the roads to keep them in good condition. A beautiful feature of the landscape are the trees which line both sides of the highways, extending as far as the eye can see. As these French roads are not laid out at right angles, as our roads are, and cross-roads are not so frequent, these rows of trees act often as guide posts to indicate from a distance where there is a road. As seen from the hilltops overlooking the valleys these straight rows of trees add greatly to the beauty of the landscape. While it will take many years to bring our highways to this stage of development, nevertheless, as progressive citizens, we ought to be keenly interested in every movement for beautifying the landscape.

Good roads abroad have always been a most valuable asset. In Switzerland and Italy many of the roads are part of the old Roman ways which, as you know, were constructed to facilitate the rapid movement of armies across the Alps. These roads now afford easy access from

country to country, and are crowded with tourists on foot and in automobiles and are of the greatest convenience and economic benefit to the residents. Great buses make daily return trips of many miles. In Colorado we are just beginning to learn what it is to enjoy our mountains by using these auto bus lines which run to various mountain resorts.

Many years ago President Roosevelt referred to our state as the playground of the nation. At that time he referred largely to the enjoyment of the hunt and the chase which Colorado afforded, but in these days our splendid highways extending into every part of the state have opened up the whole state as a playground for the nation.

I rejoice with you in the purpose which brings us together, namely, to continue the agitation for good roads until we have accomplished thoroughly what we set out to do. We need to be patient with those who do not see this matter from our vantage point and who feel at times burdened with heavy taxes. However, we should keep up the good work of spreading Good Roads propaganda and encouraging by every possible means the use of the automobile, because when one drives his machine over a poor road he at once becomes an advocate of good highways and is willing to pay the increased taxes necessary to make them possible.

The question of the continuance of Federal aid is a vital one, particularly to the West. We have two good precedents for the purpose of granting Federal aid for the construction of roads. In the 60's, when the Union Pacific road was constructed across the country, Congress granted a bonus and the corporation came into the ownership of land of great value. Later this same method was adopted in the construction of the Northern Pacific. This grant of land was made to corporations and, while it was grossly abused, it indicates that the government has always recognized the principle of extending aid to the West in its great task of building up the country. The railroads contribute to this end—so do automobiles, and good roads are a necessity for rapid and regular transportation.

Again, when the United States Reclamation Service was organized, it was for the purpose of giving government aid to worthy irrigation enterprises where private capital could not undertake the great expense necessary. Many thousands of acres of land have been opened to settlement by this method.

This nation is a unit and its progress depends upon the development of all sections of the country. It is the obligation of the nation not to withhold, but to extend Federal aid where the purpose is as popular and as necessary for the development of the country as are good roads. It is a perfectly valid and good expenditure of public funds.

I am glad to be here and you may rest assured that Colorado will do her full share, not only in the construction of highways within her own boundaries, but in spreading abroad the idea of good transcontinental highways wherever they are needed.

Address made by Governor Sweet at Good Roads Convention in Albuquerque, May 27, 1924.

Top—Showing bridge assembled on roadway. Lower—After being rolled into place over Beaver Creek, near Florence.

Unusual Engineering Feat Staged in Construction of Beaver Creek Bridge

An unusual engineering feat was successfully accomplished a few weeks ago in the construction of the steel bridge over Beaver creek, on the Pueblo-Canon City highway.

The bridge was completely assembled on the roadway and then pulled on to the piling supports and fastened into place upon the concrete abutments. Much time, labor and money can be saved by such a method. After the bridge was in one solid unit a heavy cable was fastened to it and a tractor pulled it into place.

This method is expected to be unusually successful in constructing bridges during flood season, when the flood waters rush down upon bridge sites. Floods striking a network of supports means in most instances complete destruction. Through this method, supports need not be installed until a day or two prior to installation of the span. This was the reason H. M. Fox, the contractor, and J. C. Weber, state highway engineer, developed the new idea. The bridge has been opened to travel.

HOOVER HIGHWAY SAFETY CO-ORDINATION PROGRESSES

Progress in the co-ordination of programs dealing with street and highway safety measures was made April 19, when representatives of eight national organizations called together recently by Secretary of Commerce Hoover made tentative selections of committees to study various phases of the safety problem. Efforts are being made to enlist the aid of nationally known leaders familiar with such studies as statistics, control of traffic, road construction and engineering, city planning and zoning, insurance, education in safety matters, and the mechanical equipment of automobiles and motor vehicles. On completion of studies of these matters, a national meeting of all national organizations interested is planned.

Study is to be made of traffic laws and rules, speed limits, street and road marking, rules for pedestrians, signs and signal systems for police and drivers, parking, patrols, street and highway illumination, grade crossings, street intersections and similar control-of-traffic measures. In this connection the licensing of drivers, form of examination, physical, mental and moral fitness, experience and actual ability, previous record, revocation or suspension of license, age limits, and kindred topics will be referred to a sub-committee.

Rotary Plow Solves Snow Problem

WHEN will such and such a pass be open? This question is hurled at State Highway officials a score of times a day for a period of six weeks each spring.

From the number of calls received it would seem that every motorist in the state was "standing by" anxiously awaiting the word to go. These calls are not limited to any one particular part of the state. They come from every section.

Removal of snow from the highways crossing the Continental Divide at an elevation from 11,000 to 12,000 feet and above timber line, where weather conditions are severe, is one of the biggest problems that state road officials must solve. For two years experiments with a rotary snow plow have been conducted by the Highway Department, under the personal direction of Maj. L. D. Blauvelt, state highway engineer. At the same time experiments with blades and other snow removal equipment have been made. But most success has been accomplished with the rotary plow.

Shortly after Major Blauvelt took charge of the state highway department three years ago, a delegation of citizens from northwestern Colorado called upon him and requested that he take some action toward removing the snow from Berthoud Pass early in the spring of each year, in order that they might have access to the eastern slope at an earlier date than was afforded by nature, which did not take place until about the middle of July, thus restricting motor transportation between the eastern and western sections of northern Colorado until that date.

Major Blauvelt promised to see what could be done. Immediately he set to work on designs for a rotary plow after the fashion of the huge plows used by the Moffat railroad. Major Blauvelt was chief engineer for the Moffat line for several years and he is thoroughly familiar with the work of the railroad plows.

As a result of his experiments a specially designed rotary plow was put to work on Berthoud Pass on May 17 this year. Through drifts of heavy snow and ice from six to twenty feet deep this machine burrowed its way to the summit of the pass, reaching the Continental Divide on May 26. A roadway from six to eight feet deep and eight feet wide had been cut through the snow from the foot of the pass over the summit on both sides by June 7.

On this date the first caravan of motor cars and trucks passed over the Divide from Empire on their journey to the western slope. This is the earliest date on which traffic has been able to move over Berthoud Pass, and about three weeks earlier than would have been the case had the snow in the roadway remained untouched until melted by the rays of the sun. "New" snow which fell during the storms the latter part of May this year would have shut out traffic until the first of July, had not the rotary plow been put in operation.

Two trips were made with the plow across the pass. On the second trip, which was started from the western slope, a passageway twelve feet wide was made in the snow. With the snow which melted and that removed later by use of a tractor and heavy grader, the roadway was in such shape by June 10 that cars travelled from Empire to Fraser without skid chains.

The snow plow and tractor was brought back to the highway shops in Denver on June 13.

The removal of snow from the roadway over Berthoud Pass was the most stupendous undertaking ever attempted by road officials in this western country. It was accomplished against overwhelming odds. Working under the most adverse weather conditions, a greater part of the time in zero temperatures, and in snow, sleet and cold rains, the operators of the plow and auxiliary equipment never once faltered on the job.

A word of high praise is due these men, under the able leadership of Robert H. Higgins, state superintendent of maintenance, and Charles Brock, maintenance superintendent in Division No. 1, for ac-

Left—View of Berthoud Pass highway, with plow bucking 6 ft. of snow. Right—Showing front of rotary wheel throwing snow 250 ft. down slope. Insert—Plow emerging from 20 ft. drift, with temperature two above zero.

Upper left—Side view of rotary plow and tractor outfit. Upper right—Front view of rotary wheel. Lower left—Clearing way thru snow slide. Lower right—Making 8 ft. cut thru slide on danger curve. Insert—"Sleepy Bill," the human measuring stick, takes snow reading.

complishing that which heretofore had been said was impossible. These men are looked upon as heroes by their co-workers.

It was universally acknowledged by those who witnessed this undertaking that the rotary plow removed the snow that it would have taken 1,000 men with shovels to remove in the same length of time.

The removal of the snow from Berthoud Pass this year was more in the nature of an experiment than anything else. The experiment was highly successful. It was conclusively demonstrated that the rotary plow will produce the desired result. However, defects were discovered in the motive power of the tractor which pushed the plow. The chief drawback was found to be that the present tractor is not geared down slow enough to permit the plow to do its best work. However, this was no fault of the tractor, and it is one of the defects in design that can be corrected with very little difficulty.

Considering that the plow and all of its mechanism was constructed from cast-off parts of trucks and tractors allotted to the state by the U. S. War Department as surplus war materials, its performance is considered little less than marvelous.

The wheel, which was personally designed by Major Blauvelt, was cast in a local foundry and put together in the State Highway shops. This wheel stands 6½ feet high and weights 2700 lbs. The entire weight of the plow is 3200 lbs. Operating the rotary wheel is a 90-hp. VanBlack Marine motor. This motor was formerly a part of the equipment of a centrifugal pump used in France during the war.

The rotary wheel is mounted on a frame of seven-inch channel steel, taken from a discarded truck. The springs were a part of a war truck, while the wheels were taken off an old Mack truck. These are equipped with 9-inch tires and skid chains. The driver's cab and housing for the rotary wheel was cut from sheet metal shipped to the state highway department by the government.

All of the electrical devices and gauges were made from junk parts, while the tactitometer used to give the speed of the wheel, was made special under the direction of Thomas Shelton, mechanical engineer of the highway department, who supervised the construction of the plow and also its operation during the Berthoud experiment, acting under the personal direction of Maj. Blauvelt.

The transmission used on the rotary was constructed from spare parts which came with several Liberty trucks which the government allotted to the state. Wherever possible only cast-off parts were used in constructing the plow and its auxiliary equipment. About the only new thing about the entire mechanism is the wheel, thus giving a fine example of the adaptation of surplus war materials to peace-time usage.

The driving motor of the wheel has four cylinders, equipped with 12 spark plugs. It starts on four plugs, idles on four plugs and uses eight for excessive duty, thus giving excessive explosion for increased power when throwing snow.

A 10-ton Holt caterpillar tractor was used in the experiment to push the plow. This also was allotted to the state by the government from surplus war stocks. While this tractor has sufficient power to push the plow through the deepest cuts of snow, it was found that it is not geared low enough to feed the wheel into snow at a speed slow enough so as not to choke the wheel in heavy drifts.

This defect is to be corrected by the use of a larger tractor with adjusted gear ratio. Already the department has procured from the war department a 20-ton Holt tractor, which it is expected will give power enough to keep the rotary plow moving at a steady pace. The only fault that could possibly have been found with the tractor used was that its gear ratio was too high to give the evenness of power desired for this particular work.

The first day the plow was put in operation it covered a distance of over a mile. For a distance of two miles on each side of the summit it was necessary to use dynamite in order to break a crust of ice covering the snow in order for the wheel to handle it. More than eight tons of explosives were used.

A snow drift more than 20 feet deep was encountered in the first mile covered. On four working days the plow cleared snow from four miles of the roadway at an altitude of from 9,000 to over 11,000 feet.

For two days the men worked in a

(Continued on page 18)

Scene near Kremmling on Victory Highway.

Beautifying by Roadside Planting

By JENS JENSEN,
Renowned Landscape Architect

Editor's Note: Jens Jensen, one of America's leading landscape architects, the man who has had most to do with the development of Chicago's wonderful park system since 1890, was responsible for the beautification of the Ideal Section of the Lincoln Highway. He is a pioneer in roadside beautification in America.

ROADSIDE planting should be a part of the general character of the landscape so that the roads themselves do not appear as a definite line apart from the rest of the landscape, but a means to an end that is in sympathy with its surroundings. The highways are the points from which the traveler sees and enjoys the surrounding country. It is, therefore, of importance that the roadside planting does not shut out adjacent lands. Out on the plains, the open country and the freedom of it is a real charm and inspiration. Even roadsides lined with rows of trees in the avenue fashion would be a mistake. This not only would change the broad expanse of prairie country, but would tend to checkerboard the prairie landscape. The same idea may hold good in mountainous countries where the valley is the object of beauty.

Scattered trees planted promiscuously along the highway, as one sees them in the forest, are more in keeping with our landscape and with the American mind than stately avenues of monarchs. It is rather lanes that we want, or "pikes," as they are called in the South, where trees seem to enjoy the roadside and each other's company. There is nothing stiff or set about it. A lane or a pike is tolerant even to the shy but sweet violet that may be permitted to scatter its perfume along the highway. I have seen pikes in Kentucky that come as nearly to what I consider a beautiful American highway as anything I know of. They are serviceable, beautiful and cool on hot summer days. Native plants of all sorts find a happy home along these roadsides and give their beauty and their wonderful message to the passerby, and in them nest our birds that thrill us with their songs.

We want this expression of freedom along the open road. We want shadows and we want sunlight. We want the comfort of shady lanes and we want the beautiful outlooks over the surrounding country. I have passed over prairie roads with nothing but wavy plains in green and brown before me, and way off in the horizon the purple riches on the crest of a prairie wave. Those are inspiring things and they stimulate a love for our native land.

All roadside planting should be determined and based on the country and its native vegetation through which the road winds its way. In this way the roadside planting will become a part of the general landscape and enhance the beauty of its surroundings as far as this is possible for a highway to do. For instance, swamp or lowland landscapes are of a widely different character than prairie or hilly country and the vegetation fitting for these different types of landscapes are equally as different.

Never have I seen a white oak prettier and the landscape nobler by the oak being a part of it, than on one beautiful May day in Missouri, with the oak crowned with golden tassels against the blue sky. It is just one instance where the oak or any tree will bring out its greatest beauty when planted in a fitting situation. Every plant has its proper place in the out-of-doors. To find this place is worth while because here it reveals its greatest beauty and gives us joy in the fullest measure. Trees adapted to their environs may grow to great age and nobility and in this way highway planting will become a most important task in the making of our rural landscapes. This points to another important matter—the designing and supervision of the work. It is a matter of great importance, a matter that requires great knowledge of plant life as well as the vision of the artist.

Roadside planting, the development of state reservations, and rural parks are equal in importance to city planning and are far greater in scope and vision than the latter. A period of great cultural advancement is always measured by the vision and the outlook for the future. Roadside planting belongs to such a period. It is pioneer work with us, but it is a part and a very important part of a great cultural movement of our people.

Road News, Views and Gossip

FOOL-PROOF HIGHWAYS URGED BY HIGHWAY OFFICIAL

Highways can be made fool-proof if funds are available, John A. MacDonald, Connecticut State Highway Commissioner, told the Yale University-State of Connecticut Conference on Traffic recently. In order to make accidents almost impossible, he said, obstructions in and alongside of the highways must be removed, building lines established, sight lines provided, speed regulated to prevent too fast and too slow driving, proper curves and banks built, congestion guarded against, suitable widening assured, telephone and telegraph lines set back and parking near the curb eliminated.

"Highways, like every other means of transportation, are today carrying many times their estimated maximum capacity at the time of their construction," Mr. MacDonald said. "Many of our roads were laid out at a time when motor vehicles were unheard of, and no thought was given that these roads would ever be asked to carry the present traffic.

"One of the functions of a good road is to carry the traffic required of it with safety, and if accidents are happening, due to improper conditions, then those highways are not functioning properly. It is a well established principle that no road should ever be improved to an extent in excess of its earning capacity. The return to the public in the form of economic traffic is the sole measure of such improvement."

TOWN OF RENO MOVED FROM RAILROAD TO CONCRETE ROAD

Reno, a small community 6 miles east of Paris, Texas, has reversed the time-honored custom of towns following the railroad. Reno has moved away from the railroad to the new concrete highway that runs east out of Paris.

This town of the Texas & Pacific railroad saw only four trains a day passing through it, while about ½-mile away a steady stream of traffic was passing over the concrete highway. So the town packed up all of its three business houses and moved over to the highway. Only a swimming pool was left at the old site.

GOOD ROADS SAVE MONEY ON AUTOMOBILE OPERATING COSTS

The department of public works of Ontario has been figuring the savings on automobile depreciation due to improved roads. The depreciation of its automobiles was formerly $240.00 per car per year, from running over roads in the condition existing some years ago. Some cars were practically wrecked in a single year on bad roads.

Recently cars have been turned in that showed depreciation of only $125.00 per year, the result of improved roads. It is figured on this basis that a saving of $15,000,000 is made on depreciation of cars and trucks owned outside of the cities of the province. It will generally be found that judicious road improvement pays for itself in saving on motor vehicle depreciation, to say nothing of economy in time and other costs.

"ROAD TO HAPPINESS"

"The Road to Happinness," a highway film produced jointly by the Ford Motor Company and the National Automobile Chamber of Commerce, representing the entire motor vehicle industry, and the Highway Education Board, has just been released for distribution. The picture was made with the advice and guidance of the Bureau of Public Roads, United States Department of Agriculture.

President Coolidge, who is a strong believer in the value of road improvement, appears as one of the principal characters in his proper role as President of the United States.

Showing operation of concrete finishing machine which insures smooth riding surface of highway pavements.

The story has to do with the life of a farm lad reared in an old farm home on a mud road, surrounded by all the handicaps, difficulties, and discouragements attendant upon such an environment.

As the result of an essay contest for a four-year scholarship prize, offered through the Highway Education Board, the boy, who wins the contest, obtains the chance for a college education. He becomes a highway engineer and is privileged to bring about such changes in the condition of the roads of his home community that even the most skeptical opponents of road improvement are brought to a realization of the truth of the maxim which forms the moral of the picture, that "we pay for improved roads whether we have them or not, and we pay less if we have them than if we have not."

The film is distributed by the Ford Motor Company through its numerous branches, and is available for use in schools and at public meetings without other charge than the cost of transportation. Full information in regard to the film can be obtained from the Ford Motor Company, the National Automobile Chamber of Commerce, the Highway Education Board, or the United States Bureau of Public Roads.

HOW MAINTENANCE OF ROADS SHOULD BE PAID

"Tax the automobile and build the road from the revenues," is a principle which has been expressed by the non-informed voter too many times. But education and sound economics as enunciated by bankers and statesmen have changed the cry. Few who now concern themselves with road financing, but understand that the right way to pay for a road is either by road bonds based on general, not specific taxation, or from current general funds.

The experience of years proves that the fees from taxed road vehicles must be spent for maintenance. Maintenance is always being used up; vehicle taxes are always coming in to provide that maintenance. To use the maintenance fund for building more roads is as uneconomic as the procedure of a man who builds a house for rent, and instead of using some of the rent to keep his property in condition, and insure it and paint it, spends it for another house. letting the first go to ruin. He will end in the poorhouse, and the county or state which does not provide a steady maintenance fund for road upkeep will be bankrupt in good roads long before the roads are paid for.—National Highways.

GET YOUR MONEY'S WORTH

Everything you eat, wear, live in, sell or play with, at some stage of its production has to be hauled over the roads. How much you have to pay depends on how good those roads are. Some folks haven't found that out yet, and that's why they will spend only a little on the roads, and then pay a great deal because of the roads.

You know why you buy a good suit of clothes, a strong plow harness, a well made desk, or a concrete sidewalk—because you want the quality that gives you your money's worth before the article wears out.

Just so with roads. They have to stand harder wear than anything else you use—that's why you should demand permanent roads. Permanent roads have the qualities that resist wear and hard usage. The states and counties which have had permanent roads longest know by experience that the people get their road money back before the roads wear out. That's why they keep on building permanent roads.—Exchange.

REPORTS FROM THE DIVISIONS

DIVISION I.

HEADQUARTERS, DENVER.

JOHN P. DONOVAN, DIVISION ENGINEER.

Counties of Adams, Arapahoe, Boulder, Clear Creek, Gilpin and Jefferson.

After a considerable delay the new steel and concrete bridge which spans Clear Creek near Arvada was opened to traffic on June 10. This is one of the most imposing bridge structures in the Denver district.

Pouring of concrete has been started on the new pavement between Denver and Morrison. It is expected that three miles of this road will be paved by the time snow flies.

Concrete also is being poured on the project north of Broomfield. R. M. Larsen has the contract for this three miles of paving. He expects to complete the work by the latter part of August. Plans now are being drawn for an extension of the paving to the city limits of Lafayette. This will probably be put under contract in a few weeks.

Giggey & Haines, sub-contractors on the mile of pavement on the Arapahoe road east of Boulder, are making splendid progress. Over half of the concrete has been poured. This piece of concrete will connect with the Denver-Fort Collins road near Ten Mile corner.

Plans for the extension of the Turkey Creek road from Conifer to Shaffer's Crossing are nearly completed. This will be a Federal Aid project, with an appropriation of $75,000.

Good progress is being made by Contractor Chris O'Neill on the new steel highway bridge across Platte River west of Petersburg, leading to Fort Logan.

DIVISION II.

HEADQUARTERS, GRAND JUNCTION.

J. J. VANDERMOER, DIVISION ENGINEER.

Counties of Delta, Gunnison, Hinsdale, Mesa, Montrose, Ouray and San Miguel.

A fine record has been made by Contractor K. V. Johnson in the construction of Federal Aid Project No. 102, which consists of one mile of extremely heavy rock work between Bear Creek Falls and Poughkeepsie Bridge in Ouray county, on the Durango-Silverton-Ouray "million dollar highway."

This road will be opened to traffic this summer, with a celebration early in July.

The project now being finished by Contractor Johnson consists of blasting a road out of the almost perpendicular quartzite canon walls about 1000 feet above the bottom of the canon. The distance from the line of the road to the top of the canon is about 3000 feet.

The contractor, who is recognized as one of the best "hard rock" men in the Western country, declares that the Ouray project is one of the most difficult he has ever contracted. However, he is building a very economical road, considering the nature of the country and the class of rock encountered. He is not moving a yard more of solid rock than is necessary to construct a good road, first-class and full width, and up to the Federal Aid specifications.

Hinman Brothers have started grading of the approaches to the Sapinero bridge. They expect to finish early in August. The completion of the bridge and the approaches at Sapinero will eliminate one of the most dangerous stretches over the Rainbow Route between Denver and Grand Junction. At the same time the cost of the bridge and approaches was about $40,000 less than it would have cost to reconstruct the old road through the canon.

On May 24, Winterburn & Lumsden completed the 600-ft. steel truss bridge across the Gunnison river just north of Delta. A big celebration was held at the bridge at the time of the opening. W. C. Peterson was in charge of the engineering on this project.

DIVISION III.

HEADQUARTERS, DURANGO.

J. R. CHENEY, DIVISION ENGINEER.

Counties of Archuleta, Alamosa, Conejos, Costilla, Dolores, LaPlata, Mineral, Montezuma, Rio Grande, Saguache and San Juan.

Completion of Federal Aid Project No. 119-B by Girardet-Hotchkiss Engr. Co. is reported. This project consisted of seven miles of grading and gravel surfacing on Cochetopa Pass. Flood waters caused considerable damage to the work while under construction. Inspectors report a splendid piece of work by the contractors.

Rapid progress is being made by Shields & Kyle on their work between Bayfield and Pagosa Springs. This consists of a steel bridge and one mile of gravel surfacing. These contractors have the happy faculty of getting action on their work.

A maintenance crew has removed all of the snow and rock from Wolf Creek Pass.

Operations on the Pass were resumed this month, with Roy Mooney in charge. About four miles of work remains to be done on the western slope. It is probable that the steam shovel will continue on the road from Wolf Creek towards Pagosa Springs.

All roads in this district below 10,000 feet have been in splendid condition for travel since the last part of May.

A crew of workmen have resumed work on Cumbres Pass, which, when completed, will give another scenic route to the Mesa Verde National Park.

Travel over Red Mountain will be good about June 20, with favorable weather conditions.

Late snows and slides have made travel over some of the mountain roads in this district difficult of travel. Weather conditions have been the worst in years, and some of the contractors have been delayed with their work until late in May.

DIVISION IV.

HEADQUARTERS, PUEBLO.

JAMES D. BELL, DIVISION ENGINEER.

Counties of Baca, Bent, Crowley, Custer, Fremont, Huerfano, Kiowa, Las Animas, Otero, Prowers and Pueblo.

All of the concrete base course for the asphalt paving north of Trinidad has been poured. This work was started early this spring. It is expected that this three miles of hard surfaced roadway will be finished by August 1. Stamey-Mackey Const. Co. are the contractors. The asphalt top will be Warrenite. It is the second piece of asphalt paving laid by the State Highway Department.

The new steel bridge over Six Mile creek between Avondale and Vineland was completed on May 28. Rains caused considerable extra work on the approaches.

Work has been resumed on F. A. P. 246-A, consisting of two and one-half miles of concrete paving east of Pueblo. A central mixing plant is being used. The mix is carted to the road in Ford dump body trucks. Good results should be produced the next two months. Bad weather was experienced during the early part of the month.

Progress on the paving between Pueblo and Vineland during the past month during the time work could be carried on was good. Rains held the work back, making the roadway sloppy and unfit to work. However, the contractors have now started pouring concrete.

Luther Harris, of Sugar City, has been awarded the contract for the construction of a 60-ft. timber bridge over Black Draw in Crowley county. This bridge is a part of a grading and surfacing project between Crowley and Olney Springs which is being done by farm labor on a one cent per mile per cwt. basis. The sand is being scarified into the subgrade and will be kept dragged until it is packed.

J. Finger & Son have completed their work on F. A. P. No. 247-A, near Swink, consisting of 1.329 miles of pavement.

DIVISION V.

HEADQUARTERS, COLORADO SPRINGS.

ERNEST MONTGOMERY, DIVISION ENGINEER.

Counties of Chaffee, Cheyenne, Douglas, Elbert, El Paso, Kit Carson, Lake, Lincoln, Park and Teller.

In spite of the fact material has been very difficult to handle, the James V. Stryker Const. Co. has made good progress on four miles of grading north of Buena Vista in Chaffee county. When completed this piece of work will eliminate a very bad stretch of the road to Leadville. It will probably take all of June to finish the project.

Paving was started on the Breed-Husted concrete project on June 3. This piece of paving will connect with the underpass at Breed, being an extension

of the pavement north of Colorado Springs.

Contractor Busselle has been working on the Pine Creek bridge foundation excavations and excavation for the roadway. The Santa Fe railroad has completed the driving of piling for the underpass at Breed. Actual paving is expected to start about July 1.

Motorists are loud in their praise of the detour around the Breed-Husted work. This was constructed before the main road was closed. A special crew of men are employed to keep the surface of the detour smooth.

Plans have been submitted to the Bureau of Public Roads for approval of a three-mile extension of the pavement now under contract to LaNier, Selander & White, north of Breed.

Work has been started on the twelve miles of grading and surfacing between Buena Vista and Salida under contract to the Western Const. Co.

Splendid work is being done by convict labor on Poncha Pass. In another 60 days this roadway will be completed to the Saguache county line.

County forces are now constructing the detour road which will be used by traffic during the construction of the ten-mile stretch of pavement between Gann and Castle Rock, which will be let on contract in a few weeks. This will be an extension of the concrete pavement now being constructed between Wolhurst and Gann.

The south end of the Wolhurst-Gann paving will be opened to traffic in about three weeks, thus eliminating the necessity of sending traffic over the lower end of the present detour.

Surveys for the five-mile stretch of pavement planned to be constructed south of Colorado Springs have been completed.

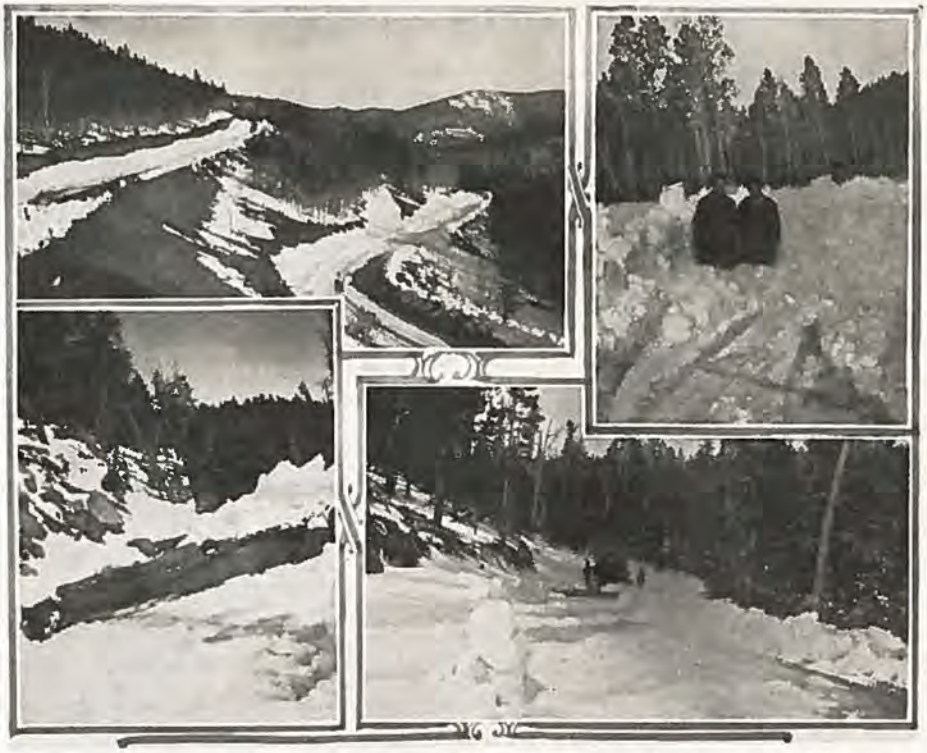
DIVISION VI.

HEADQUARTERS, GLENWOOD SPRINGS.
H. L. JENNESS, DIVISION ENGINEER.
Counties of Eagle, Garfield, Jackson, Moffat, Pitkin, Rio Blanco, Routt and Summit.

Fine progress is reported on F. A. P. No. 240, consisting of grading and gravel surfacing of five miles between Gypsum and Dotsero. This project improves the worst section of highway between Tennessee Pass and Grand Junction. A. L. Hockett is the contractor. The grading is practically completed. To date about 3,000 feet of crushed gravel base has been laid on the finished subgrade. His crushing and screening plant is located on a gravel bar in the Colorado River and to date the Austin-Western crusher has given no trouble. W. A. Whitney is the resident engineer in charge of the work, with W. E. Goodrich inspecting the concrete and supervising the placing of the crushed gravel.

The county commissioners of Garfield county have let a contract for the refloooring of the bridge across the Colorado river at Glenwood Springs. Steel runways will be placed on the flooring for the wheel tracks in an effort to reduce the wear on the flooring.

A large crew of men have been employed on the Byers canon project between Hot Sulphur Springs and Parshall. This is one of the heaviest pieces of rock work in the state. The Pioneer Const. Co. has the contract. All clearing has been completed. Machinery for moving the heavy rock has been installed on the job.



Scenes on Monarch Pass, showing method of snow removal by County road forces.

This spring the Colorado river did a large amount of damage in Grand County due to ice jams forming in the river on a section 50 miles in length and damaging the bridges at different points. A three-span bridge at Kremmling was practically a total loss. This was replaced by a temporary structure.

Resident Engineer A. J. Tanner reports satisfactory progress on F. A. P. No. 223, which consists of three miles of gravel surfacing on the Victory Highway, starting at a point seven miles north of Kremmling, extending toward Muddy Pass.

Construction of five miles of the roadway between Steamboat Springs and Brookston also is under way by the Northwestern Const. Co. This project improves the alignment and grades. Crushed gravel will be used for surfacing. P. J. Becker is the resident engineer.

DIVISION VII.

HEADQUARTERS, GREELEY.
A. B. COLLINS, DIVISION ENGINEER.
Counties of Larimer, Logan, Morgan, Phillips, Sedgwick, Washington and Yuma.

Regrading and gravel surfacing of State Road No. 16, east from Loveland to the Weld county line, has suffered numerous delays during the month through continuous rains. Three miles of this road has been graded and one mile gravel surfaced. It passes through a prosperous irrigated section.

It is reported that two miles of the new roadway on the North St. Vrain from the Boulder county line was graded, widened and gravel surfaced during the month of May. Continuous snow and rain interfered with the progress of the work.

The Engineers Const. Corp., with their usual satisfactory progress, during May prepared 10,000 sq. yds. of subgrade, and placed 6550 lineal ft. of pavement between Platteville and Greeley. With fair weather the contractors expect to finish the concrete the first part of July.

Progress on the paving contract held by J. Fred Roberts & Son, which calls for six miles of paving between LaSalle and Gilcrest, has been equally as satisfactory. At the present rate this contract should be completed by September 1.

On May 19 the paving between Fort Morgan and Brush, under contract to the Colorado Bridge & Const. Co., was completed. This contract consisted of three miles of 18-ft. pavement.

Sixty per cent of the grading on two miles of pavement northeast of Merino, under contract to W. F. Pigg & Son, is finished. All side culverts have been placed and all cross culverts and siphons completed.

Generally speaking, all work in this division is progressing with reasonable speed and hopes are entertained that with normal weather, all work will be completed within contract time.

The Colonel: "Confound it, sir, you nearly hit my wife!"

Mr. Miggs: "Did I? Well, have a shot at mine!"

Highway Smileage

IN COOLERS—NOT CARS

A very prominent citizen of this county asks some questions which we cannot answer. Here they are: "Why is it that drunks are often told to get in their cars and get out of town? Why send them out on the roads to endanger the lives of others? Why not put them in the cooler instead and take charge of the car?"—LeSueur Center Leader-Democrat.

WHAT'S WHAT

"Step on it. That train is a mile away."

"I'm sure those are headache tablets. They come in that kind of a box."

"That gun's safe. I unloaded it the last time I used it."

"Ever drive a car before? Try it—it's as easy as pushing a wheelbarrow."

"It's too shallow here. Let's swim beyond the life lines."

These apparently innocent words cost the lives of tens of thousands of persons annually, says R. E. Kropf, who is engaged in preaching the doctrine of accident prevention among the 1,300 councils of the Royal Arcanum in the United States and Canada.—St. Paul Pioneer Press.

TO INCREASE BUS TAXES

An attempt will be made when the next session of the legislature convenes to classify busses and make them pay a fair proportion of the upkeep of the highways they are using without any great cost to themselves.—Mankato Ledger.

CAR DRIVER VERSUS ENGINEER

What would happen to the engineer of a locomotive if he were discovered sitting at the throttle with a pet dog in his lap, adjusting his glasses and reading bill-boards along the way, while traveling forty miles an hour?

If he took his 12-year-old boy along and permitted him to run the machine?

If he discussed the baseball game with his fireman and missed a number of signals, even though "nothing happened?"

He'd lose his job—if not his life. But the "engineer" of a motor car is supposed to be "different." He is excused on the grounds that he ought to know better.

NOT SO ROTTEN IN DENMARK

In Denmark a man who is convicted of driving an automobile while under the influence of liquor is permanently barred from again operating a machine in that country. That is a good law, and the Minnesota legislature next winter would do well to adopt such a law in this state. —Levang's Weekly.

NEW KIND OF PEST

A paper from an adjoining county reports the appearance of a new kind of pest in the form of a person who quietly, and under the cover of darkness, dumps rubbish, such as tin cans and the like, along a public highway.—LeSueur Center Leader-Democrat.

ONE BORN EVERY MINUTE

Some people will spend two dollars' worth of gasoline on bad roads just to avoid a dollar's worth of taxes.—Bill Roads in N. H. Highways.

TROUBLES ON THE ARK

Fable: Once upon a time there was a man who saved lots of lives including his own by driving just according to the instructions his wife broadcasted to him from the rear seat.—Zit's Weekly Newspaper.

REPAIRING NEATLY DONE

Irate Customer: "I bought a car of you several weeks ago, and you said if anything went wrong you'd supply the broken parts."

Dealer: "Yes."

Irate Customer: "I'd like to get a nose, a shoulder-blade and a big toe."—Manitoba Free Press.

Doctor: "Did the medicine straighten your husband out all right?"

Wife: "Yes, we buried him yesterday."—The Engineers Bulletin.

PERSONALS

Commissioners James E. Beckley and W. T. McMurray, of Delta County, were visitors in Denver on June 1. They conferred with state highway officials relative to the Grand Mesa highway.

James E. Maloney, assistant highway engineer, made an inspection tour of the Pueblo district roads early in June. He was well pleased with the condition of the main highways in that section. He reported splendid progress on all construction work.

Dr. Paul B. Godsman of Burlington was a visitor to the highway offices during early June. Dr. Godsman formerly was a member of the legislature and a staunch booster for good roads.

Robert H. Higgins and Charles Brock, of the maintenance division, are receiving congratulations from other members of the department for the splendid job they did in removing the snow from Berthoud Pass with the new rotary snow plow constructed in the State Highway shops. It was some job and an achievement to be justly proud of.

Maj. L. D. Blauvelt, state highway engineer, was one of the officials of the American Association of Highway Engineers to greet the Pan-American Highway Commission in Washington, D. C., on June 2. Every country in South and Central America was represented on the Commission. Maj. Blauvelt accompanied the delegation to North Carolina, where the Pan-Americans were shown various phases of highway construction.

Roy Mooney, who first gained fame as a road builder during the construction of the Lookout Mountain road, has joined the state highway force. He has been placed in charge of the steam shovel outfit which has resumed operations on the western slope of Wolf Creek Pass.

Tom Shelton, the mechanical genius who constructed the department's rotary snow plow from scrap parts taken from surplus war supplies at the highway shops, is busy preparing plans on a new plow. In this he hopes to correct some of the defects found in the experimental plow.

Douglas N. Stewart, for 14 years surveyor and road supervisor of Douglas county, is another new member of the state highway force. "Doug" succeeds the late B. A. Briggs as assistant superintendent of maintenance in Division No. 5. His appointment became effective on June 15. He is a splendid road man, as anyone who has traveled over the Colorado Springs-Denver highway will attest. His headquarters will be at Colorado Springs.

Rod Chisholm, commissioner of Rio Grande county, was a visitor to the Highway Department in Denver in May. Mr. Chisholm is a pioneer road booster. He was a member of the board appointed to construct the first road over Wolf Creek Pass.

Contractors' Column

Dale Hinman, Denver contractor, has the contract for constructing eight miles of gravel surfacing between Grand Junction and Fruita. His bid was $81,255, which was about $28,000 under the engineer's estimate. Hinman has just completed four and three-quarter miles of gravel surfacing for the state highway department between Grand Junction and Palisade.

Three contracting outfits are pouring concrete on the Denver-Greeley highway between Ft. Lupton and LaSalle. The Engineers Construction Co., of Greeley, are finishing up on six miles between Platteville and Gilcrest, and J. Fred Roberts & Son are paving from Gilcrest north towards LaSalle, while the Southern Surety Co. is finishing up White & Johnson's job south of Platteville.

R. P. Morrison, Golden contractor, was successful bidder on three and one-half miles of gravel surfacing between Gunnison and Sapinero. His bid was $34,900. He moved his outfit on the job June 8.

J. Finger & Son have completed a mile and a third of pavement near Rocky Ford, on the Santa Fe Trail. Finger went on the job April 15 and finished May 31. It is the quickest job on record in this state. The contractors were off the job before the commissioners of Otero county knew the job was finished.

Peterson, Shirley & Gunther are finishing up on the eighteen-mile branch line of the Union Pacific to the Fort Collins oil fields. They expect to move off the job on July 1.

Contractor Charles Sheeley expects to finish up three miles of paving between Morrison and Denver by August 1. This project has been delayed several weeks this spring on account of adverse weather.

W. H. Welsh and Everett Bedford, Greeley contractors, have a contract for the construction of the Buffalo-Ten Sleep highway in Wyoming.

Rotary Plow Solves Snow Problem

(Concluded from page 9)

blizzard which old-timers living in the district declared was the worst they had ever experienced.

"I am perfectly satisfied with the experiment," declared Major Blauvelt. "We have demonstrated that the rotary plow is the thing. There's no gainsaying that. The wheel throws the snow over 200 feet from the roadway. That's sufficient.

"But we have found some faults in the mechanism, which is always the case with every piece of untried machinery. However, these can easily be corrected.

"At present the power plants are in two separate power units. Shelton thinks they should be installed in one unit. We will have to decide that after we have gone over all of the data.

"This I am sure of, it will be a great thing for the people of both sides of the range, if we can get three or four of these machines working and be able to open our mountain passes from two to four weeks earlier than is now the case."

A crew of thirteen men were employed on the plow, tractor and auxiliary equipment.

On June 9 Major Blauvelt announced that all roads over mountain passes in the state, with the exception of Rabbit Ear, were open to traffic.

These included Wolf Creek, Cochetopa, Monarch, Tennessee, Hoosier, Kenosha and Berthoud.

The first private car to cross over Berthoud this year was a flivver from Emporia, Kans.

B. A. BRIGGS PASSES AWAY

It is with deep regret that Colorado Highways announces the death of Benjamin A. Briggs, for three years assistant superintendent of maintenance of Division No. 5, with headquarters at Colorado Springs.

Death came to Mr. Briggs on May 24, at his home in Denver after a long illness which had confined him to his bed for a number of weeks.

Mr. Briggs became connected with the Highway Department at the time of its reorganization under the 1921 Highway Act. Prior to his employment by the state he had been engaged in the contracting business.

To his position he brought wide experience in construction work and unusual executive ability. The fine condition of the highways in the Fifth District was largely due to his untiring efforts. No one regrets his death more than the commissioners of the counties which comprise the district in which he worked.

For a number of years Mr. Briggs was Bridge Foreman of the Cripple Creek Short Line railroad. In 1902 he was promoted to Superintendent of Bridges and Buildings. Then he was in charge of the city streets of Colorado Springs for several years. In 1914 he became superintendent of bridges and buildings on the Moffat Line under Major L. D. Blauvelt, chief engineer, remaining with the railroad for three years.

Until 1921, when he joined the Highway Department, he engaged in the general contracting business.

PEOPLE VOTE FUNDS

That the people will vote for improved highways when they are given an opportunity and when the issue is presented to them in a clear and unbiased manner, was demonstrated by the results of the vote in Pennsylvania recently in a proposal to issue $50,000,000.00 in bonds. Highway building in that state has been carried on to the satisfaction of the people, and they are gradually reaping the benefits of the development of the Pennsylvania highway system.

Returns from the election show that the $50,000,000.00 bond issue was given a majority of 386,754, which is 121,223 more than the majority given a similar proposal in 1918. Four counties voted against the bond issue in 1918 and only three were recorded against it at the recent election. Even those counties with comparatively few miles of improved roads gave large majorities in favor of the proposition. One county voted 962 to 72; another 4,087 to 261, a third 826 to 48 and another 6,761 to 788. In counties that have considerable mileage improved, large majorities were likewise given. In Philadelphia the majority was 177,153 votes.

The state highway commission responded to the petition of the Conejos county commissioners for emergency aid to repair state highway No. 16 where it was recently destroyed by flood waters from La Jara creek, north of La Jara. Four thousand dollars was provided for the emergency work.

STATE HIGHWAY DEPARTMENT, STATE OF COLORADO

SEMI-ANNUAL STATEMENT OF THE HIGHWAY AND BOND FUNDS FOR THE PERIOD ENDING MAY 31, 1924.

BALANCES, DECEMBER 1, 1923:			
Highway Fund	$1,142,405.80		
Federal Aid Bond Fund	998,031.24		
County Bond Fund	123,687.14		
Total Balances		$2,264,124.18	
RECEIPTS:			
One-half Mill Levy	$ 492,608.78		
Gasoline Tax	358,401.16		
Internal Improvement	40,500.00		
Federal Aid	280,382.29		
County Aid	9,802.86		
Excess War Supplies	34,664.40		
Total Receipts		1,216,359.49	
Total Balances and Receipts			$3,480,483.67
DISBURSEMENTS:			
Federal Aid Projects	$ 776,419.46		
State Projects	284,509.35		
Maintenance	269,051.84		
Property and Equipment	48,964.58		
Administration, General Office	30,248.65		
Administration, Engineering	40,587.93		
Road Signs and Traffic Census	5,270.95		
Refund to Yuma County	128.50		
County Bond Projects	37,007.40		
Total Disbursements		$1,492,188.66	
BALANCES MAY 31, 1924:			
Highway Fund	$1,467,656.16		
Federal Aid Bond Fund	433,959.11		
County Bond Fund	86,679.74		
Total Balances		1,988,295.01	
Total Disbursements and Balances			$3,480,483.67

The Bulletin Board

C. H. & E. MUD HEN

A new diaphragm pump for use in muddy water has been brought out by the C. H. & E. Mfg. Co., according to Ray Corson, sales manager of H. P. Wilson & Co., Colorado distributors. This pump is called "Mud Hen" and is especially designed for pumping carrying a large percentage of soil content.

Mr. Corson reports sales of new Koehring Pavers to R. M. Larsen, contractor of four miles of state highway pavement north of Broomfield, and to J. Finger & Son, who are laying concrete pavement on the Santa Fe Trail near Swink.

New model Barber-Greene loaders were recently purchased by the Allied Construction Co., doing city paving in Denver, and H. C. Lallier, who has a city surfacing job.

Sales of several Heil bodies and hpdrohoists were made during the month, according to Mr. Corson. Grader sales also have been unusually large.

The Koehring Company announces a new 13-E paver, made to conform with the suggestions and recommendations of the Association of General Contractors of America. A new gyratory crusher particularly designed for the crushing of fine material is announced by the Austin-Western Company.

CLINTON CLIMBS BERTHOUD PASS

L. L. Clinton, president of the Clinton-Held Co., believes in keeping a weather eye on the products that his firm sells while they are on the job. He made two trips to Berthoud Pass during the snow removal experiment conducted by the State Highway department, to watch the operation of the Holt tractor used in pushing the rotary snow plow during the experiment. On one of the trips he walked three miles across the summit of the pass to get a glimpse of the plow and tractor in operation. The Clinton-Held Co. recently put in a complete stock of Holt tractors.

THREE NEW RUSSELL GRADERS

Three new designs of Russell Super-Mogul Graders, designed for especially heavy tractor duty, are being featured by Herbert N. Steinbarger, Rocky Mountain distributor for the Russell products.

Mr. Steinbarger reports the sale of a heavy duty Rex paver to W. F. Pigg & Son, for use on their state highway paving project near Fort Morgan.

H. H. Hoddle, sales manager of the Steinbarger Company, took two weeks off the first part of June for a vacation in the mountains. Fishing and hiking is his hobby.

BEST TRACTOR ON PIKE'S PEAK

A concerted drive on sales of attachments for Fordson tractors is being made by the sales force of H. W. Moore & Co., accompanied with splendid success, according to Harold W. Moore, president.

During the month of May snow removal experiment with a Best tractor and specially designed plow was conducted by the Moore concern on Pike's Peak. As a result the world-famous highway to the clouds was opened for traffic about three weeks earlier than in previous years.

BARNEY STILL GOING STRONG

Barney Miller, wizard steam shovel sales representative of the Osgood Company in this territory, reports that his sales are still going strong. Barney's old friend, W. L. Phillips, who handled Osgood sales in the Chicago district for several years, has resigned from the company and has gone into business for himself, according to a letter just received from him. Barney counted up more than thirty Osgood shovels on jobs in Colorado, nearly all sales he had made in the last two years.

NEW P. & H. BULLETIN

Another new illustrated bulletin on P. & H. road-building and contractors' equipment is ready for distribution through Paul Fitzgerald, Colorado sales representative. This booklet describes various applications of P. & H. products to heavy duty work.

Fitzgerald reports a large number of sales during the past month, with P. & H. heading the list.

"DOMESTIC ENGINES"

The Domestic Engine & Pump Company, of Shippensburg, Pa., is now furnishing small pumps and hoists equipped with two-cylinder 5-8-horsepower engines in addition to their regular line of single-cylinder engines. This engine is combined with hoisting units, trench force pumps, etc. It is a 2-cylinder, 4-cycle, water-cooled 5-8-horsepower gasoline engine completely enclosed in a metal housing. The engine is complete with high tension magneto, speed control governor, radiator and cooling fan, and reduction gears for power take-off. The firm also manufactures a portable air compressor utilizing four engine cylinders to operate a 2-cylinder compressor. In this plant the width of housing is 36 inches and the over-all width of trailer 5 feet 6 inches and over-all length 9 feet 6 inches. It has an air displacement capacity of 150 cubic feet.

HOLT MEN GO IN PACKS

On June 9 three representatives of the Holt Company were visitors in Denver, calling upon the Clinton & Held Co., distributors of the Holt tractors in Colorado.

They were: W. D. Crawford, assistant sales manager; L. B. Neumiller, manager of supply section; and William Macedo, manager of harvester service department.

Showing Best Tractor and Blade outfit clearing snow from Pikes Peak highway.

CONTRACTS AWARDED

Proj. No.	Location	Length	Type	Successful Bidder	Bid Price
242A	Grand Junction-Fruita	7.703 mi.	Gravel Surfacing	Dale Hinman, Denver	$81,255.60
258A	Gunnison-Sapinero	3.239 mi.	Gravel Surfacing	R. P. Morrison, Golden	34,900.92

PROJECTS ADVERTISED FOR BIDS

Proj. No.	Length	Type	Location	Bids Opened
245B	2.711 mi.	Grading	Hadley, east	June 18, 1824
281A	1.249 mi.	Paving	Lafayette, south	June 18, 1924
281B	3.068 mi.	Paving	South of Longmont	June 18, 1924

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

116C	3.163 mi.	Paving	North of Breed
262A	2.059 mi.	Gravel Surfacing	West of Walsenburg
269A	2.172 mi.	Surfacing	Cortez, east and north
273A	4.047 mi.	Gravel Surfacing	East of Lamar
279A	1.439 mi.	Paving	Denver, southwest toward Morrison

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

210B	8 mi.	Gravel Surfacing	Grand Valley-Debeque
213A	2 mi.	Grading and Surfacing	Hesperus-Mancos
262B	0.2 mi.	Bridge	Alamosa, east
262C	3 mi.	Gravel Surfacing	LaVeta Pass, west
267A	3 mi.	Gravel Surfacing	Hehre, north east
272A	0.2 mi.	Steel Bridge	Apishapa
272B	8 mi.	Surfacing	Otero-Pueblo county lines, west
275A	10 mi.	Paving	Wolhurst-Castle Rock
276	.2 mi.	Overhead R. R. Crossing	North of Colorado Springs
278A	5 mi.	Sand-Clay Surfacing	Cheyenne, west, east
279B	6 mi.	Graded	Conifer, south
286A	.2 mi.	R. R. Grade Separation	Between Nunn and Dover

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1923

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
2-R	Trinidad, north	3 mi.	Asphalt Pavemt.	Strange-Maguire Const. Co.	$121,934	34	2-R
17-R	Breed-Husted	2.339 mi.	Conc. Paving	LaNier, Selander & White	81,399	3	17-R
102	Ouray-Red Mountain	1.06 mi.	Mtn. Grading	Johnson & Johnson	58,972	73	102
116-A	Colorado Springs paving	4.18 mi.	Conc. Paving	Standard Engr. & Constr. Co.	238,944	73	116-A
116-B	Breed-Husted	0.892 mi.	Conc. Paving	J. L. Busselle & Co.	51,001	0	116-B
119-B	Cochetopa Pass	7.5 mi.	Grad. & Surf.	Girardet-Hotchkiss Engr. Co.	53,709	95	119-B
125	Sapinero-Cimarron	11.3 mi.	Grav. Surf.	Dale Hinman	36,797	47	125
125	Sapinero-Cimarron		Steel Bridge	Winterburn & Lumsden	53,072	90	125
135	Denver-Morrison	5.3 mi.	Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	27	135
157-B	Buena Vista-Leadville	4.20 mi.	Grading	J. V. Stryker Const. Co.	65,715	92	157-B
168-B	Lamar-Hasty	6.86 mi.	Gravel Surf.	Standard Engr. Co.	60,194	72	168-B
174	Red Mountain	3.03 mi.	Mtn. Grading	Pickering Bros.	82,071	84	174
190	Summit County Bridge and Road	1.45 mi.	Grad. & Bridge	Colo. Bridge & Constr. Co.	40,154	82	190
207	Dillon-Kremmling	100 ft.	Truss Bridge	Rogers & Pickard	28,831	59	207
208-C	Grand Junction-Palisade	4.75 mi.	Gravel Surf.	Dale Hinman	46,627.35	100	208-C
213-B	Durango-Hesperus	5.26 mi.	Grav. Surf.	J. Edd. Hansen	72,960	53	213-B
214	Durango-Bayfield	3 mi.	Gravel Surf.	Dale Hinman	53,411.05	70	214
221	Loveland, north	4.05 mi.	Conc. Paving	Fred C. Dreher Constr. Co.	142,125	98	221
222-C	Broomfield-Lafayette	2.82 mi.	Conc. Pavement	R. M. Larsen	134,933	29	222-C
223-A	Kremmling-Rabbit Ear	2.88 mi.	Grav. Surf.	Henry Shore	30,565	52	223-A
224	Morrison-Baileys	5 mi.	Grading	M. J. Kenney Const. Co.	59,781	49	224
225	Fitzsimons Hospital road	1.00 mi.	Bit. Paving	Miller, Douglas & Hanes	36,618	80	225
226-A	Brighton-Ft. Lupton	8.23 mi.	Conc. Paving	White & Johnson	241,133	97	226-A
226-B	Brighton-Greeley	2.86 mi.	Conc. Paving	White & Johnson	89,993	66	226-B
226-C	Platteville-Greeley (Div. 1)	4.4 mi.	Conc. Paving	Engr. Const. Corp	120,114	72	226-C
226-C	Platteville-Greeley (Div. 2)	6.335 mi.	Conc. Paving	J. Fred Roberts & Sons	175,647	10	226-C
229	Pueblo-Florence	1 mi.	Grav. Surf. & Bridge	H. M. Fox	34,646.50	100	229
230-A	Wolhurst, south	0.852 mi.	Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	40	230-A
230-B	Wolhurst, south	3.99 mi.	Conc. Pavement	Brodie & Anderson	153,971	30	230-B
231	Six Mile Creek Bridge	0.45 mi.	Steel Bridge	McCormick & Brockaway	25,165	83	231
240	Gypsum-Dotsero	5.185 mi.	Gravel Surf.	O. L. Hackett	66,178	41	240
241	Gunnison River, North of Delta	600 ft.	Steel Bridge	Winterburn & Lumsden	99,309	100	241
243-A	Bayfield-Pagosa Springs	1.6- mi.	Gravel Surf.	Shields & Kyle	48,311	1	243-A
245-A	Las Animas-Hadley	4.54 mi.	Gravel Surf.	W. A. Colt & Son	42,786	92	245-A
246-A	East of Pueblo	2.537 mi.	Conc. Paving	R. A. White	78,431	35	246-A
246-B	Vineland-Pueblo	0.787 mi.	Conc. Paving	W. A. Colt & Son	29,453	14	246-B
247-A	Rocky Ford-Swink	1.329 mi.	Conc. Paving	J. Finger & Son	41,369	31	247-A
248-A	Buena Vista-Salida	12. mi.	Grading & Surf.	Western Const. Corp.	93,533	1	248-A
251	Lafayette-Boulder	1.1 mi.	Conc. Paving	J. Fred Roberts & Sons	32,670	18	251
252	Loveland-Berthoud	3.2 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,676	21	252
253-A	Steamboat Springs, west	6.50 mi.	Gravel Surf.	Northwestern Cons. Co.	126,374	2	253-A
254-A	Byers Canon	1.057 mi.	Grading	Pioneer Const. & Engr. Co.	72,408	1	254-A
255-A	Ft. Morgan-Brush	2.70 mi.	Conc. Paving	Colo. Bridge & Constr. Co.	85,763	66	255-A
255-B	Brush, west	2.944 mi.	Conc. Paving	W. F. Pigg & Son	92,486	1	255-B
256-B	Merino, northeast	2 mi.	Conc. Paving	W. F. Pigg & Son	53,702	0	256-B
257	North of Denver		Conc. Viaduct	C. C. Madsen	12,178	30	257
266-A	Durango, south	3.03 mi.	Gravel Surf.	Mishon, Engler & Teyssier	22,233	0	266-A
283-A	Loveland-Berthoud	2.530 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,829	1	283-A

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No. 2—12 tons at 12 ft. radius. Handles following loads sand or gravel (clamshell buckets): ¾-cu. yd. at 43 ft. radius; 1 cu. yd. at 37 ft. radius; 1½ cu. yd. at 27 ft. radius. Boom lengths to suit conditions. 4-cyl. 5¾x7 in. gasoline engine, 925 R. P. M.

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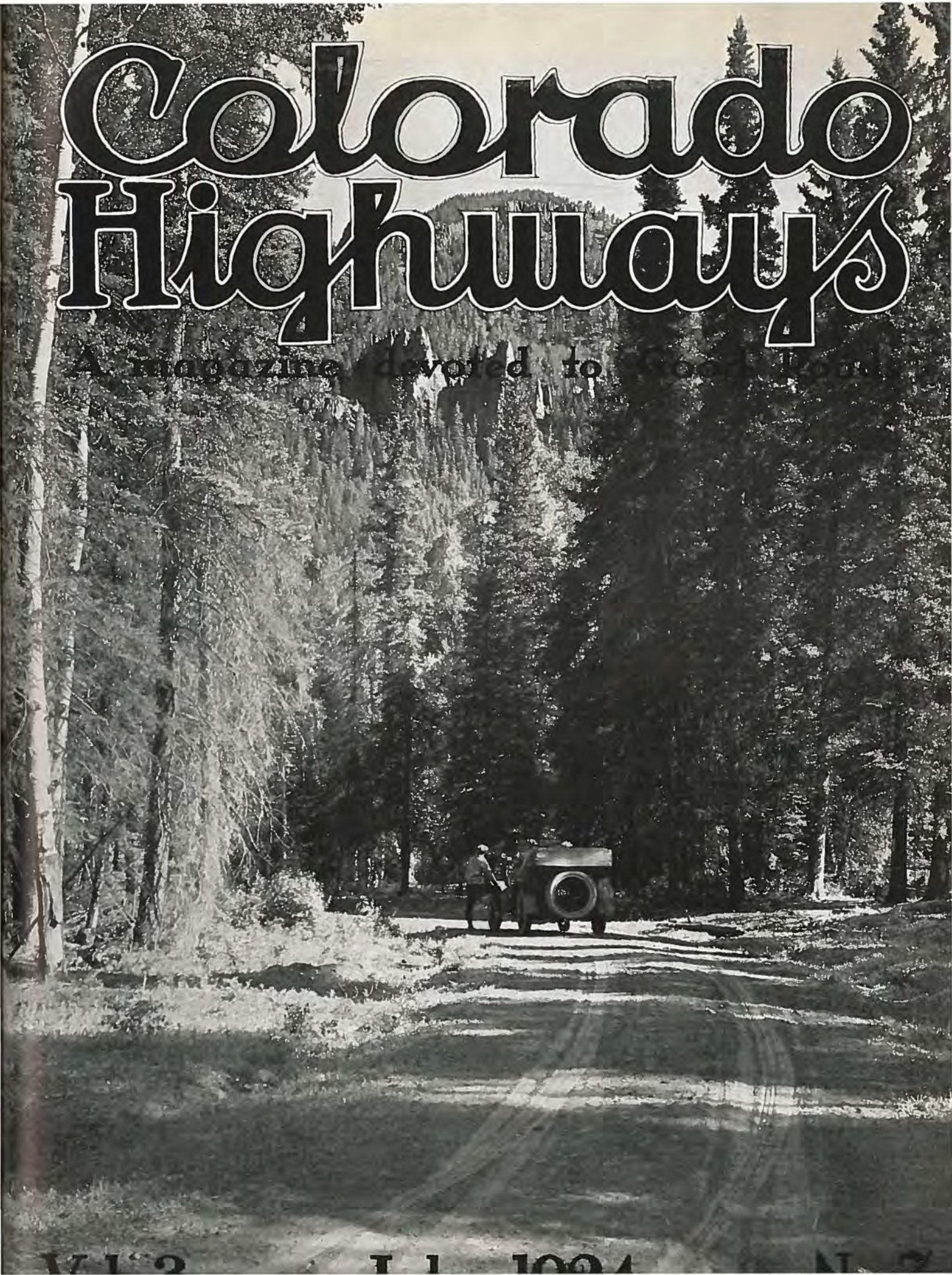
Colorado Highways

A magazine devoted to [illegible]



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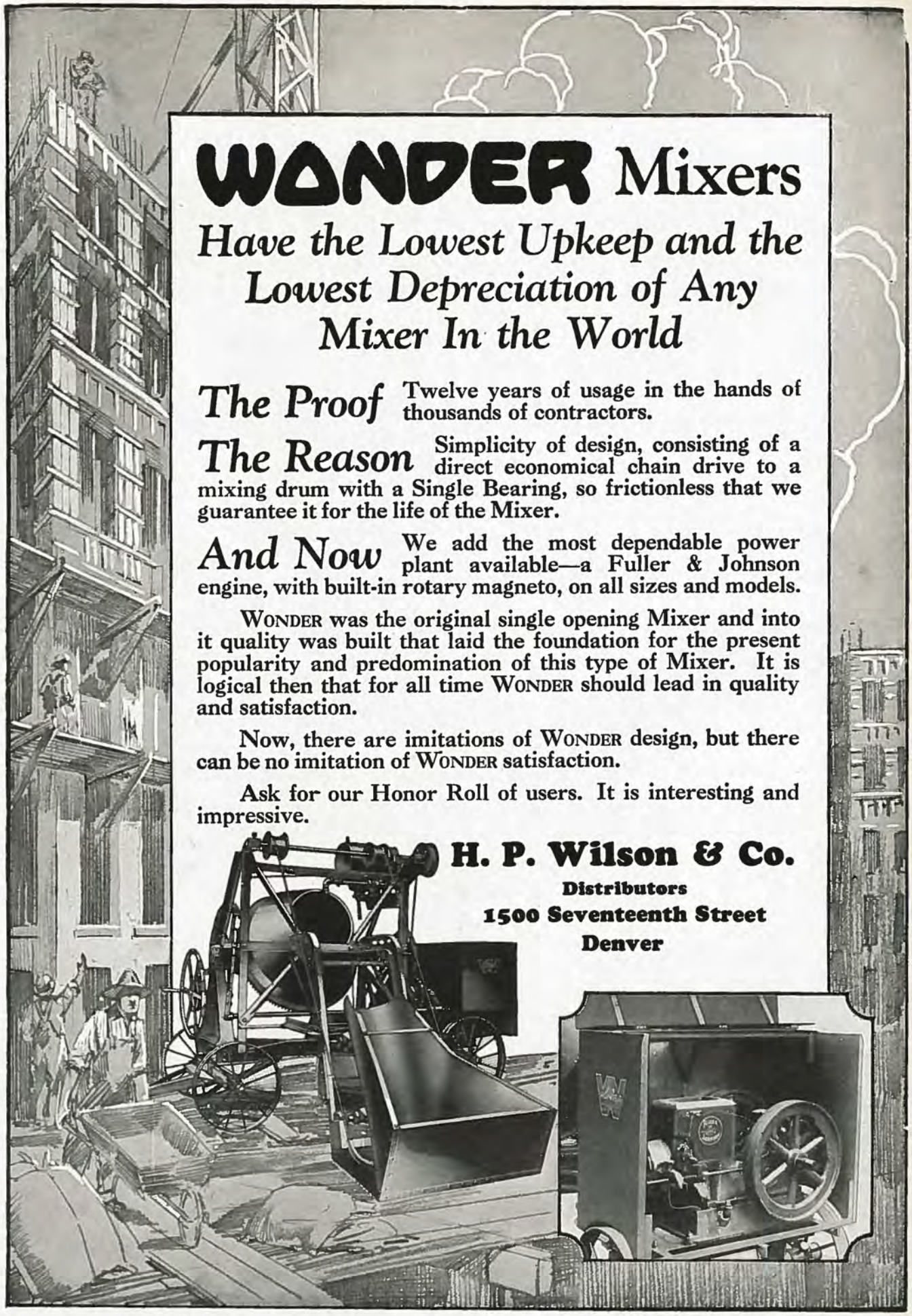

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Articles on the subject of road building and highway development in the West are solicited. Manuscripts should be addressed to the Editor, with return postage. Photographs should accompany articles whenever possible. Manuscripts not found available will be returned promptly.

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OUR COVER PICTURE

For a frontispiece this month Colorado Highways prints a view taken on the western slope of Wolf Creek Pass, where the State Highway Department is now engaged with a steam shovel making much needed improvements on grade and alignment. During the past year the state has expended more than $25,000 widening and constructing drainage structures on this famous mountain highway, which affords tourist travel a direct route to the Mesa Verde National Park.

Colorado Highways
"BETTER ROADS"
VOLUME III. JULY, 1924. NUMBER 7.

Record Road Mileage Completed

THE State Highway Department will set a new high record for construction work this year, judging from the amount of work accomplished the first half of the fiscal year which ended May 30.

Favorable weather for construction is all that is needed to set a new figure in the number of projects undertaken and miles of new roadway built. Heavy rains and an unusually early winter would be a retarding factor.

Not since the state undertook the construction of a system of state highways has there been so much activity in all sections of the state than there is at present. More work on projects, both of the Federal Aid and of the State type, is now going on than ever before in the state's history.

Moreover, the engineering division of the department is working at a rate of speed which has prompted Maj. L. D. Blauvelt, state highway engineer, to predict that long before the end of the fiscal year which ends on November 30, every project in the 1924 budget will be under contract.

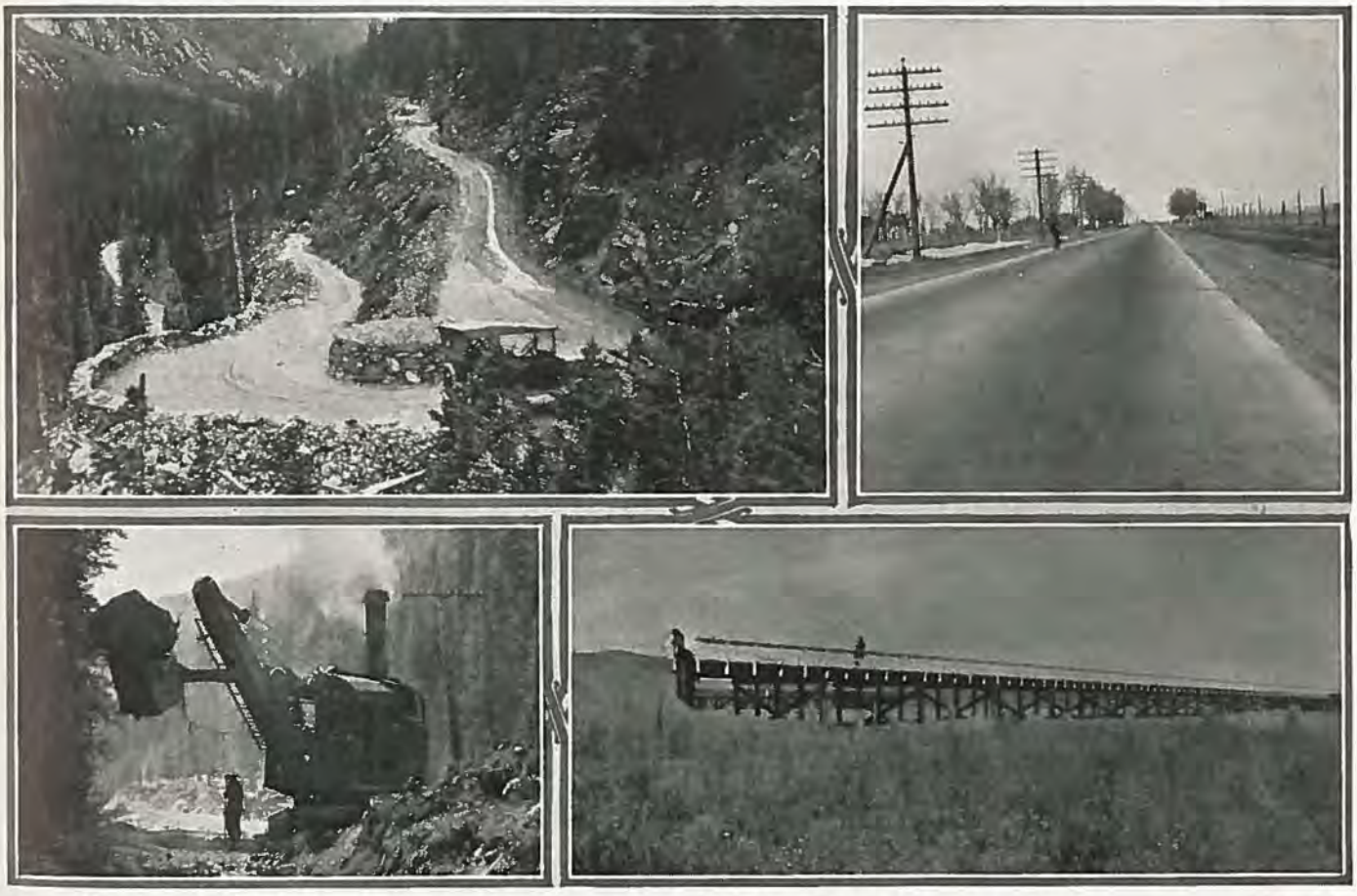
The citizens of the state will realize what this means, when it is known that never before in the history of the highway department has the department succeeded in getting its entire budget for a specific year under contract, regardless of how hard the engineers have worked to make the surveys and prepare the necessary plans and specifications. This has not been the fault of the engineers or any other department official, it might be explained in passing.

The delay in the past has been due to the fact that the highway budget is made up in December, preceding the year for which appropriations are made; that is to say at a time when it was too late, in many instances, for engineers to go into the field and make the surveys and get the plans ready for contracts to be let in time for construction work to begin during the fiscal year for which the appropriations were made.

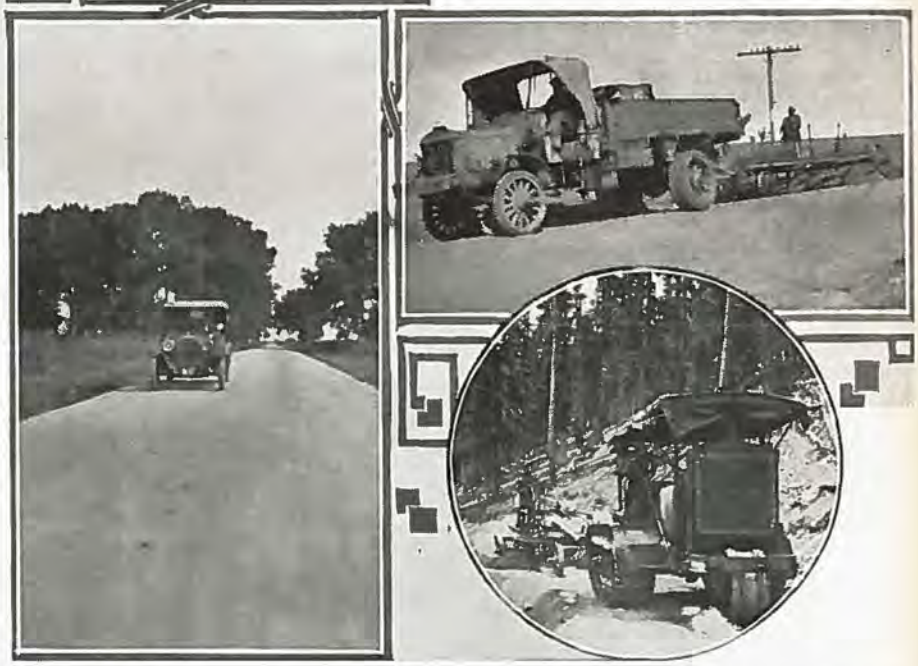
The first six months of the current fiscal year has seen the completion of twenty-nine sizeable projects, thirteen so-called Federal Aid and sixteen state projects. Altogether these twenty-nine projects involved an expenditure of $1,042,-815.81 of state, county and government funds, divided as follows: Federal Aid projects, $851,377.55; and state projects, $191,438.26.

Each of these projects form an important link in the state's highway system and will do its share to spread the fame of Colorado's roads thruout the country.

Excellent as this showing is, it will be far surpassed during the second half of the fiscal year. Work is progressing rapidly on scores of projects. Reports from



Upper left—View of Fall river road, showing drainage system on switchbacks. Upper right—A stretch of concrete near Platteville. Lower left—Steam shovel moving heavy rock on Wolf Creek Pass. Lower right—New wood pile bridge near Bennett, Colo.



Upper left—Mountain grading near Fraser, Colo. Upper left—Showing method of curing concrete on Brighton-Greeley road. Upper circle—Showing method of pouring concrete. Lower left—A picturesque stretch of road near Parker. Lower right—Maintenance crew in Arapahoe county. Lower circle—A Forest Service mountain grading outfit.

contractors and resident engineers made to the auditing division of the department indicate that during the month of June alone the construction work will total nearly $1,000,000.

Besides the completion of the twenty-nine projects, the department started work on many other projects and rapid progress was made on others. Not counting the State Projects, work is now progressing on 49 Federal Aid projects, to say nothing of scores of smaller state projects and improvements located in various parts of the state in which the highway department is in partnership with the U. S. Forest Service.

It is safe to predict at this time that the end of the present construction season will see the completion of all the projects which were carried over into the present year from 1923 and 1922.

These projects involve an expenditure of practically $3,400,000. In addition a large portion of the 1924 budget will be completed or far advanced. Already nineteen of the 40 Federal Aid projects comprising the 1924 program for improvements on interstate highways are under contract, six more are in the hands of the U. S. Bureau of Public Roads, and on the balance, engineers are now drafting plans.

The following table gives a summary of the work accomplished by the highway department during the first half of the fiscal year:

Federal Aid Projects Completed

F. A. P. No. 29—Southwest of Morrison in Turkey Creek, Jefferson county, 2 miles of grading; cost, $91,039.

F. A. P. No. 71-B—Between Durango and Hesperus, LaPlata county, 3½ miles of gravel surfacing on the Spanish Trail; cost, $58,300.

F. A. P. No. 119-B—Northwest of Saguache, Saguache county, 7¾ miles of grading and crushed rock surfacing on the Rainbow Route; cost, $52,690.

F. A. P. 168-B and -C—West of Lamar to Bent-Prowers county line, Prowers county, 6.861 miles of gravel surfacing, on Santa Fe Trail; cost, $45,114.

F. A. P. 208-C—West of Palisades on Grand Junction-Palisades highway, Mesa county, 5¾ miles of gravel surfacing; cost, $58,874.

F. A. P. 216-A—West and east of Holly, Prowers county, 5½ miles of gravel surfacing and bridge on Santa Fe Trail; cost, $69,569.

F. A. P. 221—North of Loveland, on North-South highway, Larimer county, 4 miles of concrete pavement; cost, $145,295.

F. A. P. 225—East of Aurora on Union Pacific, one mile asphalt pavement, Adams and Arapahoe counties; cost, $29,396.

F. A. P. 229—Between Pueblo and Florence, Fremont county, bridge and 0.585 mi. gravel surfacing; cost, $44,767.

F. A. P. 231—Steel truss bridge and approaches over Six Mile creek, northwest of Avondale on Santa Fe Trail, Pueblo county; cost, $22,965.

F. A. P. 245—West of Las Animas, Bent county, 4½ miles of gravel surfacing on Santa Fe Trail; cost, $49,474.

F. A. P. 241—600 ft. steel truss bridge over Gunnison River at Delta; cost, $105,910.

F. A. P. 256-A—Between Merino and Atwood, 2½ miles concrete pavement; cost, $77,978.

State Projects Completed

S. P. 518—Between Lawson and Empire, 2 miles of grading on Victory Highway; cost, $35,580.

S. P. 636—Northwest of Canon City, thru Devil's Gap, 3¾ miles grading on Pike's Peak Ocean to Ocean highway; cost, $20,369.

S. P. 714—North of Rifle, two miles of grading and gravel surfacing in Garfield county; cost, $13,979.

S. P. 738—Three bridges and approaches over Boggs, Rock and Rush creeks, Pueblo county; cost, $17,521.

S. P. 739—North and south of Pinon, Pueblo county, five miles of grading and surfacing; cost, $22,068.

S. P. 742—South of Springfield, Baca county, grading, surfacing and drainage, 25 miles; cost, $10,049.

S. P. 776—Between Idaho Springs and Central City, thru Virginia Canon, Clear Creek county; cost, $18,358.

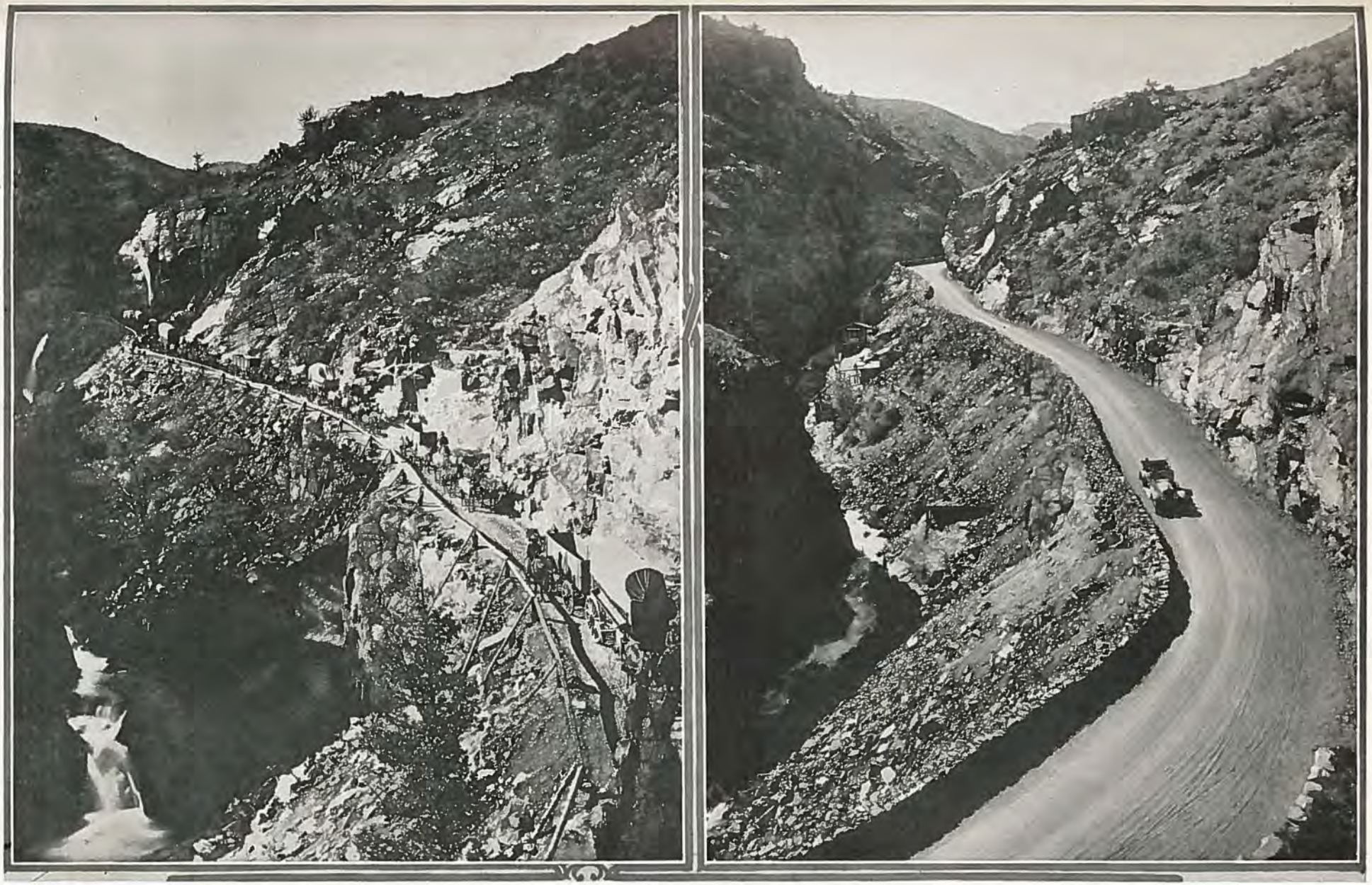
S. P. 787—Approaches to Box Elder creek, between Watkins and Bennett, Adams county; cost, $4,987.

S. P. 789—East of Byers, over Rattlesnake creek, Arapahoe county, 204 ft. timber bridge and approaches; cost, $13,593.

S. P. 841—Near Coke Ovens, State Road No. 90, Montrose county, 2 miles of grading; cost, $7,000.

S. P. 884—Bridge over Boulder creek, Boulder county; cost, $947.

(Continued on page 18.)



COULD you make Ute Pass on high gear with your car as shown in the picture on the right? How would you pass another machine? Here we have two pictures of a famous Colorado motor road, as it looked 30 years ago, and today, taken from almost the identical spot. One picture shows "covered wagons" in which freight was hauled between Colorado Springs and Leadville during the gold rush days, the return trip being made with silver heavily guarded with armed outriders, as seen in the picture. Now thousands of motor cars pass the same spot daily over the Pikes Peak Ocean-to-Ocean highway. At the extreme right of both pictures may be seen Rainbow Falls, one of the picturesque beauty spots of Ute Pass. The steep grades, narrow road and timber guard rails indicate how much work has been done by highway engineers in recent years to make this historic route available for automobile travel. The road is now one of the finest in the country and any car negotiates it without the slightest trouble.

—Photos by courtesy Pikes Peak News Bureau.

United States Forest Roads

By ALLEN S. PECK,
District Forester.

THE United States Forest Service is responsible for the proper handling of the lands within the National Forests. In recognition of this fact, Congress has apportioned money to be spent in building roads and trails in the forests. Since 1907, by Act of Congress, 25 per cent of all gross receipts of the forests have been available for roads and schools. This fund is distributed each year to the counties in which National Forest lands are located and amounts to approximately $120,000 each year.

In 1912 Congress further appropriated 10 per cent of all the gross receipts of the forest to be spent by the forest service on roads and trails within the forest boundaries. The amount of money available from this source each year is about $45,000. From the Congressional Act of 1916, $64,000 comes each year to be spent in Colorado until 1926 and is known as Section 8 money. The amendment of 1919 to this Act appropriated $9,000,000 for roads in the National Forests, giving to Colorado $450,000. The Berthoud Pass, Durango-Silverton, North Hardscrabble, Independence Pass, Rabbit Ears Pass, Mount Evans and Monarch Pass roads, besides many smaller ones, were begun with this fund.

On November 9, 1921, $15,000,000—$9,500,000 for large projects chiefly for public use, and $5,500,000 for small development roads, was appropriated by Congress. Colorado realizes $717,000 for the large projects and $330,000 for small roads and trails from this fund. Some of the roads upon which this money is being spent are Cameron Pass, Arapahoe Glacier and Berthoud Pass from Empire to east foot of pass, Durango-Silverton, Red Mountain, Mesa Lakes, Bennett Creek, Dolores, Norwood and Squirrel Creek. A new road act has just passed Congress appropriating $6,500,000 for each of the fiscal years 1924 and 1925. So far $198,809 has been received from this fund by Colorado for 1924 and is being spent in the same manner as the November 9, 1921, appropriation. Program of construction for what are known as forest highway projects (roads which are of primary use to the public) is based upon the joint recommendations of state highway departments, the bureau of public roads and the forest service.

It is the policy of the forest service to build as great a mileage as possible of good, well drained roads. To do this, many of the development roads will be narrow, not more than nine feet, but on such a grade that they may later, in case of need, be improved. To spend the money all on high class roads would make it possible to build only a few miles and thus serve only a few interests.

There is no legal requirement, except in the use of the Section 8 fund, that the state match this money with a like amount from the state treasury; but where a number of projects are up for consideration, co-operation is one of the deciding factors in selecting the ones to be built.

To properly administer and protect the forest areas, roads and trails are necessary and are built where they will open up tracts of merchantable timber, protect against fire and add to the grazing value. The human use of the forest is large and these roads and trails are making accessible new localities where visitors may reach the isolated places and the local settlers can get out and market their crops.

In 1920 the Forest Service, under the direction of Fred D. Mendenhall, district engineer, made a detailed study of what roads should be built in the forests and how much we were justified in expending

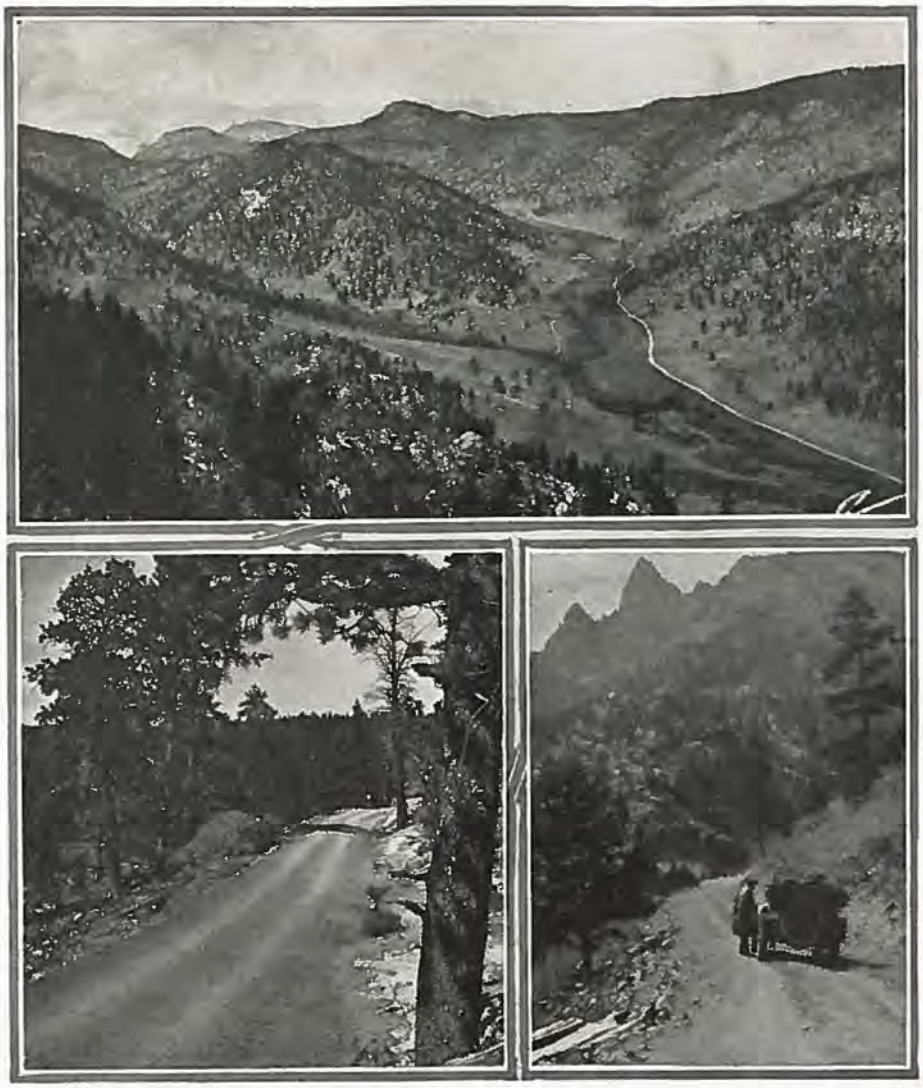
Upper—Scene at Big Narrows, Cache La Poudre Canon road. Lower—The Sawtooth Range as seen from Owl Creek Pass in the Uncompahgre National Forest. Photos by courtesy U. S. Forest Service.

upon them, and there is now on file a comprehensive road plan covering all the forests of the state. In accordance with this plan, 2,450 miles of roads at a cost of $9,271,000 and 1,021 miles of trails, costing $86,000, should be constructed.

Forest service roads and trails are built on easy grades, are well drained and so placed that no expensive relocation and reconstruction will ever be necessary. Care is used to put them where they will best serve the needs of the communities they reach. Colorado's mountain scenery is becoming world famous and in 1923 the fifteen National Forests in the State entertained 1,600,000 visitors. The newly built roads and trails are taking people more and more into these wonderful spots. The Durango-Silverton road, which has been formally opened by the Brooklyn Eagle party now touring the West, makes possible a circle trip through that most stupendous San Juan region about Silverton and Ouray. Here water from the melting snows rushing by leaps and bounds over rocky courses, the spray glistening in the sunshine, and the vari-colored towering mountains with their shades of gray, yellow and red, makes this one of the most attractive regions in the state. Berthoud Pass road makes easily accessible the wonderful fishing regions of Middle and North Parks and gives a rapidly changing view of mountain scenery far and near. Monarch Pass and Cochetopa Pass, beautiful highway on easy grade, make it possible to reach the Western Slope in comfort and enjoy the superb fishing of the Gunnison River and its tributaries. Other roads, little and big, might be mentioned; but they each serve a definite purpose, and while built primarily for business, since they are in the mountain areas, serve the double purpose of business and recreation. As more money becomes available and projects are completed the forests can be handled much more efficiently and easily, the fire menace will be materially lessened and Colorado's mountain land will have become a veritable playground.

Pueblo county's $100,000 bridge-building program for 1924 is practically completed. The two bridges are finished and only filling of approaches is being carried out now. At Boone the county built a 200-foot steel bridge across the Arkansas river to replace one swept away in the 1921 flood. On St. Charles creek, on the South Vineland road a 300-foot, three-span concrete structure was constructed, also spanning a flood-swept channel which claimed a bridge in 1921. Fills for the St. Charles bridge are being made from a hill directly east of the bridge. A cut is being made in the hill so that two dangerous hill-curves can be eliminated.

The full length of the South Vineland road east of Pueblo to Six Mile creek, a distance of fourteen miles, is being surfaced with gravel by Pueblo county. The road will be used this summer as the official detour from the Santa Fe Trail, where two concrete paving projects are under way.



Upper—Looking north up Muggins Gulch, on Lyons-Estes Park road. Lower left—View on North Hardscrabble road, in San Isabel National Forest. Lower right—View on Cochetopa Pass highway. Photos by courtesy U. S. Forest Service.

MULNIX SELLS HIGHWAY BONDS AT HIGHEST PREMIUM IN 25 YEARS

A $500,000 installment of the second series of State Highway bonds authorized by vote of the people at the general election held in November, 1922, was sold by State Treasurer Harry E. Mulnix, on June 19.

The sale was made to Boettcher, Porter & Co. and the Denver National Bank. They paid $510,490 for the lot. This is the highest price obtained by the state for any of its securities in more than 25 years. The price is $1,020.99 for every one thousand dollar bond.

Bidding for the bonds was extremely brisk, more than thirty banks and investment houses submitting bids for the issue. The fact that such an excellent price was obtained for the bonds and that so large number of bids was submitted, again demonstrates the fact that Colorado's securities are considered gilt-edge by the investing public, and that the state is regarded as in splendid financial condition.

The premium of $10,490 goes into the state highway fund and also becomes available for the construction of roads.

The issue of which the $500,000 sold is a part of $1,500,000. The next installment of $500,000 will be offered by the Treasurer at public sale on September 1, and the third and last installment will be put on the market at the end of the year.

Sale of the entire issue in three installments, instead of in one lot, was ordered by Governor Wm. E. Sweet. The governor took the position that the bonds should be sold as the money was needed for construction purposes, and felt that the state should save the interest charges.

Colorado tourists unable to find the porch light switches in Longmont, one of the gateway entrances to Rocky Mountain National Park, learn to their surprise next morning that the city operates the light plant and furnishes free porch lighting for residences.

Chimney Canyons, out of Sterling, is a vacation setting newly discovered in Colorado and contains a scenic wonderland of red rocks and cedars, with delightful camping spots that attract tourists bound for the Rockies.

The D. S. O. Romance

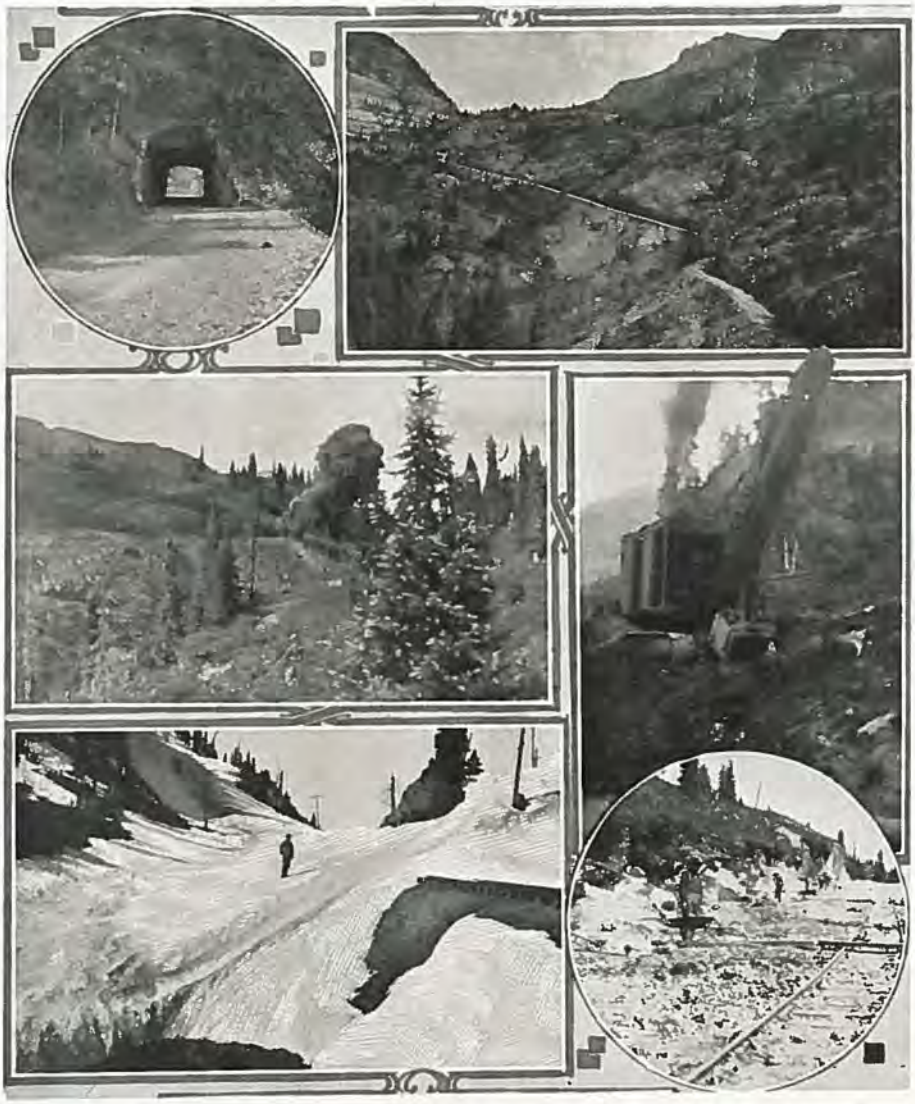
By J. R. CHENEY,
Division Engineer

TO start this story at its logical beginning is a bit difficult, as the country through which this road traverses was set on "edge" in an age when lizards with long names and longer necks were shuffling about over the landscape. It apparently was heaved up by nature with the idea of the Famous Verdun Slogan in mind, namely, "They Shall Not Pass," but nature, in those days, reckoned not on the ingenuity of the human pioneers who were to follow.

The earliest recorded history of the San Juan country refers to a Spanish Priest, by name Fray Escalante, who crossed this country with a small company of soldiers, en route from Santa Fe, N. Mex., to the West Coast about the time the pine trees were set out. There was also one Fremont, who came to the San Juan section in 1848, but his men and animals were largely killed off by the Indians, and he made a strategic retreat back through the San Luis Valley, to New Mexico.

Another adventurous soul, John Baker, and party came from the East into the Park where Silverton is now located, in 1860, but it appears that the Utes objected more or less effectively and "razzed" him out of the country, to the place from whence he came. He succeeded, however, in giving his name to the Park.

Approximately 10 years later, prospectors began to trickle into the San Juan Mountains from the East, and many of the now famous claims were staked out between 1870 and 1880. In 1881 the country around Red Mountain was prospected, and in 1882, the famous Yankee Girl Mine was discovered. This was the beginning of large scale operations, and the rapid development of this section made the demand for better transportation facilities. About 1877 a company was organized and built a road from Ouray, North toward Montrose. About a year later the Ouray-San Juan Wagon Road Company was organized and started construction on a road from Ouray, South toward Red Mountain and up Poughkeepsie Gulch. In 1883 the county took over the road and expended some $42,000 toward its completion. Additional funds were then advanced by Otto Mears, who was a transportation pioneer in this section, and he completed the road, and operated it as a toll road for some years. The toll rates were, $5.00 for team and wagon, with $2.50 additional for each extra span of horses; $2.50 for a trail wagon, and $1.00 for saddle animals. The first president of the Ouray-San Juan Wagon Road Company was Ira Munn, and the stockholders were mainly local merchants and miners. They had done much work, and advanced considerable money and when Otto Mears took over the road and operated it as a toll road, there was considerable agitation, as they felt that he was getting more than his share of the "gravy," and that the toll rates were excessive.



Upper left—Tunnel blasted from granite wall. Upper right—Looking north on finished project. Middle left—Blast on top of Red Mountain. Note "Lady Grundy." Middle right—Shovel at work on Mother Cline Hill. Lower left—Red Mountain Divide. Circle—Rock construction on Red Mountain.

The road was officially taken over by the county and State in 1887. Just previous to the official act, it was unofficially opened by some earnest exponent of lower taxes, who was driving a six-horse wagon up the canyon, and dropped a chain over the toll gate bar as he passed through and went on up the canyon taking the bar with him. This road was built primarily as a means of getting ore out and supplies in to the rapidly growing mining center around Red Mountain. The road was narrow, with sharp turns and grades of 15% to 20%, but it served until the present as the shortest connecting Highway Link between the Uncompaghre Valley and the San Juan Basin. It occasioned much pushing and grunting, to say nothing of profanity by many Ford tourists, but they generally got over the hump and went on their way.

In 1916 the State and Ouray County expended $8,000 on the first two miles out of Ouray. In 1920 the State and County with Federal Aid built 1.15 miles below Bear Creek Falls, at a cost of $75,000. This stretch contains a 200-foot tunnel, and was located and built under the supervision of Dick Winnerah of Ouray, and excepting the mile of road in Byers Canyon, recently put under contract, this probably is the highest priced mile of road in the State. In 1921 a mile above Bear Creek was started, and is still under contract, to cost about $59,000, and a three-mile stretch from the upper end of Ironton Park to the top of the Divide was started. In 1922 the U. S. Bureau of Public Roads undertook the improvement of approximately two miles of heavy rock work on "Mother Cline" Hill, which will be completed this spring at a cost of approximately $136,000, and this year they have let contracts on a section through Ironton Park for 4.6 miles, which will probably complete their work in this district.

The State in 1922 opened construction on a mile of road from the top of the divide toward Silverton, which was located on the old Silverton-Northern Railway Right of Way, and which will elim-

inate some very bad grade on top of the divide. Until 1918 there was no open road from Silverton to Durango, and all cars coming in to Silverton from the North had to be shipped by train to Durango. In 1918 the Bureau of Public Roads with some State Aid undertook to open a road from Silverton to Durango, and this work was carried on by the Government during 1919 and 1920 to its completion, at a cost of approximately $485,000—$330,000 of which were Federal Funds, and $155,000 of State Funds. This covered a stretch of approximately 32 miles, from Silverton South through a difficult country, as all supplies and equipment had to be packed to the various camps, so that work could be carried on at several points simultaneously. This section was handled by day labor under the supervision of the Bureau of Public Roads with Luke Smith acting as construction superintendent.

Upper right—Top of Molas Divide, June 13. Upper right—Above Ouray. Middle left—Section of Mother Cline Hill. Right circle—Silverton-Red Mountain, looking south; Sultan Mt. in distance. Lower circle—Side hill cut, thru cut and tunnel. Lower center—Bear Creek Falls.

When all work now under contract has been completed, a section of highway 77 miles long, costing around $1,000,000, will be thrown open. It extends south from the town of Ouray, at an elevation of 7,700 feet, climbs to the top of Red Mountain Pass, at an altitude of 11,086 feet, and drops down to the town of Silverton at a 9,300 foot elevation on the headwaters of the Animas River, then climbs out of Silverton to cross a divide at Molas Lake at an elevation of 10,800 feet, and thence down to Durango in the Valley of the Animas River, with an altitude of 6,500 feet. The town of Ouray, named after the late Chief of the Utes, is located in a beautiful Red Rock Amphitheatre, the like of which for natural beauty cannot be found elsewhere in the State. The road from there to Red Mountain traverses a country which for pure rugged grandeur is without peer, and after crossing Red Mountain, descends through spruce covered slopes to the Valley of the Animas River, making a trip which is a constant source of delight and awe to the motorist. We who have worked on this link of highway concede to no other section of the State a trip of similar length with so much of natural grandeur and appealing beauty.

GASOLINE TAX PROVES POPULAR WITH MOTOR CAR OWNERS

The gas tax is popular, it is explained, because it is paid in nickles and dimes—at an average of a little over 2 cents a gallon on the gasoline that is put in the auto tank at the filling station. Also, it permits the automobilist from another state to pay something toward the upkeep of the roads he uses.

A recent gas tax survey of the United States follows:

No Gas Tax—Illinois, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New York, Ohio, Rhode Island and Wisconsin.

1-Cent Gas Tax—Connecticut, Kentucky, Louisiana, Mississippi, New Mexico, North Dakota, Texas, Vermont and Wyoming.

2-Cent Gas Tax—Alabama, Colorado, Delaware, Idaho, Indiana, Maine, Maryland, Massachusetts, Montana, Nevada, New Hampshire, Oklahoma, Pennsylvania, South Dakota, Tennessee, Washington and West Virginia.

3-Cent Gas Tax—Arizona, California, Florida, Georgia, North Carolina, Oregon, South Carolina and Virginia.

Utah has a 2½-cent gas tax and Arkansas a 4-cent gas tax, and Massachusetts levy is subject to a referendum next November, the report adds.

Of the 19 states first to adopt the gas tax, 13 have since increased the rate in order to secure a larger portion of the road funds by that plan and 17 states adopted it last year. It is predicted that within a few years a gas tax will be collected in practically all states, and further that those having many motor tourists will be next to adopt it.

Five miles of mountain grading is being constructed by Contractor Richard W. McQueary in Grand county for the Forest Service. He recently completed four miles of heavy grading for the state highway department between Lawson and Empire. His outfit led the procession of summer traffic over Berthoud Pass on June 8.

New 300-ft. Concrete Bridge Over St. Charles River in Pueblo County Recently Completed.

Bridge Builder Uses New Method

TRAFFIC started moving over the new 300-ft. concrete bridge over the St. Charles river, south of Vineland in Pueblo county, the latter part of June.

Engineers and road experts describe this bridge as one of the most imposing structures of its kind in the state, and the contractors, the Salle Construction Co. of Pueblo, have been congratulated on all sides for the splendid piece of construction which they accomplished.

The bridge is in three spans of 100 ft. each. It is located on one of the main traveled highways out of Pueblo.

Excavations for the bridge were started on Feb. 16, this year, and the concrete work completed on June 4. Approaches for the bridge were completed and the bridge opened the latter part of June.

Work on the super-structure started on April 22, at which time the Pueblo county commissioners made an inspection of the work. From the time the county let the contract for the structure, work was rushed ahead as rapidly as possible, in order to get it finished before the flood season, which usually starts at this point about June 1.

Unique methods were employed by the contractors in building the bridge. A new method of making coffer dams was introduced to the engineering world by the company on the bridge. Instead of digging and using plank to keep the pier excavations from caving, the Salle company invented a new concrete coffer dam system.

The concrete walls were made one foot thick. The reinforced concrete walls were set where the pier was to be located, 16 feet of wall being made before sinking started.

This concrete shell was lowered as the earth under it was removed from the interior of the shell. When the 16 feet had been lowered, forms were placed and additional shell added until bedrock was reached.

When in place the shell was filled with concrete and reinforcements and the completed pier formed. This method was used on the two piers and the two abutments of the bridge.

Some of the largest contractors in the West have investigated the system which is being patented by the Salle Construction Company.

ANOTHER IMPROVEMENT FOR RAINBOW ROUTE. NEW $100,000 DELTA BRIDGE

Among the important contributions to safety and comfort on the Rainbow Route this season are the two mammoth bridges, one at Sapinero in Gunnison county which will be formally opened with a great celebration June 24th, and the bridge across the Gunnison at Delta, which has been in use since Memorial Day.

The bridge at Sapinero is spectacular and will be a scenic attraction for all time because of its height and wonderful scenic surroundings, but the bridge at Delta is a great deal larger. It is 600 feet long and cost $100,000. It replaces an old wooden structure which has been in use since the white man first came to Western Colorado. Thru the courtesy of the Delta Tribune we are enabled to present readers of the News-Champion with a late photo of this bridge which connects Delta and North Delta on the road toward Grand Junction.

The second photograph below illustrates the four spans, each of them 150 feet. Alongside of the completed bridge may be seen the suspended water main which brings Delta's supply of mountain water from Grand Mesa. On the other side it is expected that a foot bridge will in time be suspended.

These bridges are vivid examples of the way in which the federal government and the state of Colorado are now constructing highways that, like the roads of the ancient Romans, will be in existence for centuries instead of being built for a generation or two.—Gunnison Champion.

To the whistling of the whip
And the clanking of the chains—
Snap! Crack!
Thud and thwack!
Sing the chanty of the Plains—
Never, never, turn we back!
Never, never, turn we back!
O'er the trails that rise and dip,
Thud and thwack!
Snap! Crack!

Road News, Views and Gossip

HALIFAX DRIVING RULES

The Halifax Automobile Association has prepared a series of instructions in the name of the Safety First movement. The instructions are sent to all members of the association. Most interesting are the following:

"Drive as if the other driver was a born idiot.

"Drive as if every hill had a cavern at the bottom.

"Drive as if all children and most pedestrians were bent on suicide beneath your wheels.

"Drive as if every curve was a highwayman, a Bengal tiger and a stone wall."

THE HIGHWAY OF THE STARS

Ambition is life's greatest highway that points to the stars—it is lighted by the rays of hope that spring from the heart of man and paved with beads of sweat that fall from his brow. Few of us are fortunate enough to reach the heights for which we strive, but we gain all we get from the strain and sweat—and the struggle is always worth while.

For the accommodation of the masses, a good highway is probably of more importance than a railroad. This is at least true as regards passenger traffic, for a good highway paralleling a railroad carries from five to ten times as many people as the railroad.

Give us good roads or give us social isolation, economic paralysis, and intellectual stagnation.

Twelve thousand consolidated schools in the United States testify to the educational value of the highway.

Personal liberty does not mean that you can appropriate the highway irrespective of the rights of the coming vehicle. Your personal liberty ends where the other half of the highway begins.—Texas Highway Bulletin.

FAMILIES ON THE HIGHWAYS

It is doubtful if there is anything more important in our complicated civilization than swift, pleasant and comparatively cheap means of inter-communication and all these things are closely associated with good roads. They are a prime industrial asset spelling added wealth in millions to the state, and in these days when so many families spend their hours of keenest pleasure on the road, they have become more important than ever.—Minnesota Daily Star.

ROAD SIGNS

Autoists who have taken extended trips have been impressed by the fact that towns which have road signs directing tourists to the town are pretty nearly always better towns than those which do not. It looks like a town which does not direct tourists is a little bit ashamed of itself.

This writer has covered a good many thousand miles by automobile. And in almost every case where there were no road signs, the town, when it was finally located, was found not worth stopping at. By the same token, the towns which use road signs most generally have pretty nearly all been better than average towns.

IRON ORE AS BINDER MAKES SUPERIOR ROADS

Iron ore, found in northwestern Louisiana, has proven of great value in road building in that state and, in some localities where it has been used, has effected a saving of $2,000 to $3,000 a mile in the cost of construction. Highway engineers in Louisiana have been using the ore as a binder instead of sand clay and have found it far superior to that material in many instances. During 1922 the Louisiana state highway department completed 350 miles of new roads. Most of this mile-

Snowmass Lake and mountain in Holy Cross National Forest—Photo Courtesy U. S. Forest Service.

age consists of gravel. The remainder consists of roads built of shells, sheet asphalt, or bitulithic. The 1923 program includes a larger amount of asphaltic construction.

Iron ore was first used in De Soto Parish, Louisiana, in 1917. Then a large deposit was found northwest of Arcadia. Ore from this deposit is being used as a base course on the new Homer-Minden highway, the Arcadia-Natchitoches highway, the Ruston-Arkansas highway and the Pershing highway. The state pays about 10 cents a yard in royalties for this material against $1 a yard on sand clay gravel. The saving effected amounts to about $1.50 a yard.

The states of Pennsylvania and Minnesota this year plan to encourage the planting of shade trees along their paved highways in unprecedented fashion. Thirty thousand trees, it is declared, will be used for this purpose in Minnesota alone. One objection heretofore to shade trees at the roadside has been, that the roads did not dry out readily after rains, but that mudholes lingered. Since road building, according to more modern methods, has been so generally adopted, this argument is no longer good.

ROAD OFFICIALS KEEP PUBLIC INFORMED

"As an antidote for the criticism and dissatisfaction with the expenditure of State road funds, most generally by a public which does not understand, State Highway Departments have at last hit upon the remedy of full and complete information as to what the Department is doing and expects to do," said V. D. L. Robinson, Director of Roads of the American Automobile Association.

"Inquiry of the State Highway Departments of such states as Pennsylvania, Colorado, North Carolina, Missouri and others where the plan of taking the public into the confidence of the department has been in effect for a sufficient length of time, gives positive proof of the effectiveness of the remedy" said the director of roads.

The publicity, or more correctly speaking, the informational bureaus of many of the State Highway Departments are being organized with as much care as is given to the engineering or administrative divisions of highway construction and maintenance. Frequent bulletins, maps, news and feature articles are only a few of the methods employed in carrying out their new slogan of "The Public Be Informed". Many of the departments have specially trained speakers to attend various county and neighborhood gatherings to explain what their state highway department is endeavoring to do for them. While there has been some criticism of this, citizens generally are beginning to realize that this is very necessary for the success of their state road program.

"The state of Missouri has probably gone further in their educational work than any other state. In addition to the use of the other means of informing the people of Missouri, Chairman Theodore Gary of the State Commission has erected 100 billboards ten by twenty feet with plans for the erection of 100 more. These billboards are located alongside new projects and in addition to carrying a general statement about the work of the State Highway Department, give full information about the particular project such as its number, name of county, length of project, its cost, material used, name of engineer in charge with the name of the division engineer.

She was as pure as snow; but—she drifted.—Lyre.

REPORTS FROM THE DIVISIONS

DIVISION I.

HEADQUARTERS, DENVER.

JOHN P. DONOVAN, DIVISION ENGINEER.

Counties of Adams, Arapahoe, Boulder, Clear Creek, Gilpin and Jefferson.

Approximately two miles of paving has been completed on the Denver-Morrison project. This contract calls for five miles of concrete pavement. A detour has been opened around Soda Lakes connecting with the old pavement east of Morrison. A large crew of men have completed surfacing the detour. However, a large part of the traffic is being diverted over the new Hogback between Morrison and Golden. It is expected this project will be completed by fall. Grading has been started on the western part of the project. This section was kept open for traffic until July 7th.

A fine record is being made by R. M. Larsen, contractor, on 2.8 miles of paving north of Broomfield. About one and a half miles of the concrete has been poured. A steam shovel is being used to cut a new channel in Rock Creek. Construction of a new concrete bridge over the creek has been started. The contractor is pouring an average of eleven stones per day. From present indications a record will be made on this project.

A large force of men are now employed by the M. J. Kinney Const. Co., completing 4.7 miles of grading thru Turkey Creek, extending to Conifer. Two miles of the project is finished. About fifty men with a large number of teams are at work.

Inability of the subcontractor to furnish sand and gravel to the job has caused a delay on the mile of concrete pavement on the Arapahoe road in Boulder county. Plans for the bridge also were revised causing a further delay. However, the contractors, Giggey & Hanes, are exerting every effort to rush the work to completion. It is expected the road will be opened to traffic in about a month.

Construction of the concrete bridge over the Moffat railroad tracks on the Denver-Brighton pavement has been completed by the Carl C. Madsen Const. Co.

Edward Cowden, Locating Engineer of the Highway Department, has approved the new survey line on State Road No. 8, extending from Conifer five miles towards Shaffer's Crossing.

DIVISION II.

HEADQUARTERS, GRAND JUNCTION.

J. J. VANDERMOER, DIVISION ENGINEER.

Counties of Delta, Gunnison, Hinsdale, Mesa, Montrose, Ouray and San Miguel.

Labor conditions and weather have been ideal for rush work in this division during the past month. In the higher altitudes progress has been particularly good.

Contractor K. V. Johnson is finishing up on the project above Ouray near Bear Creek Falls, and has started a dragline to work on the project in Ironton park which will connect the new road, when finished, with the work now being done by state forces on Red Mountain.

It is expected that the work of grading and surfacing the approaches to the new Sapinero bridge, which was opened to traffic on June 24, will be finished early in August. The contractor has finished roughing the road in and is preparing for the surfacing.

Gravel surfacing is now being done by the Delta county forces on the approaches to the Delta Bridge which was completed on May 7th.

Hinman brothers have started on F. A. P. 242-A, a grading and gravel surfacing project outside of Fruita.

A crew of fourteen teams and ten men have been put on the grading and gravel surfacing project west of Gunnison by Contractor R. P. Morrison. Thus far he is making good progress.

Five miles of rock surfacing is now being laid by Montrose county forces on Cerro Summit. This is an improvement for which motorists have long demanded. In wet weather this road is very bad. Plans are being made to relocate the road from Halfway House to Cerro Summit.

Mesa county is building about eight miles of new road, from county funds, from a point about five miles north of Loma to the Mesa-Garfield county line.

Sherman Williams, superintendent of construction, has a large force of men working on the Douglas Creek Pass road. The road has been bladed from Rangely to the top of the pass.

It is expected that the steam shovel owned by the state will finish the work on Dallas Divide in San Miguel county. This work is under the direction of George Toupain, Assistant Superintendent on Maintenance.

DIVISION III.

HEADQUARTERS, DURANGO.

J. R. CHENEY, DIVISION ENGINEER.

Counties of Archuleta, Alamosa, Conejos, Costilla, Dolores, LaPlata, Mineral, Montezuma, Rio Grande, Saguache and San Juan.

A couple of bouquets are due to Mishon, Engler & Teyssier outfit for the manner in which they have hopped to the work on F. A. P. 266-A, located south of Durango. In two weeks time they have completed 45 per cent of the grading and have set up a gravel plant. This contract calls for three miles of grading and gravel surfacing, to cost $22,233.

At the beginning of this month four Federal Aid projects were under way.

Steel on the Piedra bridge is being put in place by Shields & Kyle, contractors. This steel is being hauled ten miles. This is the kind of job that is a relief to the sorely tried engineer. The grading is 40 per cent complete, the graveling 20 per cent and the substructure for the bridge poured.

Slow progress is being made on the gravel surfacing on three miles of new Federal Aid construction east of Durango. The grading is 96 per cent complete.

The weather in this division has been excessively dry the past four weeks and roads were getting deep with dust. Showers the early part of July were a great help on new surfacing projects.

DIVISION IV.

HEADQUARTERS, PUEBLO.

JAMES D. BELL, DIVISION ENGINEER.

Counties of Baca, Bent, Crowley, Custer, Fremont, Huerfano, Kiowa, Las Animas, Otero, Prowers and Pueblo.

Completion of the three miles of Warrenite paving north of Trinidad is expected on August 1st. At present the contractors are laying between 500 and 600 feet of top per day. It is expected this part of the work will be completed the middle of July. One mile of the shoulder is ready for graveling. The contractor is using two rollers, a 10-ton and 5-ton, the smaller being used for cross rolling. The Stamey-Mackey Const. Co. are the contractors. This is the second piece of bithulithic paving laid on state highways in Colorado.

Work of grading three miles east of Hadley has been started by W. A. Colt & Son, under their contract on F. A. P. No. 245-B.

Slow progress is reported on the 2½ miles of concrete pavement being laid by R. A. White, contractor, near Swink. Under the terms of the contract this work was to have been completed by Jan. 1. The probable date of completion is Aug. 30.

Reports indicate that the concrete paving east of Pueblo, near Vineland, will be all finished by August 1st. This work, which consists of one mile of paving, was started on April 24. During the month of June the contractor laid an average of three 60 ft. stones per day. Early in July four stones per day were laid. W. A. Colt & Son are the contractors.

During the month of June Federal Aid Projects No. 231, 245-A, 168-B and 247-A were made ready for final inspection.

A survey for a proposed new west entrance into Walsenburg for State Road No. 1 has been completed. It is probable an underpass crossing will be constructed.

Six miles of sand surfacing has been completed by Contractor Luther Harris on State Project No. 861, between Ordway and Olney Springs; also three miles from Horse Creek east on State Road No. 96 in Crowley county.

Charles Barton, road supervisor of Custer county, will be in charge of the grading and surfacing of Road No. 96, west from Querida. The appropriation for this work is $5,000. When this project is completed it will give a good road from Westcliffe east to Wetmore.

A GOOD TIP

Another advantage of crossing crossings carefully is that you get on the other side.

DIVISION V.

HEADQUARTERS, COLORADO SPRINGS.
ERNEST MONTGOMERY, DIVISION ENGINEER.
Counties of Chaffee, Cheyenne, Douglas, Elbert, El Paso, Kit Carson, Lake, Lincoln, Park and Teller.

Paving on the Breed-Husted Federal Aid project by LaNier, Selander & White was started on June 3. The detour around this project has been maintained in excellent condition and motorists have been loud in their praise of same.

Pouring of concrete on the blank space in the paving north of Colorado Springs is under way.

Contractor Busselle is working on the Pine Creek bridge foundation excavations. Piling has been driven by the Santa Fe railroad for the underpass. Actual paving has been started.

The above paving will connect with the work now being done by LaNier, Selander & White at Husted.

In spite of the fact that material has been difficult to handle, good progress has been made on the project between Buena Vista and Leadville. It is expected that the project will be completed by the latter part of July.

Good progress also is being made on the grading and gravel surfacing project north of Salida. Work was started on May 12 by the Western Const. Corp.

Plans are now being drafted for three other Federal Aid projects on Road No. 1, north and south of Colorado Springs.

County forces are completing five miles of grading and surfacing on Rocky Flats south of Fairplay. Twenty teams are being employed. Roads in Park county are in the best condition in history.

Rush work has been resumed on Eleven Mile canon in Park county. This road is located on the old grade of the junked Midland railroad.

Convict laborers have made a great showing on the new road over Poncha Pass in Chaffee county. Operations here will continue about 30 days, the road being completed to the Saguache county line.

Work is being carried on on the Trout Creek Pass road in Chaffee county by county forces, assisted by Warden Capps' reformatory labor and trucks.

DIVISION VI.

HEADQUARTERS, GLENWOOD SPRINGS.
H. L. JENNESS, DIVISION ENGINEER.
Counties of Eagle, Garfield, Jackson, Moffat, Pitkin, Rio Blanco, Routt and Summit.

Four Federal Aid projects were under way in this division this month, with plans well on the way to get several others under contract. Weather conditions have been ideal for work.

Considering the rocky nature of the soil, the contractors on the bridge, fourteen miles north of Dillon, are making splendid progress. This structure should be open for traffic in August. A dragline outfit is being used in the construction of the approaches. The bridge is a 100-foot span steel and concrete structure over the Blue river.

About 100 yards of gravel surfacing per day is being placed on the project west of Kremmling by Contractors Henry Shore and Ward Wren. This contract calls for three miles of gravel surfacing and grading. Twenty-two men and 15 teams are employed. This will improve one of the worst sections of the Muddy Pass road.

Gravel surfacing has progressed slowly on the Dotsero-Gypsum project, because of high water flooding the gravel pit of Contractor A. L. Hockett.

A force of 75 men and 64 teams are at work on the project west of Steamboat Springs under contract to the Northwestern Construction Co. Three miles of the project has been opened up. Very good progress is being made with the earth grading and concrete work.

The contractors have started a steam shovel on the work thru Byers canon, west of Hot Sulphur Springs. When the new road thru Byers canon is completed it will eliminate the bad hill road between Hot Sulphur Springs and Parshall.

Work has been started on three miles of grading on Willow Pass toward Rand by Contractor S. Rennard.

A force of men are employed by Contractor Henry Shore on four miles of grading on Cameron Pass.

County forces are improving a stretch of road on Hoosier Pass in Summit county.

C. A. Switzer has a contract for the improvement of the old Midland railroad grade in Pitkin and Lake counties. There are 27 miles in the project, including the Busk-Ivanhoe tunnel. Work has been started in the tunnel.

DIVISION VII.

HEADQUARTERS, GREELEY.
A. B. COLLINS, DIVISION ENGINEER.
Counties of Larimer, Logan, Morgan, Phillips, Sedgwick, Washington and Yuma.

A fleet of ten small trucks are used in hauling gravel surfacing for the detour for the pavement project between Berthoud and Loveland, contract for the construction of which has been awarded to the F. C. Dreher Const. Co. There are two and one-half miles of paving in the project.

During the month three miles of gravel surfacing was placed on Road No. 16 east from Loveland to the Weld county line. The work is being done with trucks on a yard-mile basis.

Intermittent rains during the early part of June interfered somewhat with the progress on the North St. Vrain project in Larimer county. Slightly over two miles of this road was regraded and gravel surfaced. Thirty men and eight teams are employed. Work on this project is not continuous but consists of improving sections of the road which were narrow, not surfaced and poorly drained; also the removal of numerous rock points which restrict travel to one direction.

Two and one-half miles of Road No. 14, west of Sterling, was regraded and gravel surfaced during the month. This work is east and west of Pawnee Hill, which all motorists of this section have battled in years past.

Eleven miles of gravel surfacing north of Akron on Road No. 63 was completed during the month.

During July two paving projects on the Brighton-Greeley road under contract to White & Johnson, totalling eleven miles, were completed. Pouring of concrete pavement on four miles of paving between Platteville and Greeley also was completed by the Engineers Const. Corp. It is hoped that the entire project will be opened for traffic the latter part of July.

A total of 7,100 lineal feet of pavement was laid by J. Fred Roberts & Son on their contract between Platteville and Greeley. This project calls for 6¼ miles of paving. When this project is completed, the ribbon of concrete between Denver and Greeley will be complete.

Two pavers are being used by the F. C. Dreher Const. Co. on the Loveland-Berthoud project.

TRANSPORTATION TODAY EVOLUTION, NOT A DISCOVERY

Lost in the mists which shroud the beginnings of history is the first man. Wanting to get a log from one place to another he rolled it instead of carrying it. In one year or many thousands of years, no one knows how many, early man conceived the idea of smoothing the path over which he rolled his logs. The first stone removed from the hillside down which a log was to be rolled, the first hole in the ground filled up that the log might not stick, marked the beginning of road building.

In the course of time it occurred to some man that the smaller the log the easier it rolled. From this beginning the log sections which were the first wheels were born; in India today can be seen bullock carts, the wheels of which are flat sections cut from logs. Mounting these "wheels" on an "axle," which was a smaller tree, was a true invention, but the making and use of the first wheel must have been pure discovery.

Road building, too, was discovery, rather than invention. Early man must soon have found out that heavy loads sink into soft earth, and rather than wait for the mud to dry, was led to harden the roadbed by the first means at hand. Whether this was accomplished by the placing of flat rocks in the path of the first carts, or covering the mud with boughs, grass, branches of trees (progenitors of corduroy roads), history does not say. The Romans showed the world what cut stone in courses could do towards making permanent roads (the Appian Way is still a useable stone road) and McAdam taught us what crushed stone may do, but these were but improvements upon the original discovery.

It is a long stretch of years from a log section to balloon tires, from a grass-covered path to a modern cement, brick, macadamized, oiled or tarred roadbed, but while these modern implements are the very best we know and the product of the brains of many inventors, the original means of transportation they improved were not inventions, but discoveries of means which nature had placed ready for man's use.

WATCH OUT

Be sure your aim in life is high and of a goodly pitch.

But, in looking upward see that you don't run into a ditch.

Highway Smileage

WE'RE GLAD THAT'S SETTLED

A subscriber, whose name we withhold for obvious reasons, asks our advice upon a very important matter. "I am in love," he writes, "with two girls, and both would be willing to marry me. One is very well off and is as pretty as a picture. The other is quite plain, and has no worldly goods to speak of. Which should I marry?"

The answer is easy. Marry the poor girl and send us the address of the other.

PROBABLY

He—There is an awful rumbling in my stomach—like a cart going over a cobblestone street.

She—It's probably that truck you ate for dinner.

THE DICKENS YOU DON'T

"Did you see Oliver Twist, Aunty?"

"Hush, child. You know I never attend those modern dances."

TRUE TO LIFE

Smith—I wish I had one of the crisp rolls that mother used to make.

Mrs. Smith—Yes, and I wish you had one of the crisp rolls that father used to carry.

HE MEANT IT

It was late at night. No one seemed to be about and the poor woman was very seasick. She thought if she could only get up to the deck a few minutes the fresh air would do her good. So, in her nighty, she was crawling up the stairs when she gave a feeble scream of embarrassment.

"Don't worry lady," the man groaned. "I'll never live to tell it."—Capper's Weekly.

A NEW CAR

"Is that a new runabout Frank has?"

"Heaven, no. He's known her since yesterday." —London Mail.

FOOL AND CARS

Blinks—They used to say the Lord took care of fools and drunks.

Jinks—That was before fools and drunks began to drive motor cars.

NOT HIS DESIRE

Mrs. Gray—I understand your husband can't meet his creditors.

Mrs. Green—I don't believe he wants to, especially.

"You plead guilty of stealing this pig?"

"No, your Honor. I took it for a joke."

A thoughful frown creased the judicial brow.

"How far did you carry that pig?"

"Just over to my house—a matter of two miles."

"You carried that joke entirely too far."

SERVE THEM RIGHT

Minister's Wife—Wake up. There are burglars in the house.

Minister—Well, what of it? Let them find out their mistake themselves.

—College of the Pacific Weekly.

Tardy Student—Well, a sign down here—

Well, what has a sign got to do with it?

The sign said: "School Ahead; Go Slow."

WOMAN'S RIGHTS

The occupants of the parlor car of the Limited were startled by the abrupt entrance of two masked bandits.

"Throw up yer hands," commanded the bigger of the two. "We're gonna rob all the gents and kiss all the gals."

"No, partner," remonstrated the smaller one gallantly. "We'll rob the gents but we'll leave the ladies alone."

"Mind your own business, young fellow," snapped a female passenger of uncertain age. "The big man is robbing this train."

THESE FOOLISH DAYS

"This song about bananas makes me sick," said the Foolish Old Gentleman. "In my day we had songs like 'Ta Ra Ra Boom De Ay' and 'Daddy Wouldn't Buy Me a Bow-Wow,' that had some sense to 'em."

PERSONALS

Sidney Lamb, draftsman in the Denver office, was married to Miss Jean Louisa McDonald of Denver, on July 11. They spent their honeymoon at Estes Park.

John C. Laughlin, who has charge of the blue print room, spent the week of July 14 fishing near Baileys. It was his vacation.

Several members of the Pan-American party of road engineers were visitors of the Highway Department early this month. They were very much impressed with the methods used on road construction in Colorado.

Ed. Cowden, locating engineer of the Highway Department, will spend about six weeks in the Culebra range country between San Luis and Stonewall at the head of a surveying party of nine men. They will locate a new road over the range.

Engineer George Davis spent a week in the Denver office last month working up field notes on a proposed new road from Florence to Pueblo, thru Portland.

Commissioner J. W. McMullen of Larimer county was a visitor at the Highway offices in Denver early in July.

B. F. Engstrom, of the Marion Steam Shovel Co., of Marion, Ohio, was a caller at the Highway offices in June. He supervised the assembling of the new steam shovel recently purchased by the department.

Friends of Commissioner H. G. Nunemaker of Adams county regret to learn of his serious illness.

R. P. Morrison, contractor on the Gunnison county project, left his job long enough to visit Denver a few days early in July.

Harry C. Flanders, commissioner of Adams County, conferred with state highway officials in June. He reported splendid progress in road building in all sections of his county.

Views of the Summit road, made from the old roadbed of the Cripple Creek Short Line and traveling some of the most beautiful mountain region of the state. It was opened to traffic on July 15. The new road is a two-way one, save for the bridges and tunnels.

Contractors' Column

The Pioneer Construction Co. have a contract for nine miles of grading between Woods Landing and Mt. Home Ranch, southwest of Laramie in the Medicine Bow National Forest. In the job is 50,000 yards of common and 5,000 yards of rock excavation. The work will be completed this summer. A crew of men have started work on the Byers Canon project, according to Joe Gordon.

Carl Madsen Construction Co. has the contract for paving one mile on Broadway in Englewood. This paving connects with that laid by the City of Denver to Yale avenue, the city limits.

R. P. Morrison of Golden has taken personal supervision of the work west of Gunnison, where he has a contract for three and one-half miles of grading and gravel surfacing.

Successful bidders on state highway projects during the month of June were: W. A. Colt & Son, Las Animas; Sims & Boston, Denver; J. Finger & Son, Denver; and LaNier, Selander & White, Fort Morgan. Colt & Son were awarded contracts for two projects on the Santa Fe Trail near Hadley and Lamar.

The Pioneer Const. Corp. have put a steam shovel in operation on their Byers Canon project, near Hot Sulphur Springs.

NOT SURPRISING

Frederick O'Brien, author of South Sea Island adventures, was entertaining friends at his Glendale home with some of his experiences. He chanced to remark that on one of the islands a wife could be bought for the equivalent of $5. "How perfectly awful," exclaimed one of the ladies present. "Oh, I don't know," reflected her husband, "I suppose prices are high there, just the same as everywhere else."

ONE-SIDED TOWN

"What town is this?"

"I don't see no town."

"You are looking out the wrong side of the car."—Stanford Chaparral.

RECORD ROAD MILEAGE COMPLETED

(Continued from page 4.)

S. P. 895—Poudre canon road, Larimer county, widening and regrading, approximately 5 miles; cost, $12,000.

S. P. 908—Erection of 24 Light standard on Platte river bridge north of Fort Morgan, Morgan county; cost, $2,000.

S. P. 910—North of Holyoke, Phillips county, regrading and gravel surfacing 3 miles, $2,000.

S. P. 911—North of Haxtun, Phillips county, grading and gravel surfacing, 5 miles; cost, $3,983.

S. P. 917—North of Greeley, Weld county, gravel surfacing, 9 miles, $7,000.

Altogether 93 state projects were contained in the 1924 budget. Of this number the engineers of the department report 45 already under contract, not counting sixteen which have been completed. The engineers are hard at work upon the remaining 32 projects and it is but a question of a few weeks before work will be under way on all of them. There is little doubt that the entire program of state projects will have been carried out by the time that the snow flies again.

The showing made by the department during the first half of the fiscal year is an excellent one, when the lateness of the winter and the heavy rains during April and May are considered. The May rains interfered greatly with the construction work, especially with the laying of concrete. Most of the contractors having paving jobs were compelled to remain idle during the greater part of May.

WHO PAYS FOR THE ROADS?

People who do not drive automobiles sometimes complain about the enormous sums of money spent on highway improvement. "The roads," they say, "cost a lot of money and the car owners get most of the benefit." In a measure that is true; but it should not be forgotten that the car owners pay for the roads. It is probable, indeed, that they more than pay for the roads. The federal government, for instance, reports that it has paid out $264,782,216 on account of federal aid highways, forest roads construction and expenses of administration. But this is not a tax on the non-car owner, because the government has collected $589,012,021 in taxes on automobiles, tires and accessories. This leaves more than three million dollars of automobile money to be turned into the treasury for general purposes. It is not necessary to fight sensible appropriations for making roads, since the driver pays his own way.—Farm Life.

MOTOR TRUCKS AND COACHES

While only 40 railroads in the United States were listed last year as operating motor rail coaches, a late compilation shows a total of 157, or an increase of about 300 per cent. These figures show that the use of the motor rail coach has proven its economy of operation.

More and more is the country coming to the city by motor vehicle. In Cincinnati during the past year about 97 per cent of the city milk supply was hauled by motor truck; in Atlanta, the figures show 90 per cent; Kansas City, Mo., 75 per cent; Indianapolis, 60 per cent; Milwaukee, 65 per cent; and Baltimore, 36 per cent. Other cities are fast falling into line and it will be only a short time before we can hope to see a motor truck service which will bring garden truck to the most distant point overnight.

Motor truck fleets are increasing in number very appreciably throughout the United States. The largest fleet in the country is that of the Western Electric Company in New York City, with 12,032 units. The next in line has 4,434, following down through to the last of 15 with a total of 790. It is worthy of notice that the combined fleets of seven of the biggest operators are in New York City, with a total of 23,887.—Crookston (Minn.) Times.

A hundred dollars a minute was raised by Trinidad business men and in a ten-minute meeting $1,000 was pledged for improving the road from the Las Animas county line through Vermejo Park, New Mexico, to the site of the oil wells to be drilled by the Union Oil Company of California. The county commissioners are lending every assistance toward putting the road in good shape to the state line. They have agreed to loan road grading machinery for work on eight miles of the highway in New Mexico. Trinidad business men realize that the best way to bring the oil wells closer is by improved roads.

There are parking hogs as well as road hogs. A parking hog stops within a few inches of the car ahead or behind his car.

U. S. APPORTIONS NEW FEDERAL AID FUNDS TO STATES

Provision for federal aid for the fiscal year 1925, which begins on July 1, is made in the Agricultural Appropriation Bill signed by the President on June 5. The bill authorizes the Secretary of Agriculture to apportion to the States immedately the $75,000,000 authorized by the Post Office Appropriation Act of June 19, 1922, and appropriates $13,000,000 to be immediately available, the remainder to be made available in later appropriations. The Secretary signed the apportionment order June 6, and as a result there will be no interruption to Federal-aid road work.

The apportionment is made to the states on the same basis as for preceding years, except Hawaii is for the first time admitted to a share which is on the same basis as for the states. This has been provided for in an act of the present session of Congress.

Since 1916 a total of $540,000,000 has been made available by previous acts of Congress, and the Bureau of Public Roads of the United States Department of Agriculture, which administers these funds, reports the status on May 31 as follows: Completed 32,099 miles, under construction 17,000 miles, approved for construction 2,518 miles, and $33,106,126 available for new projects.

Practically all of the old funds and the entire amount of the new funds have been or will be expended on the Federal-aid highway system of the United States. This system provided for by the Federal Highway Act of 1921 consists of approximately 170,000 miles of road, and has been designated by the states and approved by the Federal Government. At the beginning of the present year it was estimated that 60,000 miles of the system had been surfaced, about 8,700 miles graded, leaving 110,000 to be surfaced. Some of this work had been done by the states independent of Federal aid. To surface the remaining 110,000 miles by 1934 will require an annual program of 11,000 miles.

The new legislation carries an appropriation of $6,000,000 for national forest roads and trails, $3,500,000 of this amount being the remainder of the $6,500,000 authorized for the current fiscal year and $2,500,000 being the initial appropriation of the $6,500,000 previously authorized for the fiscal year 1925. The Secretary of Agriculture is also authorized to apportion and enter into contracts against the $4,000,000 remainder of the authorization for 1925 not yet appropriated.

In the apportionment of Federal-aid funds made by the Secretary, the amounts received by the various states are as follows:

States	Amount
Alabama	$1,542,052.56
Arizona	1,053,003.56
Arkansas	1,258,857.07
California	2,464,990.78
Colorado	1,361,482.06
Connecticut	475,513.91
Delaware	365,625.17
Florida	887,336.52
Georgia	1,983.022.99
Hawaii	365,625.00
Idaho	936,698.01
Illinois	3,203,867.99
Indiana	1,939,903.32
Iowa	2,078,248.33
Kansas	2,081,230.04
Kentucky	1,411,584.45
Louisiana	995,301.59
Maine	686,453.36
Maryland	635,945.01
Massachusetts	1,089,806.22
Michigan	2,226,824.73
Minnesota	2,120,906.56
Mississippi	1,294,371.65
Missouri	2,423,485.75
Montana	1,544.483.19
Nebraska	1,577,155.34
Nevada	947,623.25
New Hampshire	365,625.01
New Jersey	936,413.03
New Mexico	1,185,528.88
New York	3,663,105.86
North Carolina	1,697,246.16
North Dakota	1,178,708.13
Ohio	2,795,804.69
Oklahoma	1,753,189.71
Oregon	1,176,830.15
Pennsylvania	3,365,956.21
Rhode Island	365,624.87
South Carolina	1,054,028.17
South Dakota	1,209,144.18
Tennessee	1,628,740.97
Texas	4,410,169.76
Utah	847,741.90
Vermont	365,625.27
Virginia	1,448,562.55
Washington	1,113,308.17
West Virginia	798,275.47
Wisconsin	1,877,600.32
Wyoming	936,372.13

PRESS COMMENT

WAS PROBABLY A WISE VOTE AFTER ALL

With close to a million dollars of federal and state road money likely to be spent in Gunnison County within a few years, not only on the Rainbow Route proper, but on forest roads and state projects connected with this primary highway, a most wonderful road improvement program is opened. Recollect that Gunnison county is not required to put up a cent toward these and even the maintenance is largely carried on by the state. We do, of course, pay our share of the gasoline tax, and auto license fees that furnish these road funds, but considering our sparse population, that is not a big sum.

Take it, if you please, from a purely unselfish standpoint, but is it not a fact that we were wise in voting that last six million dollar bond issue for Colorado?—Gunnison Champion.

COLORADO'S GOOD ROADS

After careful consideration it has been decided to cease publication of the daily road bulletin in The Chieftain. The Colorado road program has reached the point where the main traveled highways are good thru the tourist season without regard to weather conditions. Storms that would have made the roads impassable for days now receive very scant attention, and in most cases bad road conditions are a matter of a few hours only.

It is impossible for any newspaper to keep up with these rapid and usually unimportant changes. Before a storm can be reported the sun is shining and the roads are dry. It is obviously impossible and not necessary to obtain reliable information with regard to the minor and local roads, and for the main highways it is now a reliable maxim that Colorado Roads are Good Roads.

Only in exceptional conditions therefore will road conditions be reported in The Chieftain, as in case of great damage by a heavy storm or the destruction of an important bridge. Under ordinary conditions the tourist may start along any highway of the state with the assurance of reaching his destination with reasonable speed and safety without regard to the weather.—Pueblo Chieftain.

SAN JUAN COUNTY EXPECTS MANY VISITORS ON D. S. O. HIGHWAY

Aside from general mining, the chief resource of San Juan county is its scenic attractions, summer climate and highways. Indications at the beginning of 1924 are that the year will be the best from the viewpoint of summer visitors in the history of the county. It is to prepare for the only other industry of the county that the warning to be ready for the summer is given. From Mesa Verde, the greatest natural attraction of southwestern Colorado, comes the advance information of more inquiry than in the history of the park, and it is to secure for San Juan county, by use of the wonderful D. S. O. highway, a share of this increased travel that the district must prepare now for a campaign of information that will bring a large portion of the increased number of people to be in southwestern Colorado during the coming summer through this section on at least one stage of their journey to the park. We have all natural attractions—plus. We must tell others about them or we will miss a large share of an increasing and profitable summer business.—Silverton Standard.

VOLUNTEER WORKERS BUILD SPLENDID ALL-WEATHER ROAD

An example of what may be accomplished by a small group of determined land owners is found in two miles of gravel surfaced roadway near Windsor. This was a poor piece of road that since has been made good through community co-operation. The stretch of road runs from the Cody Powers corner south to the river. In commenting on the improvement, the Poudre Valley (Windsor) says:

The improvement of this road will do much to facilitate the operation of School Bus No. 5. It will also materially reduce the expense of operating the bus, and will assure continuance of the milk route, which is considered one of the best of the routes serving the Johnstown condensery. Continued patronage of this route will put many more dollars into the farmers' pockets and eliminates two of the unpleasant jobs connected with dairying, namely, turning and washing the separator.

The Bulletin Board

FIRST KOEHRING DRAGLINE NOW IN USE ON DENVER SEWER JOB

About four years ago the Koehring Company of Milwaukee, Wis., started the manufacture of gasoline driven draglines. And being proud of its reputation as builders of quality products, the first three of these machines were put on tests in various parts of the country.

After correcting several defects which had developed during these tests, the first machine was actually sold to the Whitney Construction Corp., thru H. P. Wilson & Co., of Denver, distributors. This machine was placed on a large drainage contract near Alamosa in the San Luis Valley. The Whitney Corp. is a subsidiary of R. M. Ammerman, Inc., of Wichita, Kan.

For over a year the machine was used in the San Luis Valley, moving over 250,000 yards of dirt. Then it was moved to a drainage project near Ordway, where an equal amount of dirt was moved.

The machine was purchased by the Western Paving Corp., of Denver, and is at present being used on a large sewer contract for the City of Denver.

"To date Old No. 1, as we call 'her', has moved nearly a million yards of dirt, and she's still going strong," said Operator Schmucker. "At times we have worked the machine two and three shifts per day."

Mr. Schmucker has operated the machine since the day it went on the first job nearly three years ago.

ADAMS REBUILDS PLANT

J. D. Adams & Co., Indianapolis, Ind., manufacturers of Adams adjustable leaning wheel graders, report that the portion of their manufacturing plant which was burned on Feb. 1 has been entirely rebuilt and that their production is again in full swing. At the time of the fire the company was fortunate in having sufficient finished stock in its warehouses over the country to take care of the demand during the reconstruction period, and now that production is back on a normal basis, continued prompt shipment of all orders is assured. The rebuilt unit is larger than the one destroyed and with the installation of the most modern equipment and methods in the new plant, the capacity has been greatly increased. Other building operations in process or planned for completion this year will practically double the capacity of the entire plant as it stood before the fire. The expansion, the company announces, is to keep pace with the sales organization, which was enlarged this year, and the constantly increasing sales of Adams products, particularly leaning wheel graders.

AUSTIN LEANING WHEEL

Austin Manufacturing Company are now building Leaning Wheel Graders in addition to their Standard Rigid Wheel Austin Graders, this leaning wheel feature on their different size machines. The front wheels work together as far as the leaning feature is concerned and the rear wheels work independent of each other. The controls for operating these wheels are on the grader operator's platform.

The rear axle on the Austin machines instead of being in one piece, is in two pieces so that you can lengthen or shorten the rear axle at will. All the wheels are fitted with Timken roller bearings and the whole unit is Alemite greased.

PORTABLE SCRAPER UNIT

In response to the demand for a portable scraper outfit to be used with the larger portable crushing and screening outfits now on the market, Sauerman Bros., 438 South Clinton St., Chicago, have brought out a new ¾-yd. size machine. The new unit consists of a ¾-yd. "Crescent" scraper bucket, operating cables, all necessary guide blocks, bridle anchorage system, and portable hoist. It is furnished with a 35-hp. Sauerman gasoline hoist, 25-hp. Sauerman electric hoist, or Sauerman belt hoist, designed for operation by a 25-hp. electric motor or tractor.

The new Sauerman portable scraper outfit is designed to reduce the cost of sand and gravel for operators of small commercial screening plants, and for contractors, county and township road commissioners who utilize local pits in connection with their construction work. The new outfit has also proved its efficiency in making highway cuts and fills and in storing and reclaiming gravel, crushed stone, etc.

It is a simple matter to install and to run one of these machines. An inexperienced man readily becomes skilled in the operation, as all he has to do is handle the two levers of a double-drum hoist.

SANFORD BUYS RESORT

H. G. Sanford has resigned his position with the Stearns-Roger Mfg. Co., effective July 1. Sanford recently purchased Dolloff's Resort hotel on the Colorado River at Parshall, and hence will become a hotel proprietor. For the past two years Sanford has handled sales of contractor's equipment for the Stearns-Roger Co. He has contracted for the construction of twenty-five cabins on his place at Parshall. He owns two miles of land along the stream, with unexcelled fishing.

TWO MARIONS AT PUEBLO

Two Marion steam shovels are being used on the Pueblo Conservancy project by Platt Rogers of Denver. The machines, equipped with 1¾ and 1¼ buckets, were sold thru H. W. Moore & Co., Pueblo branch. Four Cedar Rapids one-piece crushing and screening plants were recently sold to New Mexico contractors and the highway department of that state by the Moore concern.

NEW NOVO DRAGLINE HOIST

Bulletins announcing a new Novo Dragline Hoist are being distributed by the Stearns-Roger Mfg. Co., Colorado distributors. This hoist is built especially for gravel pit work. It comes in two sizes—one for half-yard scraper and another size big enough for one-yard scraper.

It is announced that the Stearns-Roger firm are now distributors for the products of the Bay City Foundry & Machine Co., of Bay City, Mich. These include drum winches of various sizes and heavy-built truck cranes.

The above is a picture of the first dragline sold by the Koehring Co. It is a No. 2, caterpillar type, and is being used on a large sewer project in Denver, laying 66-in. concrete pipe.

BIDS RECEIVED

Proj. No.	Length	Type	Location	Low Bidder	Bid Price
245-B	2.711 mi.	Grading	Hadley, East	W. A. Colt & Son, Las Animas	$21,680.00
281-A	1.249 mi.	Paving	Lafayette, South	Sims & Boston, Denver	55,373.00
281-B	3.068 mi.	Paving	So. of Longmont	J. Finger & Son, Denver	102,502.40
116-C	3.163 mi.	Paving and Bridge	North of Breed	LaNier, Selander & White, Ft. Morgan	139,038.45
273	4.047 mi.	Grav. Surface	East of Lamar	W. A. Colt & Son, Las Animas	42,305.30

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

Proj. No.	Length	Type	Location
210-B	7.507 mi.	Gravel Surfacing	Between Grand Valley and DeBeque
262-A	2.059 mi.	Gravel Surfacing	West of Walsenburg
269-A	2.172 mi.	Surfacing	Cortez, East and North
272-B	12.920 mi.	Surfacing	Otero-Pueblo Counties Line, West
275-A	7.008 mi.	Paving	Castle Rock-Gann
279-A	1.439 mi.	Paving	Denver, Southwest Toward Morrison

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

Proj. No.	Length	Type	Location
2 R. Div. 2	3. mi.	Paving	North of Trinidad
213-A	2. mi.	Grad. and Surf.	Hesperus-Mancos
262-B	0.2 mi.	Bridge	Alamosa, East
262-C	3. mi.	Grav. Surf.	La Veta Pass, West
267-A	3. mi.	Grav. Surf.	Hochne, Northeast
272-A	0.2 mi.	Steel Bridge	Apishapa
276	0.2 mi.	Overhead R.R. Cross.	North of Colorado Springs
277-A	4. mi.	Paving	South of Colorado Springs
278-A	5. mi.	Sand-Clay Surf.	Cheyenne Wells, East and West
279-B	6. mi.	Graded	Conifer, South
286-A	0.2 mi.	R. R. Grade Sep.	Between Nunn and Dover

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1923

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
2-R	Trinidad, north	3	mi. Asphalt Pavemt.	Strange-Maguire Const. Co.	$121,934	56	2-R
17-R	Breed-Husted	2.339	mi. Conc. Paving	LaNier, Selander & White	81,399	12	17-R
102	Ouray-Red Mountain	1.06	mi. Mtn. Grading	Johnson & Johnson	58,972	86	102
116-A	Colorado Springs paving	4.18	mi. Conc. Paving	Standard Engr. & Constr. Co.	238,944	75	116-A
116-B	Breed-Husted	0.892	mi. Conc. Paving	J. L. Busselle & Co.	51,001	11	116-B
119-B	Cochetopa Pass	7.5	mi. Grad. & Surf.	Girardet-Hotchkiss Engr. Co.	53,709	100	119-B
125	Sapinero-Cimarron	11.3	mi. Grav. Surf.	Dale Hinman	36,797	47	125
125	Sapinero-Cimarron		Steel Bridge	Winterburn & Lumsden	53,072	100	125
135	Denver-Morrison	5.3	mi. Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	32	135
157-B	Buena Vista-Leadville	4.20	mi. Grading	J. V. Stryker Const. Co.	65,715	87	157-B
168-B	Lamar-Hasty	6.86	mi. Gravel Surf.	Standard Engr. Co.	60,194	100	168-B
174	Red Mountain	3.03	mi. Mtn. Grading	Pickering Bros.	82,071	84	174
190	Summit County Bridge and Road	1.45	mi. Grad. & Bridge	Colo. Bridge & Constr. Co.	40,154	82	190
207	Dillon-Kremmling	100	ft. Truss Bridge	Rogers & Pickard	28,831	59	207
213-B	Durango-Hesperus	5.26	mi. Grav. Surf.	J. Edd. Hansen	72,960	65	213-B
214	Durango-Bayfield	3	mi. Gravel Surf.	Dale Hinman	53,411.05	82	214
221	Loveland, north	4.05	mi. Conc. Paving	Fred C. Dreher Constr. Co.	142,125	100	221
222-C	Broomfield-Lafayette	2.82	mi. Conc. Pavement	R. M. Larsen	134,933	39	222-C
223-A	Kremmling-Rabbit Ear	2.88	mi. Grav. Surf.	Henry Shore	30,565	52	223-A
224	Morrison-Bailey	5	mi. Grading	M. J. Kenney Const. Co.	59,781	56	224
225	Fitzsimons Hospital road	1.00	mi. Bit. Paving	Miller, Douglas & Hanes	36,618	100	225
226-A	Brighton-Ft. Lupton	8.23	mi. Conc. Paving	White & Johnson	241,133	100	226-A
226-B	Brighton-Greeley	2.86	mi. Conc. Paving	White & Johnson	89,993	66	226-B
226-C	Platteville-Greeley (Div. 1)	4.4	mi. Conc. Paving	Engr. Const. Corp	120,114	72	226-C
226-C	Platteville-Greeley (Div. 2)	6.335	mi. Conc. Paving	J. Fred Roberts & Sons	175,647	28	226-C
230-A	Wolhurst, south	0.852	mi. Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	46	230-A
230-B	Wolhurst, south	3.99	mi. Conc. Pavement	Brodie & Anderson	153,971	56	230-B
231	Six Mile Creek Bridge	0.45	mi. Steel Bridge	McCormick & Brockaway	25,165	100	231
240	Gypsum-Dotsero	5.185	mi. Gravel Surf.	O. L. Hackett	66,178	41	240
242-A	Grand Junction-Fruita	7.703	mi. Gravel Surf.	Dale Hinman	81,255	0	242-A
243-A	Bayfield-Pagosa Springs	1.6-	mi. Gravel Surf.	Shields & Kyle	48,311	14	243-A
245-A	Las Animas-Hadley	4.54	mi. Gravel Surf.	W. A. Colt & Son	42,786	100	245-A
246-A	East of Pueblo	2.537	mi. Conc. Paving	R. A. White	78,431	35	246-A
246-B	Vineland-Pueblo	0.787	mi. Conc. Paving	W. A. Colt & Son	29,453	76	246-B
247-A	Rocky Ford-Swink	1.329	mi. Conc. Paving	J. Finger & Son	41,369	76	247-A
248-A	Buena Vista-Salida	12.	mi. Grading & Surf.	Western Const. Corp.	93,533	4	248-A
251	Lafayette-Boulder	1.1	mi. Conc. Paving	J. Fred Roberts & Sons	32,670	75	251
252	Loveland-Berthoud	3.2	mi. Conc. Paving	F. C. Dreher Const. Co.	84,676	33	252
253-A	Steamboat Springs, west	6.50	mi. Gravel Surf.	Northwestern Cons. Co.	126,374	9	253-A
254-A	Byers Canon	1.057	mi. Grading	Pioneer Const. & Engr. Co.	72,408	1	254-A
255-A	Ft. Morgan-Brush	2.70	mi. Conc. Paving	Colo. Bridge & Constr. Co.	85,763	82	255-A
255-B	Brush, west	2.944	mi. Conc. Paving	W. F. Pigg & Son	92,486	1	255-B
256-B	Merino, northeast	2	mi. Conc. Paving	W. F. Pigg & Son	53,702	7	256-B
257	North of Denver		Conc. Viaduct	C. C. Madsen	12,178	60	257
258-A	Gunnison-Sapinero	3.239	mi. Gravel Surf.	R. P. Morrison	34,900	1	258-A
266-A	Durango, south	3.03	mi. Gravel Surf.	Mishon, Engler & Teyssier	22,233	11	266-A
283-A	Loveland-Berthoud	2.530	mi. Conc. Paving	F. C. Dreher Const. Co.	84,829	2	283-A

HARD SERVICE

Did not affect these

KEYSTONE KEYSTONE COPPER STEEL CULVERTS

COLORADO STATE HIGHWAY No. 1
Pueblo County.

Three 48" diam. Keystone Culverts, 30 feet long, installed in September, 1916. They have been in this alkali swamp nearly eight years, and are in just as good condition as when first placed there.

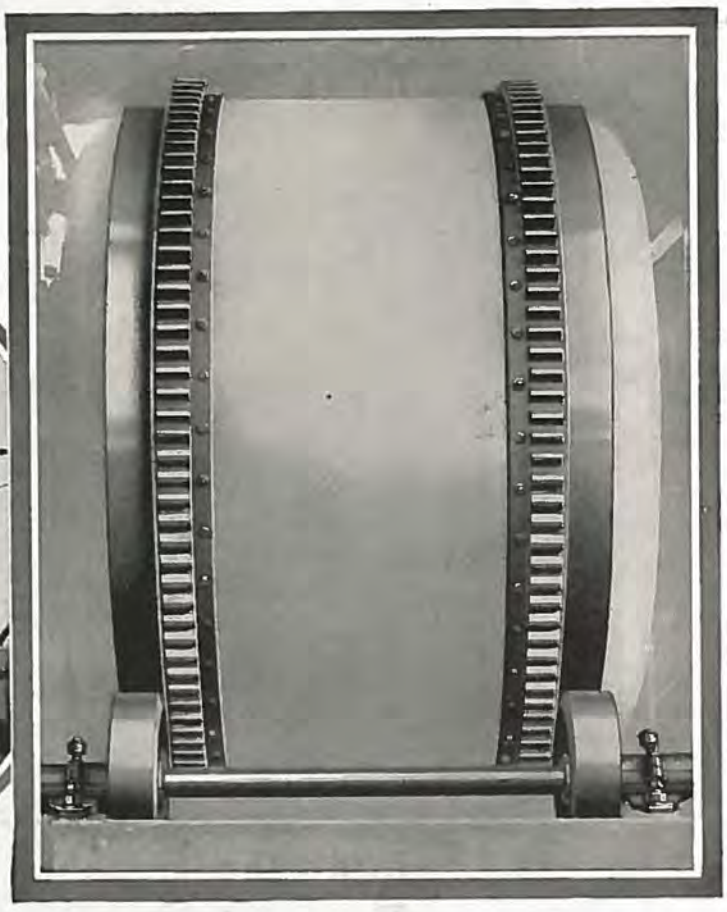
The

Colorado Culvert & Flume Co.

PUEBLO

We Use KEYSTONE Only---Because it is Best!

KOEHRING



Besting Wabbly Rollers

IF they wabble they throw moving parts out of alignment, cause crystallization, wear and breakages in every part of the mixer.

They *will* wabble sooner or later unless they are spaced wide apart to receive the direct load of the drum as aggregate shifts from end to end — unless they have a type of bearing that equalizes the wear over the full face of the bearings.

Koehring placement of drum rollers, and Koehring drum roller bearings, (the freight car truck type) together with the smooth rolling action of Koehring double drum gear drive do away with the greatest cause of breakages and depreciation at the source—wabbly rollers. *Koehring Heavy Duty construction* means trouble-free, longest service life.

Capacities

Pavers—7, 10, 14, 21, 34 cubic feet mixed concrete. Regular steel wheels or solid rubber tires; half or full length multiplanes. Boom-and-bucket or spout distribution. Double adjustable derrick on 21 E and auxiliary water tank on 21 E and 32 E if desired. Batch meter.

Construction Mixers—10, 14, 21, 28 cubic feet mixed concrete. Skids, or trucks with rubber tires optional. Power charging skip. Charging chute or batch hopper.

Dandie Mixers—4 and 7 cubic feet mixed concrete. Regular steel wheels, disc wheels with rubber tires, or flanged railroad wheels. Charging skip or low charging platform and hopper. Light duty hoist. Mixes mortar as well as concrete.

Write for Catalog P 15

KOEHRING COMPANY

PAVERS, MIXERS, CRANES, DRAGLINES, GASOLINE SHOVELS

MILWAUKEE, WISCONSIN

Sales Offices and Service Warehouses in all Principal Cities

H. P. Wilson & Co., Sales Representatives

17th and Blake Sts., Denver, Colo.

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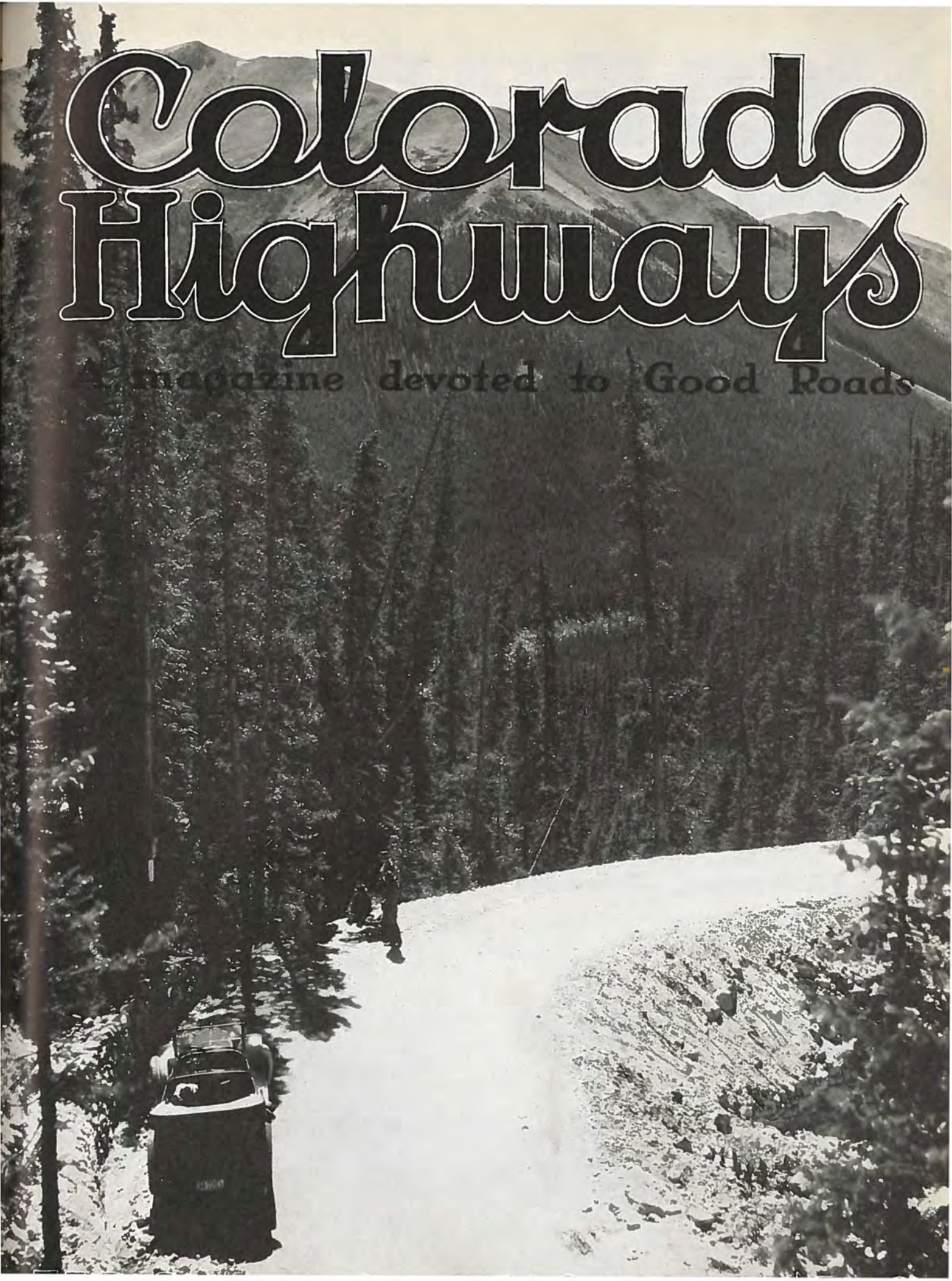
Colorado Highways

A magazine devoted to Good Roads



KOEHRING

Gasoline Shovel

Crowds Beyond End of Boom

WITH the short boom, and long sticks it can work in close quarters with low headroom, long reach and high lift. Likewise it racks way in—giving an extraordinary range of dipper travel.

The Koehring crowding action is absolutely independent of any other function—is accomplished by cables attached to opposite sides of reversing forward drum on the machine, leading down around fleeting sheaves at boom axis point and then to opposite sides of drum on shipper shaft. Automatic adjustment keeps cables taut at all times. Boom may be raised or lowered without tightening or loosening cables.

Heavy Duty! A Big Koehring Value.

Not a phrase or a slogan, but an extra margin of strength—reliability in every detail. It means trouble-free operation—less depreciation, and longest service life.

The Koehring shovel is not merely a steam machine powered with a gasoline engine, it is strictly designed for internal combustion engines, which means greater efficiency and durability.

KOEHRING COMPANY
MILWAUKEE, WISCONSIN
PAVERS—MIXERS—GASOLINE CRANES, DRAGLINES AND SHOVELS
Sales Offices and Service Warehouses in Principal Cities

H. P. WILSON & CO.
SALES REPRESENTATIVES
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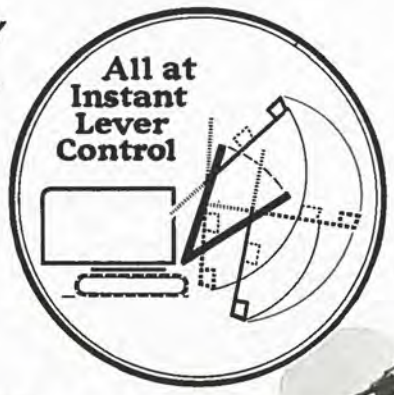
DENVER, COLO.



Shovel Capacities

No. 1—⅝-cu. yd. dipper, water measure, or ¾-cu. yd. dipper, heap measure, on 18 ft. 6 in. boom with 14 ft. dipper stick; 4-cylinder, 5x6 in. gasoline engine, 1000 R. P. M.

No. 2—1 1/16 cu. yd. dipper, water measure, or 1¼ cu. yd. dipper, heap measure, on 20 ft. 6 in. boom, with 16 ft. dipper stick; 4 cylinder, 5 ¾x7 in. gasoline engine, 925 R. P. M.

Write for Koehring Gasoline Shovel Bulletin No. S-15

Note how Bucket Reaches beyond Boom

A2263—I

Colorado Highways

"BETTER ROADS"

Official Publication of the
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

Published Monthly by the
COLORADO HIGHWAYS PUBLISHING COMPANY,
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M. W. BENNETT, Editor.

Articles on the subject of road building and highway development in the West are solicited. Manuscripts should be addressed to the Editor, with return postage. Photographs should accompany articles whenever possible. Manuscripts not found available will be returned promptly.

10 CENTS A COPY. **$1.00 A YEAR.**

OUR COVER PICTURE

A glimpse of the world-famous Berthoud Pass road is shown on the cover of this month's Colorado Highways. This road was constructed at the joint expense of the State and Federal government. Berthoud Pass is a link in the Victory Highway and is traveled by thousands of motorists from all parts of the country during the summer months. At present it is so smooth and well-maintained that a large number of cars pull it on high gear. In the winter ten feet of snow covers the roadway. This is removed by a special rotary plow early in the spring by state maintenance forces.

—Photo by courtesy of Denver Tourist Bureau.

Colorado Highways
"BETTER ROADS"
VOLUME III. AUGUST, 1924. NUMBER 8

On the Trail in Colorado

By JOSH WILSON
City Editor, The Denver Express

WESTERN Colorado is built on end. The mountains out there are higher than any mountains in the world. The water runs up hill. Downgrade is up. Up hill is going down. Rains fall from cloudless skies and the fish swim backward.

I have seen these things myself. Bob Higgins, superintendent of the state highway department of maintenance, says I am the victim of optical illusions. D. L. Stacklebeck, the world-famous reporter, allows I know nothing of geology and that my physics is a joke.

Stack says nature on the western slope follows the same laws she does anywhere else.

I know better. Higgins and Stack can't fool me.

I have just completed a trip of more than 1,300 miles through the western part of Colorado and have seen for myself these phenomena.

I was induced to make the trip by Stacklebeck, Higgins and Jodey Bennett because they wanted to scare the life out of me.

They scared me within an inch of my life but I am here to tell the tale solely because Colorado has built a system of mountain highways that would have made Julius Caesar's best efforts look like those of a blundering amateur and should cause the venerable eastern states to hang their heads in shame.

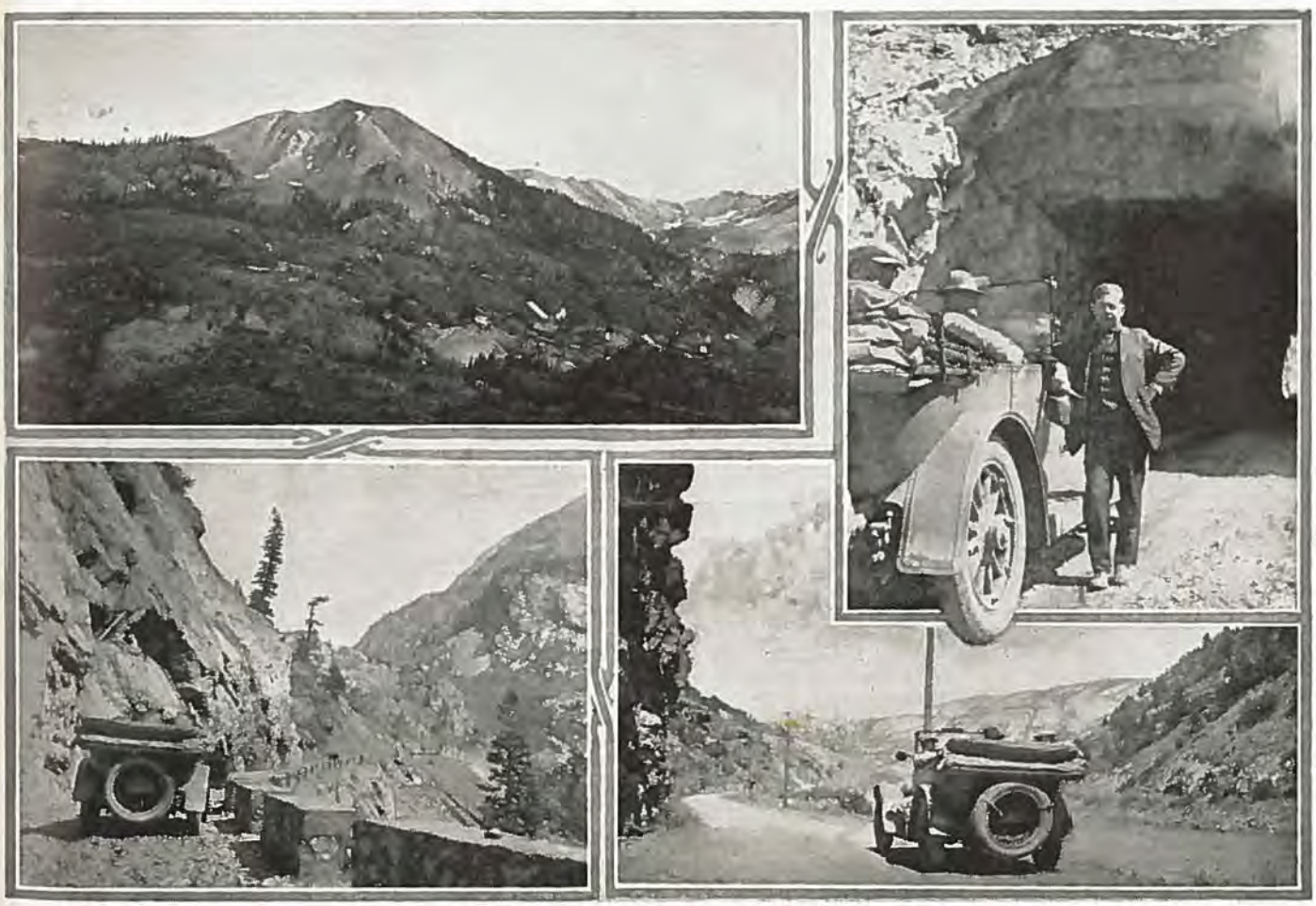
Flawless roads, 24 feet wide, according to federal specifications, have been built into inaccessible wilds. Tunnels have been drilled through the impenetrable rock. Indestructible mountains have been blasted away, in order that the tourist may speed his carefree way, unhindered by precipitous heights or rocky going.

Through regions through which the hardy pioneer required weeks of travel, the modern motorist makes in 20 minutes by the clock.

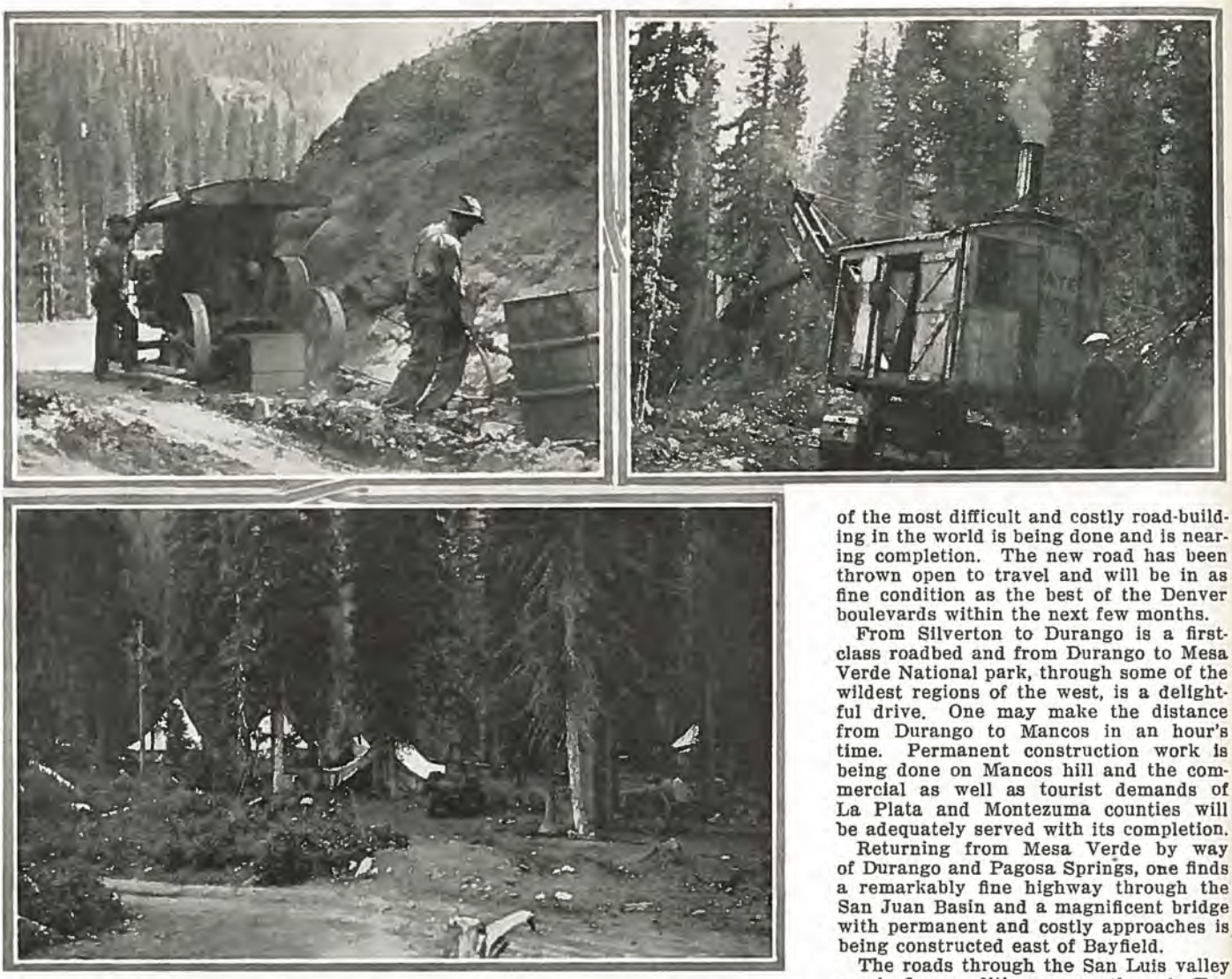
The competent motorist may make a trip through western Colorado and get more thrill to the square mile than in any other region in the world.

And all he needs is a cool head, a clear eye and his brakes in first-class condition to make the trip with less danger than he will encounter in a half-mile spin over a paved road in Indiana.

Of the 1,300 miles of my trip I found



Upper left—Red Mountain as viewed from Ouray-Silverton road. Lower left—Concrete-rock wall above Bear Creek Falls. Upper right—The author poses for a snapshot for the "home folks." Lower right—Glenwood canon, showing boulevard road.



Upper left—Compressor and drill at work on Wolf Creek Pass. Lower left—State road camp on Wolf Creek Pass. Upper left—State steam shovel widening west side of Wolf Creek Pass road.

less than 20 miles of roadway that was not in first-class condition. And the rough going all was where construction work was in progress.

The highway from Denver to Craig, over Berthoud Pass, through Steamboat Springs and into Routt and Moffat counties, a distance of more than 200 miles, may be traveled with ease in 10 hours time. Back from Craig, through the Aixel basin, Meeker, Rifle, Glenwood Springs and to Leadville, is a day's journey, giving the traveler time for brief stops and for his meals, completing the journey between sunrise and sunset.

Tennessee Pass, in Eagle county, between Glenwood Springs and Leadville, could bear up under a little well-directed energy on the part of the local authorities in the direction of road-building, but it is negotiated safely every day by numerous flivvers and hundreds of automobiles and though difficult, is not dangerous.

Some of the state's most marvelous road-making has been done at Gilman, where an immense zinc mine is being operated.

We skimmed around the edge of Battle Mountain and I can testify that the distance from the highway to the D. & R. G. W. tracks below is at least 20 miles of sheer descent.

I measured it with my eye, just before I fainted.

Higgins says I am wrong. He says it is only a trifling drop some 2,000 feet or thereabouts. He lacks imagination.

One hundred tons of TNT were required to blast out the side of Battle Mountain in order to save the motorist a ten per cent grade.

The surface of the Glenwood Springs road, with the exception of a short stretch through Eagle county, has been perfected and is excellently maintained.

The road through Leadville to Gunnison, through Buena Vista and Salida, is perfect. From Gunnison to Montrose the road is fine, except between the wonderful Sapinero bridge and Cimarron, over the Blue Mesa, where construction work is being done. Though this stretch is somewhat rough it is passable. A fine highway confronts the motorist from Montrose to Ouray, where the famous Million-dollar Durango-Silverton Ouray scenic highway begins.

Over this marvelous thoroughfare some of the most difficult and costly road-building in the world is being done and is nearing completion. The new road has been thrown open to travel and will be in as fine condition as the best of the Denver boulevards within the next few months.

From Silverton to Durango is a first-class roadbed and from Durango to Mesa Verde National park, through some of the wildest regions of the west, is a delightful drive. One may make the distance from Durango to Mancos in an hour's time. Permanent construction work is being done on Mancos hill and the commercial as well as tourist demands of La Plata and Montezuma counties will be adequately served with its completion.

Returning from Mesa Verde by way of Durango and Pagosa Springs, one finds a remarkably fine highway through the San Juan Basin and a magnificent bridge with permanent and costly approaches is being constructed east of Bayfield.

The roads through the San Luis valley are in fine condition, as are those in Fremont and Park counties.

A rough stretch of highway in the vicinity of Conifer is being rebuilt and a flawless roadbed on this important thoroughfare may be expected within another year.

Despite problems of engineering, construction and maintenance not encountered in a similar area in the world, the state's highway program is being carried out to a degree that is realized by few residents of Denver and the eastern slope.

Although 90 per cent of the autos in Colorado are owned east of the continental divide, many highways in the extreme western part of the state are equal to those of Denver's mountain parks.

Berthoud Pass Road Is Perfect

Berthoud Pass, at an elevation of 11,300 feet, affords a faultless stretch for the motorist. It is wide, perfectly maintained and has a grade of not more than five per cent in its steepest incline. It gives the traveler just out of Denver a thrill that is probably not inspired by any view between Colorado and the Alps.

Craig Highway Well Traveled

Craig, near the oil wells of Moffat county, is being visited by scores of Denver autoists daily. Naturally, considerable dust is encountered, but the road is well graded and maintained.

(*Continued on Page 11*)

A picturesque scene on Independence Pass.

Independence Pass Highway

Travel next summer will commence over the Independence Pass highway, and it is looked for hundreds of tourists to pass through Aspen each week to take advantage of the wonders of Nature as are seen on this route. This road crosses the Continental divide at an altitude of 12,500 feet, and three miles of road on top gives a view of range flanking and a panorama that is unequaled on the face of the earth.

For eight and one-half miles out of Aspen the Government has completed a 17-foot boulevard, and, with additional work each year, will continue this greatest of mountain roads over the summit and down to Twin Lakes, the beauty spot of the mountains.

The road follows, to a great extent, the old stage route over which the staunch pioneers rolled in mountain coaches pulled by sixes seeking the valley of the Indian's happy hunting ground, which is now the little city of Aspen. Along the route the vivid and many shades of green given by Nature to these hills is a scene of beauty equaled only by the many pretty and picturesque spots of the Roaring Fork river, such as the Devil's Punch Bowl, Stillwater and many other enchanting places. Along the route is seen the famous Grottoes, one of the wonders of the Western Slope. In due season one is privileged to pick flowers and wild strawberries and raspberries, and by going but a short distance, may engage in a snowball fight as a matter of diversion. Truly, a trip over the Independence Pass is like a trip through Paradise, and one that is never forgotten. For those who can see the beauty in a passing cloud mingled with the wonders of Nature, this route offers a tonic equal with drinking the waters from the spring of eternal youth.

Along the Independence Pass route one sees the vast granite deposits where unshattered granite of many colors, including pure white, stands ready to be quarried. The granite and marble deposits of Pitkin county offer untold wealth that in time will equal the mineral wealth taken from the hills.

Surely no place can boast of so many natural resources as the County of Pitkin, and the way is now being paved for complete development along all lines.

The Roaring Fork valley has many large and paying farms, and the herds of pure bred cattle now in existence are not surpassed in the entire West.

Soon Parted

At the grade crossing the fool and his car are soon parted.

COLORADO

By Warren E. Boyer.

Skyland of the nation, where majestic snow-veiled Rockies beckon the wanderer to trout-filled streams in balsam-scented forests; Aladdin's dreamland come true, in the magic of cosmopolitan cities that rear their lofty towers where Utes and Arapahoes once pitched their tepees; memories of the lure of gold, and the winding trails of prospectors since fashioned into scenic wonder ways or matched by rails of steel; hub of the West's supply and demand; mid-continental area of a thousand delights and as many opportunities; haven of recreation, rest, health; romance-land of superb sunsets mellowing a nation's playground; sand dunes, glaciers, boiling springs, curative waters, bottomless lakes; unequaled journeys to canyon cliff-dweller ruins of prehistoric peoples, and to charming resorts in cloudland's domain; vast expanses of plainsland where buffaloes roamed, yielding bountiful crops through diverted waters that come rushing from rainbow-tinted canyons; unexcelled climate, with sunshine-tempered days for ideal ski frolics in winter and snow-cooled mountain breezes for refreshing vacations in summer—this is Colorado, land of enchantment, known throughout the world for its distinctive invitation of western welcome: "Come Up!"

Bridge reconstructed by North Carolina Maintenance Forces.

North Carolina Invests $76,000,000

By FRANK PAGE,
Highway Commissioner of North Carolina
(Reprinted from Manufacturers Record)

THREE years ago this month the North Carolina Highway Commission, acting under the mandate from the General Assembly, set out to "bankrupt the State," plunge it so deep into debt that the great-grandsons of the men responsible for the nefarious undertaking would be leaving the State to escape the grievous burdens of taxation inherited from their misguided and foolish forbears.

Under an act passed with almost direful unanimity by the General Assembly, $50,000,000 had been appropriated for the construction of a system of roads, a sum of money fifteen times greater than all the debts accumulated in the eighty years since Andrew Jackson had distributed a Federal surplus among the states and taught the states extravagance, and with only the frailest of machinery for financing.

Already the State was in the throes of an economic depression the like of which had not been witnessed since the days of the panic of 1893, which, as panics go in North Carolina, is the classical standard of comparison. The deflation that set in during the early fall of 1920 had brought almost complete stagnation in May, 1921, and to it the General Assembly would add an abysmal debt of $50,000,000. Not only would the debt and consequent taxes be ruinous—the building of roads would further induce the population of the State to demoralization and frivolous practices which arose out of the war. With paved roads the people would be given utterly to what was then called "joy riding." Such business as remained with its head above the troubled economic waters would be swamped utterly. It was a dismal picture. It was dismal, that is, to the opponents of the measure that had been passed overwhelmingly in both houses of the General Assembly. All these things had been pointed out by those who felt impelled to warn the people of the impending disaster. There was not much oratory on behalf of the proposal to use the State's credit to construct and maintain a State system of roads. Faith has never produced many great orations, but it does inspire work.

North Carolina had never done $50,000,000 worth of anything at one time in its history. Back of 1921 there were 132 years of conservative history and a modesty in the matter of public expenditures that kept it down among the forties in the matter of taxes paid for the maintenance of public institutions and utilities. But something had got into the State's blood in the spring of 1921, and North Carolina took matters in hand. The Highway Commission took the $50,000,000 and set about spending it. Two years later another General Assembly, with less than an hour's discussion—and then chiefly as to whether the contemplated amount was sufficient—added $15,000,000 to it. Federal aid funds and funds donated by counties amounted to $11,000,000 during the 3-year period. Altogether, the State has spent $76,759,228.

With that money the State Highway Commission has bought 3,682 miles of road, 1,448 miles of it paving and 2,234 miles of other types, and bridges costing $2,711,996. Viewed from another quantitative angle, it has bought 86,880 carloads of crushed stone, 44,784 carloads of sand and 21,720 carloads of cement, or altogether approximately 5,818,160 tons of road-building material. For those whose minds are impressed by such figures, the train carrying that quantity would be approximately 1,597 miles long.

And has it paid?

Who may set the value upon the construction of a system of roads in a Commonwealth? Has the state gone bankrupt? Has it repudiated its obligations? Have any of its citizens fled the state to escape the ruinous extravagances of taxation? Have its citizens given themselves without restraint to heedless joy-riding? Have business and industry generally deteriorated to the point of dissolution? Have the roads paid?

Any answer to the question of whether the investment has paid must be more or less theoretical and a matter for argument. It is answered fully enough in the fact that the tribe of the calamitous who looked for dissolution has itself been swallowed up in silence. The faith of the General Assembly has been generally justified. Argument there may be about it, but there can be no argument about the amount of gasoline an automobile burns. In 1920, before the state took over its system of roads, the average automobile in North Carolina burned 520 gallons of

A typical gravel road in Harnett county.

Before and after redemption—Alleghany county, N. C.

gasoline. In 1923 the average automobile burned 446 gallons of gasoline. At an average cost of 25 cents per gallon the saving per car was $18.50. At the end of 1923 there were 226,000 passenger automobiles and 21,000 motor trucks in the state. Altogether they burned 110,332,300 gallons of gasoline. Compared with the consumption three years before, per car, the saving for the entire 247,000 automobiles and trucks in North Carolina was $4,619,500, or somewhat more than enough to pay the interest and the sinking on the entire $65,000,000 in bonds issued for the construction of roads.

The figures can be applied only in a general way. At the end of the year not much more than half of the program contemplated in the $65,000,000 expenditure had been completed. The remainder of the system was under the maintenance supervision of the commission and not all of the mileage was made on state highways. At any rate, with the program only half complete, the saving was apparent and to my mind convincing proof, if any were needed. It will not be argued that the deterioration of an automobile and its tires is greater on a paved or improved road. The upkeep saving is purely a speculative matter, but it will be conceded that any automobile will last longer when driven over a good road than it will when operated over the types of road that used to be in North Carolina. The saving on that score, however, cannot be computed or estimated.

But there is no argument about it in North Carolina. **The people have spent their money and they are satisfied with the results.** The state has a system of roads, approximately 6,180 miles in length, with 60 per cent of it rebuilt outright in operations complete or under construction, and the remainder of the mileage giving year-round service under the maintenance system. These are the available and apparently conclusive facts, unless there are those who would argue that automobiles run less miles on good roads than they did on indifferent roads, with a consequent economy in gasoline. There are other fact phenomena that might be brought forward to prove that the roads are worth all they cost, but **the most conclusive argument is that the people who are paying for them are satisfied with them.**

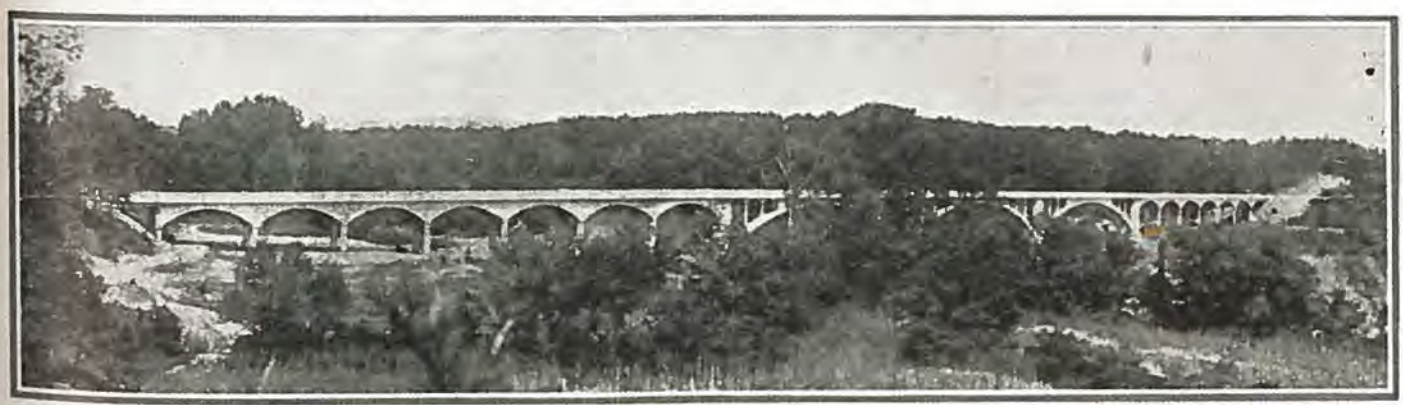
And then there are the intangible values. The editor of the Manufacturers Record has said that North Carolina is the most prosperous state in the Union, making relatively greater agricultural, industrial and educational progress than any other state. The truth of this statement is cheerfully admitted without qualification. We may have boasted mildly about it in the past two or three years.

Casual reference to the literature of any of the chambers of commerce of the state will establish the fact that in North Carolina there are longer rivers, wider bays, bigger tobacco factories, bigger cotton factories, bigger furniture factories, bigger peach orchards, bigger and newer schoolhouses, more school trucks, and several other miscellaneous bigger things, all operating every day. They are all here. We have built roads over and under and around and through all of them, mountains, rivers, tobacco fields, peach orchards, and in one instance we had to float a road three miles long over one of the sounds. They are all here, and all of them have been touched by this road system. None need rush to the conclusion that the road system is responsible for their being here. Many of them were here first, and they are all flourishing, even the mountains.

Three years ago the state hit bottom. Resources of the banks dropped 50 per cent. Factories here, as well as elsewhere, were closed. North Carolina had a problem on its hands that it has rarely had in this generation—the employment problem. The depression was partly psychological. People were, as they say, "blue" to the hue of indigo. Stark ruin stared the state in the face, and largely because of the psychological depression. The groundwork of the state highway system had been laid before the depression swept over the Commonwealth in 1920, and it went over its own momentum. The passage of the measure was a chal lenge to the nine men named on the Highway Commission by Governor Morrison, a challenge they accepted quietly at the first meeting after they were inducted into office early in May, 1921. Within a month the first of the $50,000,000 bond issue was sold and the money was in North Carolina banks.

It is a curious thing what a little money can do. Those first few millions, trifling compared with the resources of the banks, put heart into the state. The sky didn't fall when the Governor went off and borrowed the money. Before many weeks the work was under way. Several hundred men were put to work. As months went by others were put to work and more money was brought in. Before fall the state was coming out of its panic, and things were moving along to normal, several laps ahead of the rest of the country.

(*Continued on Page 16*)



Swift Island Concrete Arch bridge.

View of State Highway west of Colorado Springs.

Mountain Roads Pay Dividends

DO mountain roads pay? This is a question sometimes asked by those interested in the construction of a modern highway system in Colorado.

The answer to the question seems to be found in the Pikes Peak toll road. It is said that the corporation which operates this highway pays big dividends.

A group of capitalists headed by Spencer Penrose of Colorado Springs have asked for bids for the construction of a scenic highway to the summit of Cheyenne Mountain. The length of the road will be six miles and the estimated cost is $350,000.

The Pikes Peak auto road, constructed several years ago, cost to build $500,000. It is eighteen miles in length. Wages of labor were much lower at that time than now.

During the past few years thousands of persons from all parts of the world have visited Pikes Peak, and the auto highway has been a means of gaining more publicity for Colorado than any other single project in the state. This road is known all over the world and is regarded as one of the greatest road engineering feats in the country.

Since the Pikes Peak road was completed the state and the U. S. government have constructed roads over five of the main mountain passes in the state, all over 10,000 feet in elevation, and bringing into close touch with the centers of population scenery the equal of the Pikes Peak region. However, these roads were not intended as scenic routes, but have been built for commercial purposes.

By the end of the present construction season it is expected that two additional roads crossing mountain passes at high altitudes will be completed. These are the new roads over Cameron Pass in the northern part of the state, connecting the Poudre canon highway with the roads into the North Park country, and the Cumbres Pass highway, extending into New Mexico and forming a new route to the Mesa Verde national park. The latter road opens up an entirely new recreational area in the southern part of the state.

Formerly these roads were trails used by the early pioneers with pack trains. Today the smallest cars easily negotiate them. Some of them have been blasted from solid granite and converted into smooth automobile boulevards.

During the past month a party of motorists made a trip of 1,200 miles over the state, crossing five of the mountain passes over the Continental Divide, including Berthoud, Rabbit Ears, Tennessee, Monarch and Wolf Creek. On only one of these pass highways did the party find roads not equal to or superior to the streets of most cities.

Automobiles bearing license tags of nearly every state in the Union were met on this trip. At the summit of one of the passes six cars from as many different states were seen. The owners of these cars were loud in their praise of the condition of the road. Each said that he would tell the folks back home about Colorado's wonderful roads and scenic attractions. This is the sort of advertising that the state cannot buy in the columns of national magazines.

But that's the tourist side of the picture. It is true that they bring millions of dollars of money to the state each year. However, it is the commercial side of the picture that the State Highway Department and the U. S. Government takes into consideration when constructing roads thru box canyons of solid granite and over mountains at dizzy heights.

"How much commercial traffic does the road carry at present, and how much will be developed thru the building of such a road?" is the question that is considered.

It has been found that traffic on some of the mountain roads has increased as much as 500 per cent in the last five years, each year showing a large increase. In several instances commercial centers have been connected with highways that formerly were impassable. Distances have been reduced. Where it was formerly necessary to travel over a hundred miles to reach a certain point, new roads have been constructed reducing the route to fifteen or twenty miles over a modern highway.

If private interests can construct scenic roads and make money from tolls, then the state of Colorado and the U. S. government certainly are justified in spending large sums for the building of commercial mountain roads, which also serve as scenic routes, in the opinion of good road boosters.

By September 1, a force of between 100 and 150 men will be drilling and dynamiting the shelves of granite over which the Cheyenne mountain boulevard is to run. By June 1, 1925, the road will be open for traffic.

The summit and the end of the drive is not far from the Horns, and stairways

(*Continued on Page 17*)

A LITTLE TALK ON MAINTENANCE

Some useful suggestions on highway maintenance are given by W. A. Van Duzer in Penn Ways, a new publication of the State Highway Department of Pennsylvania. We quote as follows:

One feature of road work often neglected by foremen and road machine operators is lining up edges. Occasionally the scraper blade will strike a stone or root and throw the machine out of line, but in the main, the edges can be trued up, which will add materially to the appearance of road. Another not inconsiderable advantage is that the water flowing in a straight ditch will not erode the sides of the road, and will run off much quicker.

Wet weather means much road dragging. A universal fault in this work is that the dragsman does not start down in the ditch. Starting low has a two-fold purpose—first, it kills the weeds and grass along the berm; second, it opens the ditches, giving the water a better chance to run off and away from the road.

During this season of the year wet weather springs will develop. Some are only sufficient to cause a wet spot in the road, loosening the surface treatment and leading to a wavy appearance. If this is allowed to go without attention, the subsoil will seep up through the road, the traffic pounding a hole. Consequently, when a condition of this kind is encountered, go to the seat of trouble, and place a French or tile drain, leading from the spring to the ditch at a lower elevation.

Watch the patching very closely. Be sure that the stone is dry if a tar or cutback asphalt is being used, mixing for all deep hole repairs approximately one gallon of bituminous material to a cubic foot of stone. Use care in not getting the mix too rich. Clean the depression thoroughly, paint the bottom and sides, and then tamp the mixture in place and sprinkle dry chips over the top.

Water is an enemy to all types of roads, but none more so than those of bituminous construction. The moisture seeping through a break quickly destroys the bond. Unless these small holes are repaired (and of more importance, the cause removed) the' maintenance cost gradually mounts, until after only one or two seasons' neglect the road may need very substantial and expensive repairs.

A big job is only a series of small ones. If each employe on the maintenance crews will take the interest the job warrants it will be a credit to every man connected with it. Watch the small things. If you are a foreman or caretaker take enough pride in your section so you will be proud to have everyone know the road is under your jurisdiction.

Scarifier-grader and tractor at work on Trout Creek Pass in Chaffee county.

FEDERAL FUNDS FOR NATIONAL FOREST ROADS

With the signing of the agricultural appropriation bill by the President on June 5, $6,000,000 was appropriated and $4,000,000 authorized for the construction of forest roads and trails. Of the $6,000,000, $3,500,000 had previously been authorized for the fiscal year 1924. Of the remaining $2,500,000 appropriation, half is forest highway money, which will be spent upon roads of primary importance to the counties and States. The remaining half is known as forest development money and will be expended on roads the greatest importance of which are for use in the development and protection from fire of the national forests. Of the authorized amount, $2,250,000 is forest highway and $1,750,000 forest development.

The apportionment of the new money to the various States was approved by the Secretary of Agriculture upon June 12. The amount each State will receive is as follows:

State.	Forest highway	Forest development.
Alabama	$2,100	$3,104
Alaska	360,508	25,626
Arizona	216,507	138,346
Arkansas	25,550	37,798
California	532,846	347,724
Colorado	263,187	171,548
Florida	7,684	4,490
Georgia	5,002	10,578
Idaho	399,115	539,402
Maine	987	2,426
Michigan	1,831	3,376
Minnesota	23,794	21,918
Montana	315,991	405,084
Nebraska	3,999	5,466
Nevada	75,799	13,702
New Hampshire	12,495	12,772
New Mexico	165,833	94,816
North Carolina	10,467	24,798
Oklahoma	2,022	4,734
Oregon	453,093	440,922
Pennsylvania	1,842	9,208
Porto Rico	519	2,734
South Carolina	586	4,712
South Dakota	27,515	11,200
Tennessee	7,493	12,442
Utah	134,899	62,872
Virginia	10,794	24,660
Washington	258,478	381,492
West Virginia	3,646	7,782
Wyoming	175,368	124,265
Total	$3,500,000	$3,000,000

Expenditures totaling $247,000 of forest road funds just been authorized for the construction of highways within or adjacent to National Forest areas in Colorado, according to an announcement from the forest service, United States Department of Agriculture.

One of the projects calls for the widening of the Durango-Silverton highway within the San Juan National Forest. The sum of $75,000 has been authorized for this work.

Park county patrol outfit at work near Jefferson. Motorists say that this road between Baileys and Fairplay is the "fastest" in Colorado.

REPORTS FROM THE DIVISIONS

DIVISION II.

HEADQUARTERS, GRAND JUNCTION.

J. J. VANDERMOER, DIVISION ENGINEER.

Counties of Delta, Gunnison, Hinsdale, Mesa, Montrose, Ouray and San Miguel.

A "rock job" that is a credit to the State Highway Department as well as the contractor, is that recently completed by K. V. Johnson on the Ouray-Silverton road. It consisted of one mile of almost solid rock excavation. Johnson has moved his outfit to Ironton Park, where he is now engaged in building three miles of roadway connecting with the new work on Red Mountain.

Delta county forces are now spreading gravel on the approaches to the new Delta bridge over the Gunnison river.

T. J. Walsh is in charge of a force of men who are finishing up the Pickering Bros. project on Red Mountain, consisting of three miles of grading. This work has been taken over by the State Highway Department. This project is now 87 per cent complete.

A new roadway between Eckert and Austin has been completed by Delta county forces.

Operator Al Herbold is in charge of the steam shovel work near Sawpit in San Miguel county. Upon completion of this work the machine will be moved to Somerset, where the state plans to build a new road up the Muddy.

DIVISION III.

HEADQUARTERS, DURANGO.

J. R. CHENEY, DIVISION ENGINEER.

Counties of Archuleta, Alamosa, Conejos, Costilla, Dolores, LaPlata, Mineral, Montezuma, Rio Grande, Saguache and San Juan.

Steel for the new Piedra bridge being constructed by Shields & Kyle has been swung into place. This bridge replaces a small, narrow wooden structure which served traffic at this point for a score of years.

Engler & Teyssier of Durango have been awarded a contract for the gravel surfacing of two miles between Cortez and Dolores.

This same firm is now engaged in gravel surfacing three miles of roadway located south of Durango.

Indications are that all work in this division contained in the 1924 budget will be put under contract this year, tho probably considerable of it will not be completed.

DIVISION IV.

HEADQUARTERS, PUEBLO.

JAMES D. BELL, DIVISION ENGINEER.

Counties of Baca, Bent, Crowley, Custer, Fremont, Huerfano, Kiowa, Las Animas, Otero, Prowers and Pueblo.

Weather conditions in this division during the past thirty days have been ideal for road construction, and splendid progress is reported on nearly all projects.

On August 15 the Stamey-Mackey Const Co. will complete the three miles of asphalt north of Trinidad. The roadway is now open to traffic.

Indications are that two and one-half miles of concrete paving east of Pueblo will be opened about the middle of September. This pavement is located near Vineland.

W. A. Colt & Son have two outfits working on different stretches of road on the Santa Fe Trail. One outfit is working four miles of gravel surfacing east of Lamar in Prowers county, and another is grading three miles of roadway east of Hadley in Bent county. On the Lamar project two screening plants have been set up.

DIVISION V.

HEADQUARTERS, COLORADO SPRINGS.

ERNEST MONTGOMERY, DIVISION ENGINEER.

Counties of Chaffee, Cheyenne, Douglas, Elbert, El Paso, Kit Carson, Lake, Lincoln, Park and Teller.

Indications are that motorists of Colorado Springs will be riding on pavement to Husted before snow flies. The pouring of concrete on two and one-third miles of the roadway between Breed and Husted has been completed. On August 4 the contractor started pouring concrete on three miles of paving north of Breed.

Both of these contracts are being executed by LaNier, Selander & White, and much credit is due them for the manner in which they have handled the work.

The underpass crossing at Breed has been excavated, and work is progressing rapidly. J. L. Busselle, who has the contract for this work, also is completing the concrete pavement which connects with the city limits of Colorado Springs.

Four miles of grading between Buena Vista and Leadville has been completed by James V. Stryker, contractor.

Plans have been completed for eight miles of sand-clay surfacing east of Cheyenne Wells.

Convicts employed on Poncha Pass for the past several months have been moved to Independence Pass in Lake county. Repair work is being done and additional drainage structures installed. Road open to traffic and in reasonably good condition.

DIVISION VI.

HEADQUARTERS, GLENWOOD SPRINGS.

H. L. JENNESS, DIVISION ENGINEER.

Counties of Eagle, Garfield, Jackson, Moffat, Pitkin, Rio Blanco, Routt and Summit.

Construction of the new 100-foot span steel and concrete bridge across the Blue river, north of Dillon, has been completed. During the past month the contractors, Rogers & Pickard, have been using a dragline in the construction of the approaches. This has been a very difficult job on account of the rocky nature of the material.

Slow progress is reported on the bridge over the Blue ten miles north of Dillon. This is also a 100-foot steel and concrete structure.

A. L. Hockett, contractor, has resumed work of gravel surfacing between Dotsero and Gypsum. This job was closed down for several weeks because of high water in the river. The project consists of five miles of gravel surfacing.

Good progress is being made on the Byers canon project west of Hot Sulphur Springs under contract to the Pioneer Const. Co.

It is expected that Contractor Henry Shore will finish the four-mile project on Cameron Pass in Jackson county by September 1.

Work of removing the ties from the old Midland grade and the Busk-Ivanhoe tunnel has been finished. Work is now confined to getting the tunnel ready for traffic. This feature of the work was delayed on account of a serious cave-in near the east portal on July 30, when one of the workmen was killed.

Routt county road forces under F. S. Chapman have graded two miles of the Gore Pass road.

DIVISION VII.

HEADQUARTERS, GREELEY.

A. B. COLLINS, DIVISION ENGINEER.

Counties of Larimer, Logan, Morgan, Phillips, Sedgwick, Washington and Yuma.

Gravel surfacing on the road east of Loveland to the Weld county line was suspended during last month on account of a shortage of farm teams. This work should be finished the latter part of August.

Three state projects were completed in Logan county during the month of July. These included a bridge at Atwood, a bridge east of Sterling and a gravel surfacing job west of Sterling on State Road No. 14.

The D L D highway from Fort Lupton thru to the state line is now gravel surfaced and is in excellent condition. A small stretch of the road in Weld county was covered with gravel in July.

The Engineers Const. Corp. have completed their stretch of pavement, four miles, between Platteville and Greeley.

The final set-up on the contract of J. Fred Roberts has been made and with an average capacity of 600 lineal feet of paving per day, this project of six miles between Platteville and Greeley will be carried to early completion. It is hoped that the entire project may be opened to traffic by September 25.

With the completion of the above project the concrete pavement between Denver and Greeley will be complete.

The paving work northeast of Merino was completed by W. F. Pigg & Son on July 25. Shouldering and gravel surfacing is being carried to completion with an effective working force.

ON THE TRAIL IN COLORADO

(*Continued from Page 4*)

Meeker 50 Miles from Railroad

The town of Meeker, in Rio Blanco county, 50 miles from a railroad, is one of the most interesting in western Colorado. In the heart of a rich ranching and cattle country, it is progressive and well-kept and does an extensive business. Near the town the Meeker massacre was committed by the Utes, and the scene is pointed out a few hundred feet from the roadside.

The highway from Meeker to Rifle, through a rugged and picturesque cattle country, is one of the finest in the state.

Ouray-Silverton Highway One of Scenic Grandeur

For scenic grandeur the highway from Ouray to Silverton is said to be unexcelled in the world. Ouray, until recently the scene of some of the state's most important gold mining developments, is as picturesque as a village of the Himalayas. It sets in a natural bowl, surrounded on every side by mountains that are among the highest in the Rockies. Formerly a town of several thousand inhabitants, the spirit of its founders has been maintained and the little city is well kept. The marvelous roadway, the new grade of which has been practically completed, gives the traveler a feeling of awe that he will not forget. Some of the most extensive mining development of the west may be observed between the county seats of Ouray and San Juan counties. The motorist should use caution on this road over the newer stretches, but he can make the trip in safety.

Mesa Verde Road In Fine Condition

The motorist will view one of the most magnificent panoramas in America, in climbing the road to Mesa Verde National park, where the ruins of the Cliff Dwellers are found. The range of vision from one point is 200 miles in either of three directions, and one may look into four states, Utah, Arizona, New Mexico and Colorado. The view from the roadside is awe-inspiring.

State Maintenance System Keeps Roads In Fine Condition

Colorado's system of highway maintenance, of which Robert Higgins is superintendent, is given much of the credit for the excellence of the state's roads. The state is in thorough co-operation with the county commissioners and Superintendent Higgins spends a large part of his time in personal supervision of the thousands of miles, for the maintenance of which he must answer to the state. Major Blauvelt, state highway engineer, Superintendent Higgins and the commissioners are in constant and close communication and are carrying out Colorado's road program harmoniously and efficiently.

Contractors' Column

Western Paving & Const. Co. are laying several blocks of asphalt paving in Golden on a "force account" contract.

Shields & Kyle are working on a grading and drainage contract on State Highway No. 10 near Pagosa Springs. They are now finishing up a 100-foot steel truss bridge over the Piedra river near Bayfield.

The Strange-McGuire Company have a contract for several blocks of asphalt paving in Canon City.

The Stamey-Mackey Const. Co. recently completed three miles of asphalt paving on State Highway No. 1, north of Trinidad.

J. Everett Young, Denver contractor, was stricken with appendicitis August 5. His address was St. Luke's hospital for two weeks.

From 480 to 600 feet of concrete per day is being poured by W. F. Pigg & Son on their pavement contract near Merino. They are using a Rex mixer. They have started work on their contract for three miles of concrete pavement between Fort Morgan and Brush.

Dooling Brothers were awarded the contract for the construction of three miles of road in the Pike National Forest near Mount Herman. Their bid was $18,000.

J. Fred Roberts expects to complete the Platteville concrete pavement contract by September 15. He has a six-mile contract.

Gaps in the paving north of Colorado Springs have been completed by J. L. Busselle, contractor. He is now working on the underpass crossing at Breed.

Road News, Views and Gossip

WHOSE HIGHWAYS?

Colorado is spending millions of dollars hard-surfacing its main highways, among others, that between Colorado Springs and Denver. The expenditures are increased and the work hastened because the state is a gigantic summer playground for motorists. The purpose is to serve Coloradoans with better facilities for travel, but also to appeal to tourists to come in larger numbers. Permanent highways help to sell scenery by making it more accessible and more enjoyable.

With millions of dollars of public funds invested in these highways, will the people stand by doing nothing while private interests reap profit out of this investment by putting up billboards which detract from the highways by marring the scenery?

The case of the billboards is properly so stated. The public spends its money building roads for its convenience and pleasure. Whenever anyone takes advantage of this effort for the sake of personal profit it serves to depreciate that in which the public money is invested. The better the roads the greater the travel, and the heavier the travel the more desirable the billboard sites. The state improves its roads as a means of selling its scenery, and billboard interests put up huge signs which mar that scenery.

Wherever a billboard stands along a public highway it is at the expense of the public, which in this manner contributes to private gain.

Bettering highways involves more than putting the surface in first-class shape and so maintaining it. The need also is to insure the largest measure of beauty. That is one reason for planting trees along roadways. Aside from their utilitarian value, they add to the pleasure of travel. Gaudy billboards are merely offensive. The Automobile Club of Colorado Springs is engaged in the worthy effort of trying to replace signboards with trees. The campaign is one that ought to be statewide. The state can never retain its deserved name of Scenic Colorado with litters of billboards on every hand.—Colorado Springs Gazette.

WHERE DO WE GO FROM HERE?

We have made some progress along the way toward complete improvement of the highways of this country in the last 10 years. The statistics give us credit for more than 400,000 miles of surfaced road, and nearly all of it has been improved within the decade. Perhaps it is time to ask the doughboy's question, Where do we go from here?

One thing is certain, and that is that we are going to have better roads in this country. The public demands them. There has been manifest of late some reaction against the expenditure of public funds for roads. There can be no avoiding that expenditure. With more than 15,000,000 motor vehicles now operating on our highways, additional mileage of improved highways and the maintenance of those already improved is a huge work that can neither be laid aside nor neglected. The cost of operating and maintaining these motor vehicles on the highways in their present condition will be greater than the cost of improving and maintaining the roadways so that they will be equal to the traffic demands.

In other words, with the number of motor vehicles now in operation, the public at large will pay in other ways a sum greater than the cost of improved highways if we do not improve the highways. Unless the States build them the locality must, and the voice of experience proclaims it a very foolish thing for the people of a State to decide not to support an adequate program of State road building, as a means of decreasing taxes, because it is much more likely to increase taxes. —Public Roads.

OPENING OF CUMBRES PASS WILL MEAN MUCH TO SAN LUIS VALLEY

The people of the San Luis valley and the region west of the Conejos and San Juan Range, in both Colorado and New Mexico are anxiously looking forward to the date when the Cumbres Pass highway will be opened for traffic which it is anticipated will be consummated the latter part of the summer. The maximum grade is 6 per cent and it will be open to traffic without interference by snow from eight to nine months in the year.

This highway is interstate and is being constructed from government funds, and is the great artery which opens up the regions of the Conejos and tributaries in the Rio Grande National Forest and the head tributary of the Chama, Navajo, San Juan and other streams tributary to the Colorado river on the Western slope of the San Juan range. For a distance of thirty miles it follows the winding course of the Conejos river and tributaries where basks in multitudes the elusive native and rainbow trout, dropping over the pass upon the Chama river which also is noted for its fine trout fishing and beautiful scenery. On its westward course it reaches the famous Pagosa Hot Springs resort, traverses the primitive home-land of the Navajo Indian and leads the sightseer to the famous ruins of the ancient civilization at Chimney Rock and Mesa Verde.

Its extensions will eventually lead to the region of the natural bridges of Utah, to the Grand Canyon of Colorado and give access to the petrified forests of Arizona. California will be its final destination and will have afforded a route of continuous pleasure and educational features within several hundred miles of less travel than any other route across the continent. It will afford delightful streams which afford cool water from the mountain brooklets and natural springs, and pleasant camping grounds almost the entire distance.

OURAY-SILVERTON HIGHWAY AN ENDURING MONUMENT

The Ouray-Silverton road is not yet completed, tho passable for any sort of motor car. When finished, it will be the most wonderful boulevard in the world thru some of the grandest scenery on earth. We believe it will compare favorably with the roads built by the Roman empire thru the Alps which are said to be yet in passable condition, tho built about two thousand years ago. It will be a monument to this age and nation, tho whether it will ever pay for the expense of building is another question. However, it is already traveled to a considerable extent. We noticed cars from California, Washington, Pennsylvania, Illinois and other distant states. It is not a speedway or race track and has not been built for that purpose.—Olathe Criterion.

Hauling steel for the new Piedra state highway bridge near Bayfield.

NATIONAL OLD TRAILS HIGHWAY

(By ED ORAZEM.)

THE National Old trails, better known in Colorado as the Santa Fe trail, is the highway of history. Immediately after the adoption of the American constitution steps were taken by President George Washington to inaugurate the building of a great national highway beginning at tidewater on the Potomac and extending westward to the Ohio at Wheeling, W. Va. The financing of the road was begun in the admission of Ohio into the union. Today that highway extends from coast to coast. The National Old trails road has been from the first an unique American institution, and was for many years a vital factor in the life, politics and industry of the United States. To no other thorofare in the United States can the name "national road" be correctly applied to the present time.

The Southern Colorado-Kansas Old Trails association and the following cities have joined in boosting the historical ribbon of road: Pueblo, Holly, Granada, Lamar, Las Animas, La Junta, Swink, Rocky Ford, Manzanola, Fowler, Florence, Canon City and Salida.

It was Henry Clay who gave his eloquent voice to its extension across the continent, and John C. Calhoun gave his powerful influence to the same measure, and declared it would "cement the states and preserve the union." It was the first real work of constructive statesmanship after the formation of the government.

It was first established by an Act of Congress approved by Thos. Jefferson on the 29th day of March, 1806. It was then known as the National or Cumberland Road. It was built and maintained by the government until 1837; it was extended by Act of Congress from Tidewater on the Potomac to the Mississippi River at St. Louis, and was then extended by Act of Congress in a bill brought forward in the Senate by Thos. H. Benton, and approved March 3, 1825, from Ft. Osage in Missouri to Santa Fe, a Mexican state. In 1827 it was surveyed from St. Louis to Ft. Osage under the direction of the president, John Quincy Adams. Thus it became and is today, a National Road, established by Acts of Congress from the Atlantic to the Pacific. It is now hard-surfaced, and in good traveling condition to the Pacific Coast. This is the only transcontinental route that can be used practically the entire year without snow sheds, or snowplows.

The early history of this National Road relates thrilling and heart-rending stories of the revolutionary days, the pioneers, the early trail blazers, trappers, traders, Indian fighters, early wagon freighters, old tavern keepers and stage coach proprietors in which the average red blooded American can but be interested, and interested to the extent that they will now, while driving over this paved, graveled and surfaced highway, and watching the speedometer in respect to the highway law which makes the maximum speed on country roads at 35 miles per hour, turn back to those early days and pay reverence to the pioneer. Compare the drive of hundreds of miles without civilization supplies or conveniences, with less than thirty minutes between stations, opportunity to buy anything you need when you want it, first class hotels, and eating houses, and camping grounds maintained by the municipalities en route. It's great to live in America.

In Colorado the road forks at two cities. The first fork is found at La Junta where the road leads to Pueblo in one direction and to Trinidad in the other. The second fork is encountered at Pueblo where the road leads west to Canon City and Montrose and south to Trinidad. The two fork roads join again at Gallup, N. Mex.

The road has the following credentials that makes it the most popular of any cross-country tour in existence: Short, logical, practical, smooth, historical, transcontinental, educational and leads thru one of the greatest agricultural belts in the United States. Not only that, but the National Old Trails is a highway that can be traveled the year round.

Reason Fled

Parent—What is your reason for wishing to marry my daughter?

Young Man—I have no reason, sir; I am in love.—London Opinion.

Wise to the Bunk

Dentist—Now, that didn't hurt, did it?

Willie—You can't kid me. My dad's in the advertising business, too.—American Legion Weekly.

NORTH CAROLINA INVESTS $76,000,000

(*Continued from Page 7*)

Issuing bonds is not set forth as a panacea for all economic ailments, but it worked in North Carolina. It is, perhaps, entirely incidental to the highway program, but it is a circumstance that cannot be ignored in any comprehensive consideration of the state's position, economically and industrially, today. North Carolina was brought out of its economic tail spin by the bold challenge of the General Assembly in the early months of 1921.

Emboldened by the success of the highway experiment in the use of the state's credit, townships and counties and municipalities embarked upon similar programs of expanded equipment for schools and local roads. Altogether it has been an epochal three years in North Carolina. Private industry caught step with the moving column and—well, there is no argument with the editor of the Manufacturers Record about the position of the state.

Opposition did not die easily. It was set forth that the revenues provided for paying the interest and the sinking fund on the highway bonds would be totally inadequate, and that the first interest payment would have to be made with borrowed money. Gloomy and wholly inaccurate all this turned out to be. The state highway fund has met every obligation imposed by the initial statute, additional obligations imposed in the second enactment, and for good measure added $1,000,000 to the sinking fund last year.

North Carolina does not set forward its road law as a grand model for the emulation of all other states. North Carolina is satisfied with it, and under its operation has bought 3,600 miles of modern roads, rebuilt 3,500 more, and has paid its way as it has gone without material difficulty in any quarter. What it may do when another General Assembly convenes I do not know, but it will probably content itself with remedying some minor provisions that have been found impracticable.

Under the provisions of the law, the state took from the counties approximately 6,000 miles of roads, connecting the 100 county seats and principal towns by the most convenient routes. It authorized the issuance of bonds in the amount of $50,000,000 for highway construction, the levying of a license tax on automobiles and a one-cent-per-gallon tax on gasoline. At that time the expenditure of more than $10,000,000 per year was not deemed practicable. Details were left to the discretion of the commission of nine members, each representing a construction district. The measure provided that the funds for construction and maintenance were to be apportioned among the nine districts equally on a basis of area, mileage and population. Construction funds were to be derived from the sale of bonds and maintenance funds from the license fees and gasoline taxes.

North Carolina wanted roads. It was impatient about it after the law was passed. Two years before the General Assembly had provided for meeting the requirements of the new Federal-aid law, but left the initiative with the counties, the county to put up half the cost, the state one-fourth and Federal-aid funds to account for the remainder. Applications for the fund were double the available amounts. The roads remained the property of the counties and the counties were responsible for their maintenance. The results were not uniformly satisfactory. Over this question of maintenance was fought the severest struggle that developed during the consideration of the road measure. There was no serious opposition to the proposal that the state build roads, but the suggestion that the Highway Commission erect an organization that would maintain 6,000 miles of road in 100 counties was, to many members of the General Assembly, an appalling and insuperable task. It has been comparatively easy, and if the state were confronted now between the choice of state maintenance and county maintenance there would not be an instant's hesitation. State maintenance has operated successfully and its cost has been well within the limits of the resources indicated in the measure for this purpose. For two years it carried the burden of traffic until completed construction began to tell on the whole system of roads.

Maintenance was the first answer to the common demand for serviceable roads in the state. Three months after the law became operative, the State Highway Commission had organized the nine districts, and cut the six thousand miles of road into sections. To each section was allocated a supervisor with motor equipment and maintenance machinery. In

this work we have about 300 gangs and employ approximately 1,200 men. One man to each six miles is, in my opinion, reasonably economical. Before fall of that year the system was in excellent condition. Many of the roads were good county roads before the state took them over, but indifferently maintained. In one county maintenance may have been excellent and in another deplorable. We were able to bring them to a uniform condition for service, and from the start the system was an improvement over the roads that were owned and maintained by the counties. It was the first fruit of the $50,000,000 venture.

Traversing the state from east to west are two trunk lines, both almost completely paved for their entire distance of 450 to 600 miles. These roads in summer carry tremendous burdens of traffic. The number of automobiles registered in the State has more than doubled during construction period, bringing a correspondingly increased burden of traffic and increased revenue for maintenance. The commission maintains a careful survey of traffic conditions throughout the state and will be able to anticipate needs to some degree.

Has it bankrupted the state?

The answer is the state itself. The bank resources, decimated by the deflation of 1920 to 50 per cent of their normal strength, have passed the peak of inflation figures reached in 1919. Every industry in the state is in operation to capacity. The state raised its largest cotton crop and its largest tobacco crop last year and got more for it. Its school system has been expanded, particularly its high schools and colleges. There are ten times the number of pupils in high schools as were registered ten years ago.

The state's credit is sound enough to bring an oversubscription to every issue of securities, **and the money that is building these roads is borrowed at 4.25 per cent. There has been no direct levy of taxes on real and personal property for the financing of the program of road building. The system of financing worked out in the initial measure has proved more than adequate.** The barest minimum of demonstrable figures indicates that the roads are paying for themselves in actual savings in the operation of automobiles. These figures, capitalized at a modest rate, would indicate that the road system as it stands today, half completed, is worth $125,000,000 in cash. Of the intangible benefits, those things that come when people are brought up out of the mud and made able to come and go as they will, there is none that can set a value upon these things.

North Carolina is satisfied with its venture into road building. The faith of the people, the great mass of the folks out in the townships who stood by when the General Assembly broke through all precedent, upset the established modes of thinking of a century and made bold use of the state's credit, has been justified. They are carrying the burden, they are reaping the benefits, **and there are not a dozen men in the State who would propose to change it.**

MOUNTAIN ROADS PAY DIVIDENDS

(*Continued from Page 8*)

will be built to enable the tourist to climb to the top of these formations. At a higher point, possibly on top of the pavilion, a platform will be constructed from which, without moving a step, one may have an unobstructed view of the country in all directions. The summit house on Pikes Peak will be clearly discernible, some of the Sangre de Cristo mountains, Mount Evans, the Spanish peaks (100 miles away) and—on a clear day—the Greenhorn mountains will be visible. Off to the east, the Kansan may look into his own state—a plain of shimmering beauty beneath the sun.

COLORADO ROADS BEST SAYS ALDERMAN HEGGEM RETURNING FROM EAST

Alderman Peter Heggem and wife and Mr. and Mrs. Ray Anderson returned Sunday evening from a five weeks auto trip to Nebraska, Iowa, and Minnesota. They had a delightful trip but are glad to get back in Longmont. Mr. Heggem reports that they experienced cool and rainy weather, and that it rained for 17 days during their stay in Iowa.

Mr. Heggem says that Colorado has them all beat for good roads, and that the difference was noted as soon as the Colorado line was struck. The D. L. D. road east from Ft. Lupton is in poor condition for miles, and has not been graveled in years.—Longmont Call.

The Bulletin Board

KOEHRING PAVER SCORES ANOTHER RECORD ON STATE HIGHWAY PAVEMENT

When the State Highway Department awarded a contract to R. M. Larsen for the building of three miles of concrete pavement north of Broomfield on the Denver-Fort Collins highway, someone asked the question:

"How is he going to do that job; he hasn't any equipment?"

Well, he is doing the job. Furthermore he is making quite a record in the pouring of his concrete. Indications are that he will be finished long before snow flies and the pavement thrown open to traffic.

To begin with Larsen "subbed" the grading to Monaghan & Cunningham. They did a fine job. Then Larsen bought a new outfit for the concrete work. He purchased a new 21E Koehring paver, a C. H. & E. force pump and Metaform rails.

On June 15 he started pouring concrete and on every working day since then has averaged eight stones per day. On five days he has run eleven stones and one day ran twelve stones, the full capacity of the paver. Less than one hour's time has been lost from breakdowns. One of the delays was caused by a leak in the water line, and the other from a break in the cable on the concrete chute.

At present it looks as tho Larsen will repeat the performance of J. Finger & Son, in their record-breaking pavement contract on the Santa Fe Trail in Otero county. Larsen has the same type of mixer used by the Finger firm. The latter concern have now moved their outfit on the three-mile paving job located south of Longmont.

The C. H. & E. Mudhen is now pumping water over a mile to the mixer on the Larsen job.

NEW GRAVEL CONCERN INSTALLS SAUERMAN CABLEWAY OUTFIT

The first strictly modern cableway gravel plant to be installed in Denver has been purchased by the Bear Creek Gravel Co. This plant is manufactured by Sauerman Bros. and was sold thru H. N. Steinbarger & Co., Colorado distributors.

The plant will be located on Bear Creek, near the new filtration plant being constructed by the Denver Municipal Water Works.

The Bear Creek Gravel Co. is a new concern organized by Charles Wall and H. B. Missillier. Mr. Wall is a well-known Denver business man, while Mr. Missillier is an engineer of wide experience, formerly identified with several large California gravel and contracting firms.

The plant consists of a one-yard Sauerman Cableway, with a 500-foot Span, equipped with a special Sauerman two-speed electric hoist. It is practically a duplicate of the plant erected early this spring by the Fountain Sand & Gravel Co. at Pueblo. It has a capacity of 48 cubic yards of material per hour.

It is planned to operate the plant on two 9-hour shifts.

Materials from this plant will be supplied to Dutton & Kendall, contractors, on the filtration plant and the Lock Joint Pipe Co. It is said that the contracts with the two firms call for 35,000 yards of gravel.

The plant will be in operation in two weeks.

ANTHONY-STREATOR BRING OUT NEW FORDSON SHOVEL-CRANE

A new One Lever Shovel Crane has been introduced on the Denver market by the Anthony-Streator Company thru H. W. Moore and Company, local distributors.

This shovel is designed for attachment to the Fordson tractor. Its purpose is to replace hand means of digging and loading. It is readily converted into a portable crane. The manufacturers say that in no sense is it a steam shovel, nor is it intended as competition for this class of heavy equipment.

As designed it is a shovel that is said to fill a long felt want for a power loader or digger on small work, or on the lighter tasks of big work.

The structure of the shovel is supported at only three points on the tractor, a most important feature in leaving the tractor unhampered and unaltered to perform fully all the work of which it is capable. Not a cap screw nor an unused bolt hole in the tractor is used or disturbed, with the exception of the king bolt in the front axle, to which are attached steadying rods.

Operation is by one lever. The shovel can be maneuvered into any position either with the tractor in motion or at rest. The machine can also very easily be converted into a 1000-pound capacity portable or traveling crane.

Its uses include cutting earth to grade in road making, excavating, stripping over-burden and back-filling; loading solids as a crane, lifting boulders, lowering pipe into ditches and other ditch work.

LEANING WHEEL MAKES GRADER HIGHLY ADAPTABLE

A feature of the Adams Fordson grader No. 1 is its adjustable wheels. The possession of this characteristic, it is pointed out by the manufacturers, J. D. Adams & Co., Indianapolis, Ind., makes it possible for the operator to lean the weight of the grader against the side load, which balances the machine and prevents it from skidding away from the work.

The Adams grader may be connected with a Fordson anywhere in 20 minutes. The only tool required is a monkey wrench. The simple connections are shown in the larger of the two accompanying illustrations. The result is a one-man, motorized patrol or grading outfit which is practical, efficient and economical.

P. & H. BUY STEEL WORKS

Pawling & Harnischfeger Co., Milwaukee, manufacturer of cranes, hoists, machine tools, etc., has taken over the property of the Hercules Steel Casting Co., that city. The steel castings foundry which the Pawling company acquired in the purchase has a capacity of 1200 to 1500 tons a month with one 10-ton electric furnace.

Koehring 21E Paver at work on Broomfield concrete pavement.

BIDS RECEIVED

Proj. No.	Length	Type	Location	Low Bidder	Bid Price
210-B	7.507 mi.	Grading	Grand Valley-Debeque	Winterburn & Lumsden, Grand Junct.	$94,267.50
269-A	2.172 mi.	Gravel Surfaced	Cortez-Dolores	Engler & Teyssier, Durango	21,215.90
886	1.8 mi.	Grading	Mt. Evans-Summit Lake	E. H. Honnen, Colo. Springs	32,286.00

PROJECTS ADVERTISED FOR BIDS

Proj. No.	Length	Type	Location
267-A	2.594 mi.	Gravel Surfaced	Model-Trinidad
272-B	12.92 mi.	Gravel Surfaced	East Pueblo County Line, westerly
279-A	1.439 mi.	Concr. Paved	Denver, toward Morrison

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

Proj. No.	Length	Type	Location
262-A	2.186 mi.	Gravel Surfaced	Southwest of Walsenburg
270-A	3.429 mi.	Gravel Surfaced	Monte Vista, southeast
278-A	8.409 mi.	Sand-Clay Surfaced	Cheyenne Wells, easterly

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

Proj. No.	Length	Type	Location
2 R. Div. 2	3. mi.	Paved	North of Trinidad
213-A	2. mi.	Grad. and Surf.	Hesperus-Mancos
262-B	0.2 mi.	Concr. Girder Bridge	Alamosa, east
262-C	3. mi.	Grav. Surf.	La Veta Pass, west
271-A	3. mi.	Grav. Surf. & Pav.	Between Florence and Pueblo
272-A	0.2 mi.	Steel Bridge	Apishapa
276-A	7.008 mi.	Paved	Castle Rock-Gann
276	0.2 mi.	Overhead R.R. Cross.	North of Colorado Springs
277-A	4. mi.	Paved	South of Colorado Springs
279-B	6. mi.	Graded	Conifer, south
286-A	0.2 mi.	R.R. Grade Sep.	Between Nunn and Dover
817		Bridge Repairs	South of Trinidad

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1923

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
2-R	Trinidad, north	3 mi.	Asphalt Pavemt.	Strange-Maguire Const. Co.	$121,934	83	2-R
17-R	Breed-Husted	2.339 mi.	Conc. Paving	LaNier, Selander & White	81,399	54	17-R
102	Ouray-Red Mountain	1.06 mi.	Mtn. Grading	Johnson & Johnson	58,972	90	102
116-A	Colorado Springs paving	4.18 mi.	Conc. Paving	Standard Engr. & Constr. Co.	238,944	81	116-A
116-B	Breed-Husted	0.892 mi.	Conc. Paving	J. L. Busselle & Co.	51,001	25	116-B
116-C	North of Breed	3.163 mi.	Paving and Bridge	LaNier, Selander & White	139,038.45	1	116-C
125	Sapinero-Cimarron	11.3 mi.	Grav. Surf.	Dale Hinman	36,797	60	125
135	Denver-Morrison	5.3 mi.	Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	32	153
157-B	Buena Vista-Leadville	4.20 mi.	Grading	J. V. Stryker Const. Co.	65,715	100	157-B
174	Red Mountain	3.03 mi.	Mtn. Grading	Pickering Bros.	82,071	87	174
190	Summit County Bridge and Road	1.45 mi.	Grad. & Bridge	Colo. Bridge & Constr. Co.	40,154	83	190
207	Dillon-Kremmling	100 ft.	Truss Bridge	Rogers & Pickard	28,831	66	207
213-B	Durango-Hesperus	5.26 mi.	Grav. Surf.	J. Edd. Hansen	72,960	65	213-B
214	Durango-Bayfield	3 mi.	Gravel Surf.	Dale Hinman	53,411.05	82	214
222-C	Broomfield-Lafayette	2.82 mi.	Conc. Pavement	R. M. Larsen	134,933	51	222-C
223-A	Kremmling-Rabbit Ear	2.88 mi.	Grav. Surf.	Henry Shore	30,565	64	223-A
224	Morrison-Baileys	5 mi.	Grading	M. J. Kenney Const. Co.	59,781	67	224
226-B	Brighton-Greeley	2.86 mi.	Conc. Paving	White & Johnson	89,993	82	226-B
226-C	Platteville-Greeley (Div. 1)	4.4 mi.	Conc. Paving	Engr. Const. Corp	120,114	85	226-C
226-C	Platteville-Greeley (Div. 2)	6.335 mi.	Conc. Paving	J. Fred Roberts & Sons	175,647	43	226-C
230-A	Wolhurst, south	0.852 mi.	Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	63	230-A
230-B	Wolhurst, south	3.99 mi.	Conc. Pavement	Brodie & Anderson	153,971	56	230-B
240	Gypsum-Dotsero	5.185 mi.	Gravel Surf.	O. L. Hackett	66,178	51	240
242-A	Grand Junction-Fruita	7.703 mi.	Gravel Surf.	Dale Hinman	81,255	9	242-A
243-A	Bayfield-Pagosa Springs	1.6- mi.	Gravel Surf.	Shields & Kyle	48,311	50	243-A
245-B	Hadley, East	2.711 mi.	Grading	W. A. Colt & Son	21,680	20	245-B
246-A	East of Pueblo	2.537 mi.	Conc. Paving	R. A. White	78,431	69	246-A
246-B	Vineland-Pueblo	0.787 mi.	Conc. Paving	W. A. Colt & Son	29,453	86	246-B
247-A	Rocky Ford-Swink	1.329 mi.	Conc. Paving	J. Finger & Son	41,369	100	247-A
248-A	Buena Vista-Salida	12. mi.	Grading & Surf.	Western Const. Corp.	93,533	12	248-A
251	Lafayette-Boulder	1.1 mi.	Conc. Paving	J. Fred Roberts & Sons	32,670	75	251
252	Loveland-Berthoud	3.2 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,676	54	252
253-A	Steamboat Springs, west	6.50 mi.	Gravel Surf.	Northwestern Cons. Co.	126,374	23	253-A
254-A	Byers Canon	1.057 mi.	Grading	Pioneer Const. & Engr. Co.	72,408	15	254-A
255-A	Ft. Morgan-Brush	2.70 mi.	Conc. Paving	Colo. Bridge & Constr. Co.	85,763	84	255-A
255-B	Brush, west	2.944 mi.	Conc. Paving	W. F. Pigg & Son	92,486	4	255-B
256-B	Merino, northeast	2 mi.	Conc. Paving	W. F. Pigg & Son	58,702	24	256-B
257	North of Denver		Conc. Viaduct	C. C. Madsen	12,178	94	257
258-A	Gunnison-Sapinero	3.239 mi.	Gravel Surf.	R. P. Morrison	34,900	11	258-A
266-A	Durango, south	3.03 mi.	Gravel Surf.	Mishon, Engler & Teyssier	22,233	11	266-A
273	East of Lamar	4.047 mi.	Grav. Surface	W. A. Colt & Son	42,305.30	0	273
281-A	Lafayette, South	1.249 mi.	Paving	Sims & Boston	55,373	1	281-A
281-B	South of Longmont	3.068 mi.	Paving	J. Finger & Son	102,502.40	1	281-B
283-A	Loveland-Berthoud	2.530 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,829	6	283-A

Keystone KEYSTONE COPPER STEEL Culverts

Were used in the recent reconstruction work on

The Famous La Bajada Hill

NEAR SANTA FE, NEW MEXICO

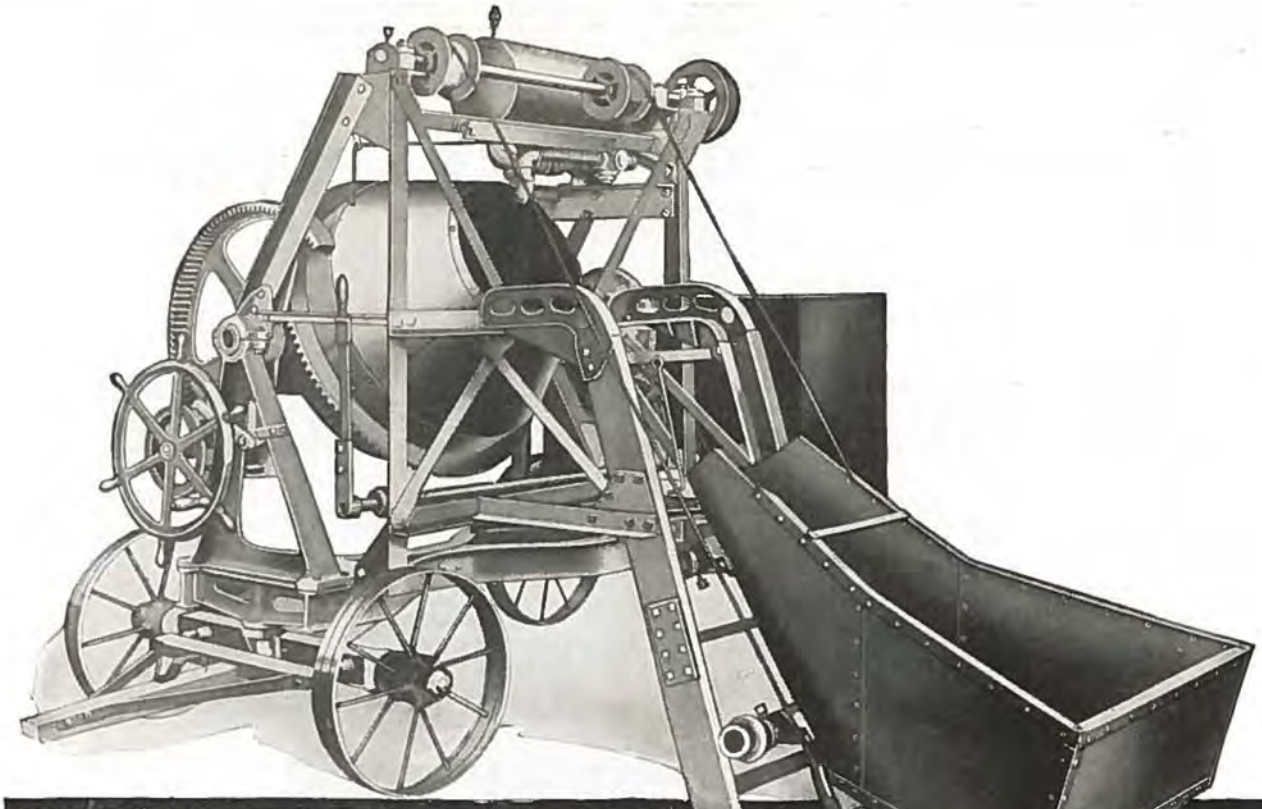
NEW MEXICO STATE HIGHWAY NO. 1

NOTE:—"La Bajada" is Spanish for "The Descent" or "Drop." The Highway at this Hill drops about 800 feet in a distance of 1½ miles, and is one of the marvels of road building in America, being cut out of volcanic lava in the face of a steep precipice. It has 23 hair-pin turns, some on a very heavy grade, but in spite of this the road is perfectly safe, as all the turns have been widened and some of them eliminated in the relocation, and retaining walls built at dangerous points. The trip up or down La Bajada is always remembered by those going east or west over the National Old Trails Highway, or as they call it in New Mexico, "El Camino Real," the King's Highway.

Culverts Furnished by

Colorado Culvert & Flume Co.

PUEBLO



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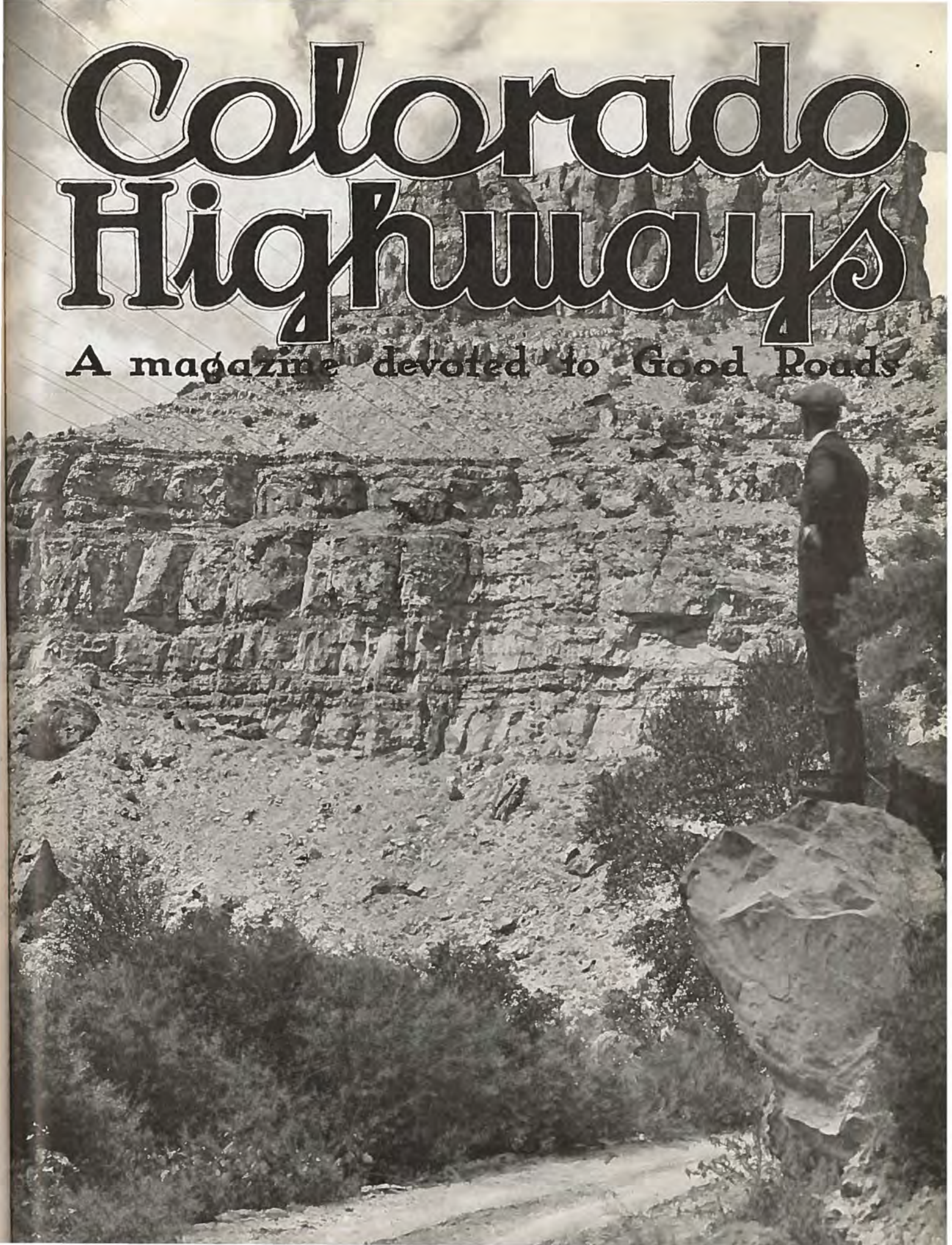
Colorado Highways

A magazine devoted to Good Roads



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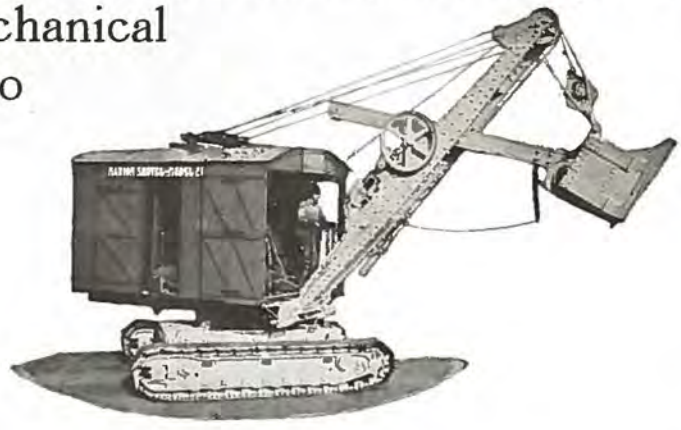

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OUR COVER PICTURE

A view of Glenwood Canon along the Colorado River is shown on the front page of Colorado Highways this month. This is one of the most picturesque canon drives in the entire western country and each summer is traveled by thousands of motorists from all parts of the world. Because of this fact, maintenance forces make it their particular duty to see that the surface is always smooth and easy to drive over. Photo by State Highway Department.

Colorado Highways
"BETTER ROADS"
VOLUME III. SEPTEMBER, 1924. NUMBER 9

The Midland Highway

By C. M. KECK

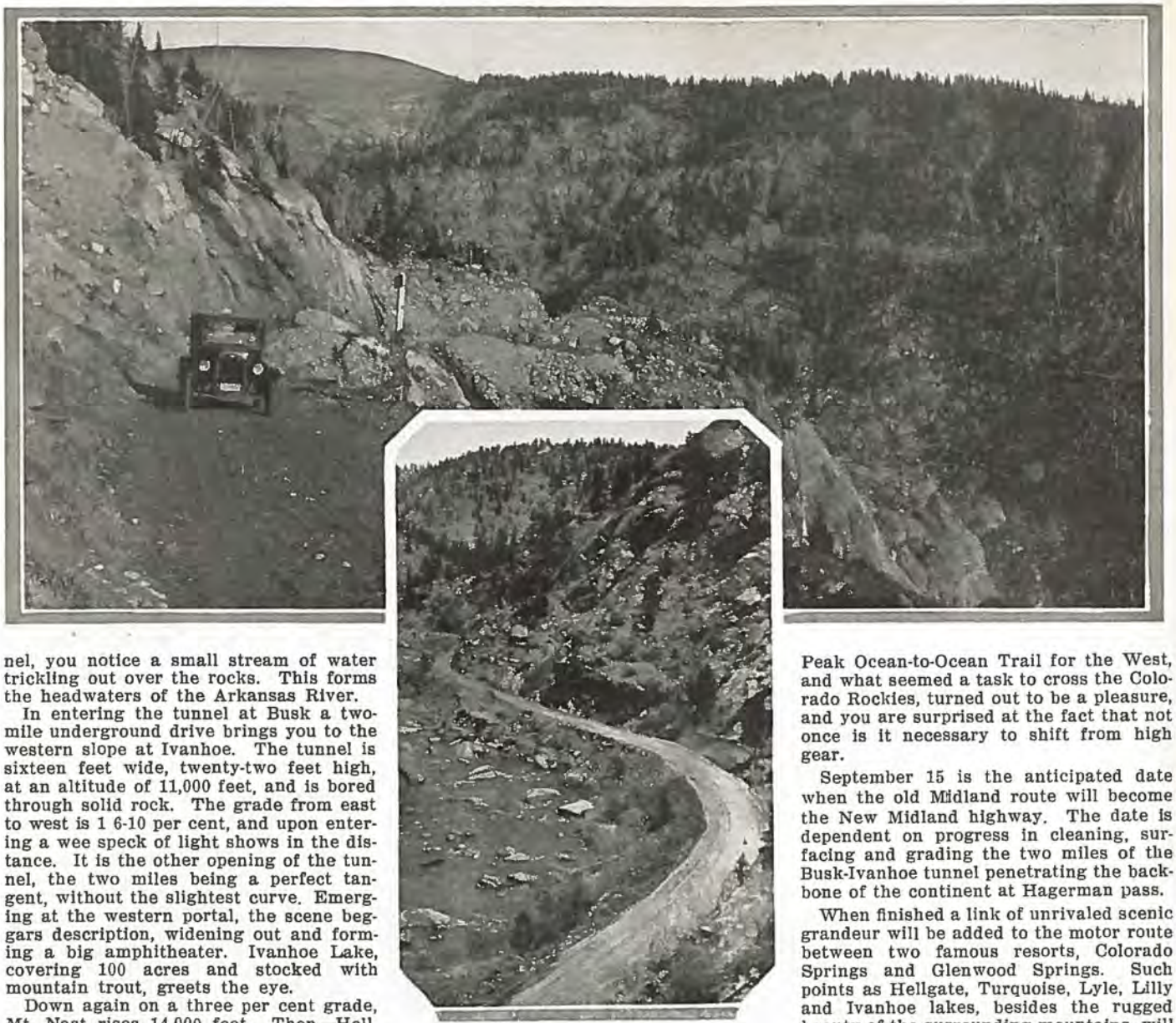
OF all the highways passing east and west through Colorado the crowning feat of engineering will find its goal in the completion of what will be known as the Colorado-Midland Highway.

August 8, 1918, the Colorado Midland Railroad, 221 miles in length, from Colorado Springs to Glenwood Springs, was discontinued; and later sold and junked. This road bed, with its steel bridges, 16-degree curves and a grade not to exceed four per cent, and only a total of about fifteen miles of that, will, for the most part, be made into an automobile highway. The Pike's Peak Ocean-to-Ocean Highway will be part of this route. Starting at Colorado Springs, where all highways, east, north and south connect with it, the traveler is taken from the shadows of Pike's Peak through Manitou up Ute Pass on a thirty-mile decomposed granite-and-gravel road twenty-two feet wide, not exceeding a three per cent grade, alongside and through scenery of unequaled grandeur. Then on through Eleven-Mile canon and the grass and cattle country of South Park, over a splendidly surfaced dirt-and-gravel road. Thence to Buena Vista, where mountains Yale, Harvard and Princeton stand at "attention" with their snow-covered peaks. Leadville, with its inexhaustible mines, greets the tourist as he climbs up to over 10,000 feet over no grade to exceed six per cent. Everybody is your friend there. While the old-time haunts are gone, the real red-blooded, two-fisted men are still in evidence.

For over forty years climbing these grades with two and often three locomotives, millions of tons of coal have been consumed, depositing cinders on the roadbed of the old grade until they, mixed with decomposed granite, have furnished a roadbed which, after removing the ties and plowing below them and grading out, has made a roadbed second to none of its kind. It has none of the disadvantages of a new road, for it is settled and hard. The mountain slopes have sloughed off until there is no danger of rocks falling or rock or mud slides, and the drainage is perfect as only an old railroad grade will make it. Pure mountain water is found everywhere on each side of the Continental Divide. Both the Arkansas River and the Frying Pan River are stocked yearly with mountain trout from state and government hatcheries, until now these streams furnish some of the finest fishing in the state, containing principally Lochlaven, Brook, Native and Rainbow trouts. Camping places are in evidence every foot of the way, with plenty of wood and water. Game hunters will find deer, bear, mountain lions, coyotes, lynx, bobcats, elk and mountain sheep close by in the mountains. It is a road you cannot get lost on. Once you strike it at Leadville, the mountains on either side will hold you to the road until you emerge at Glenwood Springs.

Reaching the eastern portal of the tun-

One of the beautiful lakes on Midland Trail near Busk-Ivanhoe Tunnel.



Top— Scene near Hell Gate on newly constructed Midland Trail. Center—Showing completed highway through Eleven Mile Canon.

nel, you notice a small stream of water trickling out over the rocks. This forms the headwaters of the Arkansas River.

In entering the tunnel at Busk a two-mile underground drive brings you to the western slope at Ivanhoe. The tunnel is sixteen feet wide, twenty-two feet high, at an altitude of 11,000 feet, and is bored through solid rock. The grade from east to west is 1 6-10 per cent, and upon entering a wee speck of light shows in the distance. It is the other opening of the tunnel, the two miles being a perfect tangent, without the slightest curve. Emerging at the western portal, the scene beggars description, widening out and forming a big amphitheater. Ivanhoe Lake, covering 100 acres and stocked with mountain trout, greets the eye.

Down again on a three per cent grade, Mt. Nast rises 14,000 feet. Then—Hellgate. It is all its name implies. Three thousand feet straight down, the roadbed blasted out of solid granite, it's the view that disrupts the English language. The Colorado Midland Railroad, when in existence, spent hundreds of thousands of dollars advertising this particular scenery and the "Seven Castles" mentioned in the latter part of this highway description. Hellgate is about half a mile long, protected on one side by granite walls reaching up 2,000 feet and on the chasm side by artificial rock wall rip rapped to a safe height. Hellgate to Nast, eleven miles by road, but if you are in a hurry, walk down the trail and it is only three-quarters of a mile, which accounts for the extreme depth of Hellgate.

In descending the eleven miles, a small tunnel 600 feet long, and numerous switchbacks are used so as not to produce a grade in excess of three per cent. Summer resorts are encountered every three or four miles the entire distance, and Wood's Lake is reached by a side road from Thomasville. The Seven Castles are then reached, each towering from 3,000 to 4,000 feet above the landscape, composed of red granite, rugged and ragged.

Down to Basalt and the country widens out and, with high mountains on each side, the Frying Pan River empties into the Roaring Fork River, which, in turn, augments the volume of the Colorado River at Glenwood Springs. Twenty miles brings you from Basalt to Glenwood Springs, to the medicinal waters at that place, which, with its outdoor summer and winter bathing pool, in hot water, gives the traveler a tonic for the next day. Here is where the Ute Indians, in the early days, brought their sick and afflicted; here is where former President Harrison spent a delightful day; where Col. Roosevelt, as Vice-President and later President, outfited for his big hunt, and where President Taft rested from his arduous campaign duties.

At Glenwood Springs you hit the Pike's Peak Ocean-to-Ocean Trail for the West, and what seemed a task to cross the Colorado Rockies, turned out to be a pleasure, and you are surprised at the fact that not once is it necessary to shift from high gear.

September 15 is the anticipated date when the old Midland route will become the New Midland highway. The date is dependent on progress in cleaning, surfacing and grading the two miles of the Busk-Ivanhoe tunnel penetrating the backbone of the continent at Hagerman pass.

When finished a link of unrivaled scenic grandeur will be added to the motor route between two famous resorts, Colorado Springs and Glenwood Springs. Such points as Hellgate, Turquoise, Lyle, Lilly and Ivanhoe lakes, besides the rugged beauty of the surrounding mountains, will be accessible to the motorist.

This addition to the highway assets of Colorado was possible thru the gift to the state by A. E. Carlton of Colorado Springs and his associates of the Midland right-of-way for highway purposes.

The gift, by far the finest ever received by this state, was followed by a guarantee from Mr. Carlton and other public-spirited citizens here and on thewestern slope of a loan whereby work could be started on the project west of Leadville, the state to repay the lenders when money was available.

This year the highway budget contains a $15,000 appropriation for the work, and a similar sum will be contained in the 1925 budget. The total of $30,000 will be sufficient for completion of the road as it is now planned, according to persent estimates.

From Leadville west over the Midland to the east portal of the Busk-Ivanhoe tunnel the task of removing ties, putting the roadbed to grade and surfacing is finished.

(Continued on Page 15)

Autumn Days in the Rockies

By WARREN E. BOYER

INDIAN trails through aspen forests in the heights!

What is more delightful than driving in the Colorado Rockies in September?

Many motorists prefer a vacation as the red and yellow leaves of many trees cover the earth with a magic carpet. The crisp morning air has a tang that sends the blood racing through a refreshed body, and the blazing spruce logs draw one to the fireplace at evening. Then comes the story-telling hour, and after that a sound sleep under a star-lit canopy.

Colorado's autumn season has its own charms. Indian trails broadened into splendid highways, and knowledge that better accommodations are available than in the summer months, lure many visitors to the balsam-filled, leaf-strewn Rockies, once used by moccasin-winged redskins. There is more room in hotels and cottages than in July and August for those who prefer such accommodations to camp life. Often attractive rates are made for September and October. The weather is delightfully balmy during the day. There is peace in the hills.

It's like living through a fairy tale, entrancingly delightful, for shut-ins of the bustling, smoke-screened city, as they romp through the aisles of nature in knickerbockers and laced boots. Truly, only the lanterns hung in the sky are out of reach, and they seem enchantingly near in the clear night.

It matters not which of the thousand and one spots in the Colorado Rockies the late vacationist or the devotee of the hills seeks. There is every conceivable kind of accommodation—exclusiveness or informality — formal dinner dances or care-free delights.

The San Isabel National Forest, out of Trinidad, Walsenburg, Canon City, and Pueblo, vies with the Pikes Peak region, Denver Mountain Parks, Grand Lake, Boulder, Fort Collins, Estes Park, Glenwood Springs, Steamboat Springs, Grand Junction, Durango and Idaho Springs in rich colorings and superb sunsets.

Spirit caves, hot springs, hidden waterfalls, marvelous sand dunes, living glaciers and enchanting resorts among the snow-crested sentinels, make of Colorado a distinctive region at any time of the year, and equally attractive in fall as in days of spring or summer, in changed nature raiments.

September's golden shafts of sunlight streaming through the cabin door bring realization of dreams and linger as a cherished memory after the commanding Rockies with their carpeted aspen trails have been left behind.

COLORADO PUPILS RECEIVE PRIZES IN ESSAY CONTEST

Lyle Mertz, a pupil of Junior High School, Sterling, has been awarded first state prize in the national safety essay contest, it is announced today by the Highway Education Board. He has been presented by the Board with a gold medal and a check for fifteen dollars, while his essay now represents the state in the final competition for one of the three national prizes, namely, a gold watch and a trip to Washington for first prize, and gold watches for second and third prizes.

Second state prize was won by Thomas Russel, St. Catherine's School, Denver, who has received a silver medal and a check for ten dollars. Five third prizes were awarded the following pupils: Marie Sawyer, Bessemer School, Pueblo; Alfred Scott, Greeley Junior High School, Greeley; Minnie Heller, Cheltenham School, Denver; Marie Webber, Fyffe School, Fleming; Kenneth Turner, Summit County, Frisco.

The national safety essay contest is conducted annually by the highway Education Board among elementary school children of the nation, its object being to promote habits of safety on the highways. The prizes are gifts of the National Automobile Chamber of Commerce. The subject was "Highway Safety Habits I Should Learn."

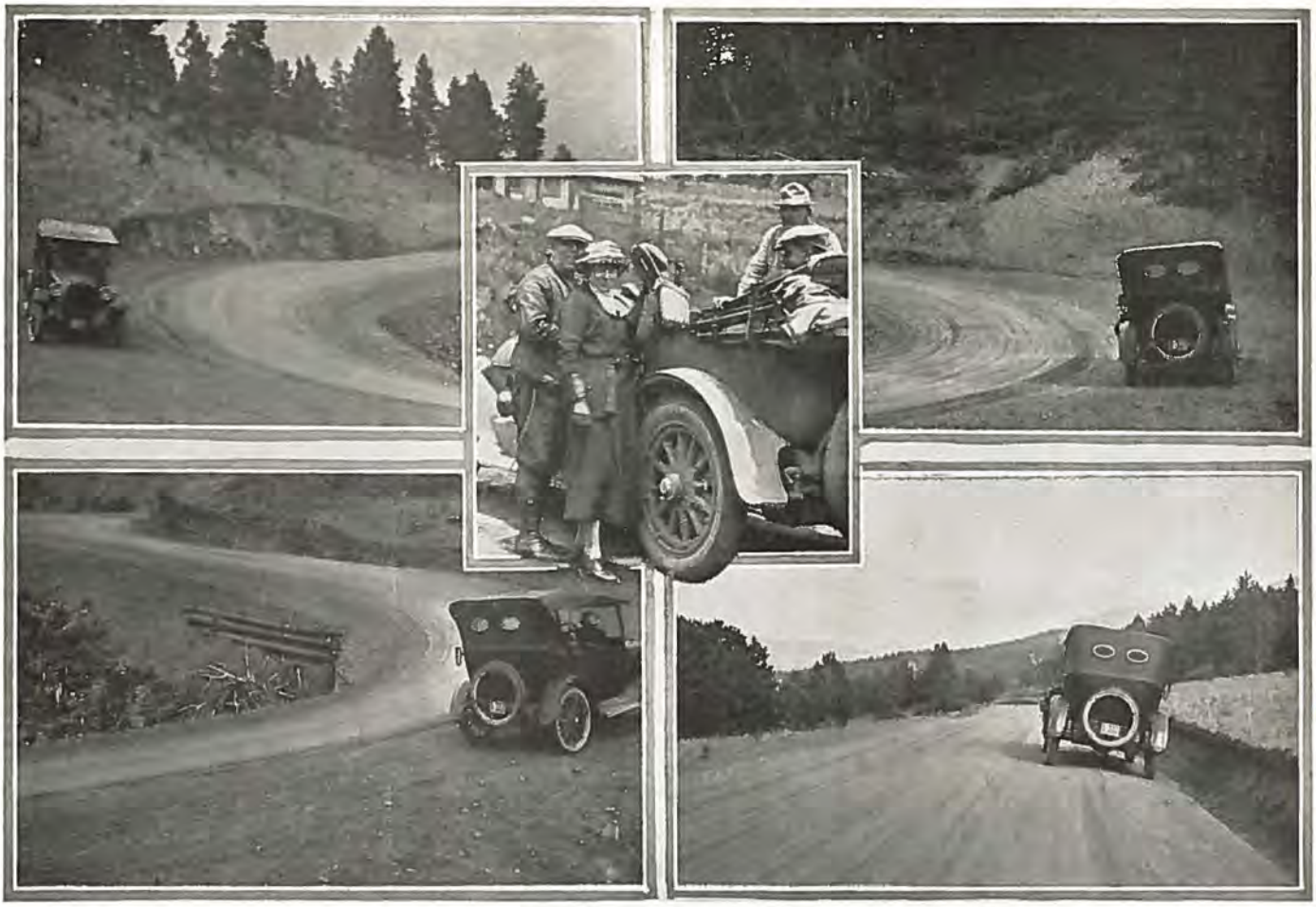
In addition to capturing the first state prize in the safety essay contest, Sterling Junior High School also furnished the teacher writing the best lesson for the teachers' lesson contest. Mrs. Myrtle A. Roe has been awarded state honors, while her lesson will represent Colorado in the national competition for one of three grand prizes—a check for $500 and a trip to Washington, a check for $300, or a check for $200.

Names of national winners will be announced within the near future.

Too True

Too many drivers, seeking to arrive on the opposite side of the railroad right-of-way, get only as far as up to and including.—Motor News.

A typical tourists' camp in the Pike National Forest.—Photo courtesy of U. S. Forest Service.



Scenes on the newly constructed State Highway between Baileys and Shawnee, in Park county. Insert—Commissioner George F. Singleton and wife greeting friends with a creel of mountain trout.

Motorists Praise County Built Road

A FEW weeks ago a party of motorists were returning to Denver after a fourteen-hundred mile tour of the state. The trip had taken them thru about thirty counties and over all sorts of roads. They were very much impressed by the splendid condition of the highways over which they had traveled.

Of course, they had driven over some poor stretches of road. That must be expected on such a long trip. But these had been few and far between. For the greater part of the tour they had ridden over remarkably fine roads, some of them boulevards on which there was a temptation to exceed the state speed limit of thirty-five miles per hour.

But it remained for them to nearly reach home to find the finest stretch of roadway on the entire trip. This was the four-mile stretch located between Baileys and Shawnee in Park county.

For over eighty miles the party had speeded along over an almost perfect roadbed in this county, starting with the summit of Trout Creek pass, thru Fairplay, Jefferson, Como and over Kenosha pass. Members of the party had commented upon the excellent condition of the highway across this county, but they had no idea that the best was yet to come.

Whether it was a prearranged plan of the driver to save the best for the last, he would not admit, but nevertheless there remains the fact that this four-mile stretch in the beautiful canon of the north fork of the South Platte river proved to be the "piece de resistance" of the entire tour. Hence this layout of pictures and praise.

This project was constructed by county road forces. It was started in May, 1922. By the middle of September the same year, two miles of the road was completed. The following May construction of another two mile link was started. This was completed in October. Since then traffic has been moving over it. Motorists all agree that it is the finest road of its type in the state.

The project starts near the town of Baileys and extends to a point a short distance east of Shawnee. It leaves the river at Baileys and follows a winding route along the foot of the hills on the south side of the river, giving an unexcelled view of the beautiful range of mountains on the north side of the canon.

The survey for the road was made by G. F. Galloway of the state highway department. All of the grading and excavation was done by county workmen with A. R. Knisely as foreman. The total cost of the project was $16,613.55, all of which was state funds, the project costing the taxpayers of Park county not a single penny of extra expense.

Cost of the project is considered remarkably low, when it is compared with other projects of a similar nature. In fact it has been claimed that this piece of construction holds a record for low costs, all conditions considered, including the excellence of the finished roadway.

To mention the Bailey-Shawnee project without calling attention to the prominent part played by George S. Singleton, member of the Park county board of commissioners, in its construction, would be an injustice. This road is a great tribute to his untiring efforts as a road official. He was active in its construction from the time of its inception to its completion.

But he does not take full credit. He shares this with those who co-operated with him in procuring the necessary funds and in the actual construction of the road. In commenting on the project recently, Commissioner Singleton said:

"I made an effort to personally supervise this piece of work and was on the

(Continued on Page 14)

County Commissioners Organize

AN organization of the county commissioners of the Third Highway District, comprising thirteen counties in the San Juan basin and San Luis valley, was formed at a meeting held in Alamosa on August 11.

C. P. Jensen of Conejos county was elected president; George S. Neibuhr, of Huerfano county, T. S. Reavies, Archuleta county, and L. G. Carpenter, Mineral county, vice presidents, and Robert Ginn, Alamosa, secretary and treasurer.

The organization is to be known as the County Commissioners Association of the Third District. One of the principal objects of the organization is to promote a more rapid, effective and permanent road program in southwestern Colorado.

S. P. Long of Alamosa acted as chairman and Robert Ginn as secretary of the organiation meeting. B. B. Allen of Silverton, member of the State Highway Advisory Board from the Third District, was the first speaker on the program. He spoke on the objects of the meeting, and told of the success attained by his home county thru organization and co-operation in road building.

Among the speakers representing the State Highway Department were Major L. D. Blauvelt, state highway engineer; Robert H. Higgins, state superintendent of maintenance, and Edwin Mitchell, state highway auditor.

Major Blauvelt expressed appreciation for the splendid co operation which the state highway department has received from the commissioners the past year.

He felt that this co-operation from the commissioners made it possible for the department to show more progress in construction and maintenance work this year than during any previous period. He stated, however, that still more progress could be made by a more uniform system of maintenance.

He said that the motorists of the state are demanding a uniform system of maintenance irrespective of county lines He also suggested that county commissioners in their several district meetings should begin to figure on the future financing of the highway department, and advanced the opinion that the next financing should cover a period of ten to fifteen years.

Mr. Mitchell outlined the manner in which appropriations and accounts of the department are handled. He suggested that a systematic method of financing state road work for the next ten or fifteen years should be presented to the incoming legislature for their appropriate action.

As no further funds are available, he said, future bond issues will have to be taken care of by a direct tax, and suggested that inasmuch as construction work will continue for at least fifteen years, that a system should be worked out whereby the department can be placed on a "pay as you go" plan.

With the co-operation of the county commissioners and the legislature, he said that the department can be financed, whereby after 1925 that portion of the $6,000,000 bond issue which has already been issued, can be redeemed and the department placed on a "pay as you go" basis.

Other speakers were County Attorney A. L. Moses of Alamosa, and A. P. Conner of the California State Agricultural college.

By-laws were drafted by the following committee: Attorney Ralph L. Carr, Conejos county; James H. McHolland, La Plata county, and George Neibuhr, Huerfano county.

A resolution was passed by the association advocating the restoration of the one-half mill tax for road purposes, which was repealed in the last session of the legislature. It was also moved that the legislative committee should communicate with the other highway associations of the state, asking for their support in this matter.

State Senator W. H. Adams of Alamosa was elected an honorary member of the association.

A special committee was appointed by the chairman to draft a three year road program to be carried out in the third district. Members of this committee are: R. A. Chisholm of Rio Grande county, Ed Myer of San Juan county and Hal Barnes of Huerfano county.

The following counties were represented at the meeting:

McHolland, La Plata county.
W. E. Tyner, La Plata county.
B. B. Allen, San Juan county.
Ed Myer, San Juan county.
T. S. Reavis, Archuleta county.
W. E. Christie, Hinsdale county.
J. H. Hammond, Hinsdale county.
Hal Barnes, Las Animas county.
Haggio Cordova, Las Animas county.
George S. Neibuhr, Huerfano county.
Robt. Young, Huerfano county.
S. P. Long, Alamosa county.

(Continued on Page 14)

Cripple Creek, the famous mining town of Teller county, as seen from one of Colorado's modern highways.

View of State Highway at entrance of Big Thompson Canon, in Larimer county.

Automobiles Show Big Increase

In Colorado there is an automobile for every five people. There are enough passenger cars and trucks in operation to permit the loading of the state's entire population into motor-propelled vehicles. On July 1 there were 186,926 motor vehicles in this state, 173,856 passenger cars and 13,070 trucks. In addition there were owned and operated 1,723 motorcycles.

Colorado stands near the top of the list of states, so far as motor cars per number of population is concerned. The state's splendid highways and its unrivaled scenic attractions, experts believe, have a great deal to do with the large number of motor vehicles operated in the state.

The increase of motor cars and trucks over 1923 is remarkable. It speaks volumes for the fine financial condition which prevails in the state. People that are not financially able cannot and will not purchase passenger automobiles and trucks.

Statistics prepared by the state motor vehicle department under the direction of Secretary of State Carl S. Milliken reveal that during the first six months of 1924 not less than 19,156 more passenger cars and 2,010 more trucks were licensed than during the same period in 1923. The fees collected on these machines have increased from $1,024,408.36 to $1,143,289.99. And the end is not in sight yet. Attaches of the motor vehicle department predict that the number of automobiles in operation will be increased by several more thousands before the end of the year.

The following table shows the number of machines and trucks licensed in each county the first six months in 1924, together with the amount of fees collected:

1924			
Counties—	Passenger Cars	Trucks	Fees Collected
Adams	3,567	502	$ 24,900.75
Alamosa	1,172	67	7,097.89
Arapahoe	3,772	303	23,842.34
Archuleta	249	14	1,315.55
Baca	1,192	195	7,930.28
Bent	1,445	59	8,078.06
Boulder	7,453	421	47,372.74
Chaffee	1,175	52	7,156.43
Cheyenne	809	73	5,061.08
Clear Creek	293	23	1,962.69
Conejos	747	31	4,145.15
Costilla	357	22	2,046.41
Crowley	1,029	94	6,402.85
Custer	345	42	2,183.16
Delta	2,101	210	13,898.07
Denver	50,628	3,581	361,180.31
Dolores	50	2	221.51
Douglas	869	62	5,399.75
Eagle	350	30	1,910.64
Elbert	1,312	57	7,568.18
El Paso	9,687	550	66,951.30
Fremont	3,879	258	24,127.76
Garfield	1,172	76	7,115.89
Gilpin	116	5	649.40
Grant	357	21	1,737.74
Gunnison	698	23	3,787.92
Hinsdale	41	4	286.78
Huerfano	2,583	112	15,340.14
Jackson	288	18	832.87
Jefferson	4,217	398	27,446.28
Kiowa	737	68	4,487.86
Kit Carson	1,890	256	13,101.88
Lake	448	6	2,554.35
La Plata	1,223	58	7,286.21
Larimer	7,211	401	45,701.26
Las Animas	5,136	321	32,617.36
Lincoln	1,460	168	9,489.84
Logan	3,496	303	21,128.52
Mesa	3,942	282	24,849.76
Mineral	86	10	471.41
Moffat	536	26	3,030.42
Montezuma	530	47	3,473.76
Montrose	1,629	146	10,406.14
Morgan	3,475	191	20,698.57
Otero	4,315	251	26,173.39
Ouray	251	9	1,461.57
Park	391	33	2,415.37
Phillips	1,664	259	11,635.26
Pitkin	164	0	742.00
Prowers	2,325	173	14,617.94
Pueblo	9,396	584	59,836.80
Rio Blanco	305	13	1,566.39
Rio Grande	1,459	217	10,589.49
Routt	1,047	29	5,262.56
Saguache	813	98	5,244.81
San Juan	71	9	449.80
San Miguel	286	22	1,826.55
Sedgwick	925	107	6,033.37
Summit	178	4	820.49
Teller	774	44	4,494.07
Washington	1,844	385	13,787.58
Weld	11,204	730	69,174.01
Yuma	2,692	515	19,920.28
Total	173,856	13,070	$1,143,289.99

THE LAKE CITY HIGHWAY

Many tourists and others who have passed over the highway between Creede and Lake City have spoken in the highest terms of the splendid road which is now nearing completion on the upper Rio Grande and leading over the divide to Lake City, all in Hinsdale County.

The road presents some of the finest scenic attractions in the state, the roadbed is smooth, broad and with no steep hills or short turns and is the finest piece of mountain road in the state.—Creede Candle.

COMMISSIONERS URGE ALL-YEAR ROADS OVER MOUNTAIN PASSES

Importance of keeping state roads over mountain passes open for travel throughout the year was the principal subject of discussion at the quarterly meeting of the Fifth Highway Association of County Commissioners, held in Leadville on August 23.

Richard Quinn, of Teller county, reelected president of the association, declared that blocked pass roads during the winter months was an economic loss, and outlined a plan which he believed would solve the problem at a small expense.

He said that the State of Colorado had invested approximately $50,000,000 in road improvements, and that the state does an annual tourist business of about $43,000,000, much of which is dependent upon good roads.

Various types of snow plows were discussed. Attention was called to the success attained by the State Highway Department in clearing ten feet of snow from the roadway over Berthoud Pass, and the V-type plow which was used this last spring on the Pikes Peak auto highway.

An urgent plea was made by several of the speakers for a closer co-operation of officials with the state highway department, as well as between road commissioners with adjoining counties.

A shortage of funds for maintenance purposes in many of the counties was reported. Several of the commissioners stressed the necessity of sufficient funds to keep the roads in good repair and smooth condition for all-year travel. The commissioners said it was a wanton waste of the taxpayers' money to build good roads and fail to make provision for their maintenance.

A uniformity of maintenance in all of the counties of the state was urged by some of the speakers.

Officials reported the roads in better condition and that more rapid progress was being made this year than ever in the history of the state.

Among those who attended the meeting were:

Richard Quinn, Teller county; R. F. Somekson, deputy county clerk, El Paso county; T. J. Ehrhart, of H. W. Moore & Co., Denver; J. H. Habernicht, commissioner of Chaffee county; Miss Ame Donley, Buena Vista; Jack Wood, commissioner, Elbert county; John A. Crook, Denver Iron Works, Denver; H. A. Foster, H. P. Wilson & Co., Denver; Frances F. Lyons, El Paso county; Mell DeWitt, county commissioner, Chaffee county; D. N. Stewart, state highway maintenance supervisor, Colorado Springs; W. J. Parks, county commissioner, Elbert county; Harold Senter, county attorney, Douglas county; J. Oscar Cell, county commissioner, El Paso county; E. Montgomery, division engineer, state highway commission; A. I. Johnson, county commissioner, Cheyenne county; J. I. Wolf, Burlington, Kans.; Robert T. Tweedt, Clinton Held company, Denver; O. L. Lester, El Paso county; A. B. Lucore, Anton Olson, Ralph H. Wood, Charles Giles, James T. Peyton, all of Lincoln county; Viga Johnson, county attorney, Cheyenne county; Harry Littlefield, engineer, El Paso county; Frank Vogler, Colorado Springs.

Maintenance outfit of La Plata county taking "wrinkles" out of State Highway west of Durango.

MULNIX GETS BIG PREMIUM IN SALE OF STATE HIGHWAY BONDS

A premium of $16,949.50 was realized by the State of Colorado when $1,000,000 of the second series of state highway bonds, authorized by vote of the people in November, 1922, was sold by State Treasurer Harry E. Mulnix during the last week in August.

Mulnix is authority for the statement that this price was the highest ever obtained by the state for any of its securities. At the price they will net the purchaser 3¼ per cent.

The issue was purchased by the International Trust Co. of Denver, which has been a steady buyer of highway bonds ever since the state adopted the policy of financing its road construction program in part from bonds.

The bonds were sold in two lots of $500,000 each, delivery of the first lot to be made on September 5 and the balance on December 1. But, say highway officials, delivery of the second lot will probably be asked for at an earlier date, due to the fact that the unusually heavy construction of highways this year will exhaust the department's financial resources before December 1.

The sale of the bonds in two lots was made at the suggestion of Governor William E. Sweet, who announced that such a proceeding would result in the saving of several thousand dollars to the taxpayers of the state. The governor at the same time made it known that he would consent to earlier delivery of the bonds, should the highway department's requirement for money make such a course necessary.

The premium of $16,949.50, together with accrued interest of $6,527.80, has been placed in the sinking fund, and becomes available for the payment of interest and amortization.

Of the $6,000,000 of bonds authorized, thus far $2,500,000 have been sold, and of this amount $360,000 has been retired with the state highway department's one-half of the automobile license fees. There is at present $2,140,000 of these bonds in the hands of the investing public.

Due to the efforts of State Treasurer Mulnix the bidding for the bonds was participated in by nearly every investment banker in Denver. The high price obtained was largely due to this spirited bidding.

MODERN ROAD CONSTRUCTED INTO TIN CUP CAMP AFTER FORTY YEARS

After forty years the famous mining region of Tin Cup located northeast of Gunnison is about to be opened to the public as a new Colorado playground and mineral territory, thru the construction of a modern automobile road.

This new road in which the forest service has co-operated with the county of Gunnison in building, will cost between $40,000 and $50,000. The road follows a water grade and is known as the Taylor river road. The forest service has spent $25,000 on its contract, and Gunnison county has agreed to complete the connecting link by rebuilding the old county road 16 miles from Almont, a large part of which was constructed this summer.

Tin Cup was the first mining town to be started when the overflow of mining men and prospectors struck out over the mountains from Leadville in 1878-79. Precious minerals were found in large quantities, but, like all other mining camps in Colorado, after the excitement was over, the camp commenced to go down hill, the expense of hauling the ore to the railroad being so great it was unprofitable to mine the mineral.

Now all that is left of Tin Cup are a few tumble-down shacks where once was a booming town of a couple of thousand. Tin Cup lies in the edge of Taylor Park, which is surrounded by mountains, and its area is about 40 miles long and 10 miles wide. In this park were found the first placer gold across the divide. Fred Lottes, one of the pioneer prospectors who made his way into that section as early as 1868, panned gold on what is known as Lottes creek, named for him.

More or less dredge work has been done for placer gold, and many efforts have been made to find the veins on the mountain sides from which the precious metal is supposed to have been washed.

REPORTS FROM THE DIVISIONS

CUMBRES HIGHWAY OPENED TO TRAVEL

Although the new Cumbres highway leading from Antonito to Durango and connecting the San Luis valley with the San Juan basin is not entirely completed, it is reported in good shape for travel. It provides a muchly needed new avenue connecting these two vastly rich empires of the state. The road passes through the Sangre de Cristo range and negotiated the continental divide by way of Chama and Pagosa Springs to Durango, thence connects with the Durango-Mancos road for the Mesa Verde park.

The Cumbres highway leaves the valley at Antonito and follows the canon of the Conejos river a distance of about 25 miles, when it crosses the river and winds to the summit of La Manga pass, then down to the Los Pinos river. It then winds to the summit of Cumbres pass and drops to the Chama river, which it follows at water level to Chama.

The new road gives Durango an outlet to Denver that does away with the heavy grades and sharp curves of Wolf Creek pass that are objectionable to tourists unused to mountain motoring and its opening will bring an army of tourists here that otherwise would not visit this section. In addition, the Cumbres highway will be of lasting benefit to the residents of both the San Luis valley and the San Juan Basin. It is a federal aid project and is a scenic highway second to none in beauty.

QUARTER MILLION DOLLARS SPENT ON CONCRETE PAVING NEAR PUEBLO

More than a quarter of a million dollars' worth of State Highway paving in southern Colorado has been completed within the past few weeks, including projects in Pueblo, Las Animas, and Otero counties.

The ten-mile stretch from Pueblo to Vineland is now completely paved with concrete and opened to traffic. The full length of the paving was thrown open to travel September 8. The last work completed was the three-mile project of Lindsey and Dolan, Denver contractors, whose work was carried to completion by their bonding company upon failure to carry out the work as stipulated. This stretch of work cost approximately $95,000.

Three-fourths of a mile of concrete paving adjoining the Lindsey and Dolan job to the east on the Santa Fe Trail was completed and opened to travel August 1. A. W. Colt of Las Animas, contractor, laid the concrete at the rate of 180 feet a day. The cost was $30,000.

These two projects connect up with two other three-mile projects laid four and seven years ago. The pavement now carries more traffic than any other highway in southern Colorado.

State highway paving east of Rocky Ford has been opened. It is one and one-half miles in length and cost approximately $50,000 and completes the Swink link in the Santa Fe Trail.

Three miles of concrete base-black top paving north of Trinidad has also been completed. Stamey-Mackey, Hutchinson, Kansas, contractors, made rapid progress on the $100,000 piece of work. It has a concrete base with a two-inch asphalt top.

All of these concrete highways have four-foot gravel shoulders.

TWO SHIFTS OF MEN WORK TO FINISH APPROACHES TO NEW SAPINERO BRIDGE

Two shifts of men are at work completing the grading and gravel surfacing on the Sapinero bridge approaches in Gunnison county. It is expected that this project, which comes under Federal Aid specifications, will be completed by Oct. 1. Traffic has been moving over the new bridge since early June.

Supt. T. J. Welsh reports that his project on Red Mountain should be completed by the last of September.

A new Northwest dragline is being operated by Winterburn & Lumsden on a grading project east of the city limits of Fruita, according to W. G. Johnson, acting resident engineer.

It is reported by Engineer H. T. Reno that the contractor on the grading and gravel surfacing project west of Gunnison should have no trouble in finishing up before snow flies. Contractor Morrison now has the grading 40 per cent complete.

Work has been suspended on the Rangeley road north of Grand Junction for the year due to lack of funds. This road forms a direct route to Vernal, Utah.

NEW JULESBURG-BIG SPRINGS ROAD IS BEING CONSTRUCTED

Work was commenced early in August on the building of a new road between Julesburg and Big Springs, Nebr., a large caterpillar tractor and elevating grader being on the job under the supervision of the Deuel county (Nebraska) commissioners. The work is making rapid progress, which is very pleasing to those who have long wished to see work commenced on this road. A new grade is being built north of the old road and on a new right-of-way off of the Union Pacific right-of-way. The new road, when completed, will provide a much needed thoroughfare between this city and Big Springs, and will eliminate a road that is one of the poorest in this part of the West at certain times of the year, and never good at any time. It has been a bugaboo to travel to and from Colorado for a number of years, and it is indeed pleasing to note that work is now in actual progress towards remedying the situation.

CONTRACTORS SHOW GOOD PROGRESS ON THREE GRAVEL SURFACING JOBS

Approaches on the new Piedra bridge between Bayfield and Pagosa Springs have been completed, and work on the steel structure is nearing completion. This bridge replaces an old wooden structure which has served traffic for a number of years.

J. Edd Hansen expects to complete the five-mile gravel surfacing project between Durango and Hesperus about Oct. 1. About the same time Dale Hinman will finish three miles of gravel surfacing between Durango and Bayfield.

By the end of September the new three-mile stretch of gravel surfacing south of Durango should be completed. This work is being done by Mishon, Engler & Teyssier. This same firm of contractors have set up their gravel plant for surfacing two miles of road between Cortez and Dolores.

The state-owned steam shovel under Foreman Roy Mooney is showing splendid progress on Wolf Creek Pass. The shovel is now operating on Fourth of July cliff.

NEW BRIDGE ACROSS SLATE CREEK NEAR DILLON READY FOR TRAFFIC

The new 100-ft. steel bridge over Slate creek, fourteen miles north of Dillon, has been completed, and the contractors, Rogers & Pickard, are now constructing the approaches. This bridge spans the Blue river and affords traffic a splendid crossing at a point that has been difficult to negotiate in past years.

Winterburn & Lumsden, contractors, on the project near Debeque, consisting of seven miles of grading, have sublet most of the work. Construction has been started with a large force.

A defective screening plant has delayed the work on the gravel surfacing on Muddy Pass under contract to Henry Shore and Ward Wren. Only a small force is employed.

Slow progress also is being made by Contractor A. L. Hockett on his contract located at Gypsum, according to Engineer H. L. Jenness.

PAVING PROJECTS IN DIVISION NO. 7 SOON READY FOR TRAFFIC

During the month of August nearly two miles of paving was placed by W. F. Pigg & Son, between Fort Morgan and Brush, and it is expected that this project will be entirely completed by Oct. 1. The pavement southeast of Merino, which was laid by this same firm, was opened to traffic.

These contractors are to be commended for the speed with which they conducted their work and the excellent results which are being obtained. A force of teams is now engaged in building shoulders for the two projects.

Paving between Loveland and Berthoud which was under contract to F. C. Dreher was completed the latter part of August. That portion of the project as far south as Campion has been opened to traffic, thereby eliminating the only objectionable detour encountered between Loveland and Berthoud.

Baldridge & Son, of Colbran, Colo., have been awarded a contract by the Forest Service for the construction of six miles of new road in the Grand Mesa National forest, being a link in the proposed McClure pass road.

WESTERN ENGINEERS DISCUSS NEED OF FUNDS FOR HIGHWAYS

The scarcity of funds available for the great mileage of necessary highway improvement—the ever-present handicap to the progress of highways in the public land states—constituted the chief topic of discussion at the semi-annual convention of the Western Association of State Highway Officials held at Yellowstone National park recently.

It was the unanimous conclusion of the convention delegates that by far the greater proportion of these roads must be of gravel surface construction, and a special committee was appointed to make an intensive study of contemporary gravel road construction methods and to make a report of its findings at the next session of the association, to be held in San Francisco in November.

Plans for future activities of the organization were outlined by President Howard C. Means, state highway engineer of Utah, in his address to the convention.

President Means indicated that such committees as are still in existence should continue their work, and that a more definite policy should be adopted by the organization relative to highways in national parks in addition to the continuing of post roads and forest highway activities.

Z. E. Sevison, state highway engineer of Wyoming, addressed the meeting on the subject of gravel road construction, emphasizing the fact that the western states have obtained far better results along this line than the eastern states, and giving as the reason for this the fact that the eastern states have considered gravel roads only temporary structures, to be replaced by a more expensive type of highway, while the western states have striven to construct gravel highways on a permanent basis.

Delegates in attendance included:

B. J. Finch, district engineer, bureau of public roads, Utah; William J. Hall, commissioner of public works, Idaho; R. J. Templeton, district engineer, Wyoming; Henry H. Blood, commissioner, Utah; H. W. Gregory, director of highways, Idaho; R. L. Silver, district engineer, Wyoming; L. D. Blauvelt, state highway engineer, Colorado; C. B. Wood, district engineer, Wyoming; Floyd O. Booe, auditor, state highway department, Nevada; T. D. O'Neil, Wyoming; L. E. Laird, state highway superintendent, Wyoming; H. W. Lunt, commissioner, Utah; George E. Goodwin, national park service; Randall L. Jones, Union Pacific system; Howard C. Means, chief engineer, Utah; Z. E. Sevison, state highway engineer, Wyoming; J. H. Johnson, district engineer, bureau of public roads, Colorado; L. I. Hewes, deputy chief engineer, bureau of public roads, San Francisco; George W. Borden, state highway engineer, Nevada.

FOR WIDE HIGHWAYS

The highway problem of today is one of mileage but also of width. There are many miles of good sectional, intersectional and transcontinental roads but in many instances these roads are not wide enough for the rapidly multiplying traffic. While energetically engaged in the building of hard-surfaced roads, it is found in more congested localities that these roads are inadequate. The result is that there is a highway problem hardly less serious than when this was a country of dirt roads.

Lack of foresight can be charged, but even now where the need for wider highways is recognized roads of obsolete width are being built. Where the facts are known there can be no foresight.

The real reason broader thorofares are not being laid is that appropriations for the purpose have been limited and mileage has been sought first of all. It is natural for each generation to take care of itself before it thinks of the next generation. The first need was for hard-surfaced roads, regardless of width. It is coming to be for wide roads.

A precedent is found in the former conflict between temporary improved highways and permanent surfaces. More miles of temporary surface than of permanent surface could be constructed for the same money but after a year or two the temporary surface had to be rebuilt.

In its haste for improved mileage the public dissipated its common wealth in the construction of temporary highways until it learned at great expense that the permanent road was the cheapest in the end. The same lesson will be learned with respect to roads of proper width.—Colo. Springs Gazette.

A new prosperous farming community in the northeastern part of Pueblo county is opened up to Pueblo by a new highway connecting up with Hanover and Highlands. Ten miles of grading was necessary and a bridge was built across Chico creek.

Road News, Views and Gossip

BUS COMPANIES SHOULD PAY

Undoubtedly the majority of thinking, conservative residents of this state who are familiar with the condition of our highway system, are of the opinion that it is an extravagant policy to attempt to keep in good condition gravel surfaced roads that are subject to as much wear and tear as are many of the trunk highways.

It has been conclusively shown that gravel roads will not stand up under the heavy traffic, irrespective of the amount of maintenance put on them. These roads go to pieces in wet weather and leave the well-known washboard effect. Likewise they become deep in dust and sand in dry spells.

A fine case in point is the road between Denver and Colorado Springs. There is no question but what the only practical and economical policy to follow is to hard-surface it. The majority of motorists who drive on that road frequently would be perfectly willing to pay a special tax levy to cover the cost of the hard surfacing. At the end of the season it would mean a saving for them.

The state highway department this year has made a splendid start in the paving of this important link in the trunk highway system. At present five contracts for paving are under way on the road, three extending from Colorado Springs north, and two south of Wolhurst, including an underpass crossing at the latter point, which will eliminate one of the worst death trap crossings in the state.

It is announced by Highway Engineer Blauvelt that a contract for ten miles of paving south of Gann, extending to Castle Rock, will be let at an early date. The detour to be used during the construction of this piece of roadway has already been completed and is ready for use.

Further extensions of this pavement are in the cards during the next few years. In the meantime, as good maintenance as available funds will permit, will be carried on on the unpaved section.

It has been suggested that increased motor vehicle fees and a higher gasoline tax will help the situation somewhat, and will spread the cost of maintenance to all those using the highways. In making these adjustments it has been suggested that the bus and truck transportation companies be made to pay their fair share of the cost of maintenance.

Under the present system, for a nominal sum they have given to them by the taxpayers of this state in the free use of our excellent system of trunk highways, a large portion of their operating equipment. This equipment, like that in any other business, depreciates with wear; constant repairs are necessary.

Those companies should be made to contribute a substantial percentage of the returns from their business for the maintenance of the highways which they use to such good financial profit for themselves.

With an increase of funds for maintenance other funds could be released for construction of pavements.

"PAY-AS-YOU-USE"

A man who drives his automobile 15,000 miles during the year gets five times as much use out of our highways as the man who drives his car only 3,000 miles. The gasoline tax equalizes this difference, requiring the man who drives the most to pay the most in highway taxes. In other words, the farmer who uses his car largely for the purpose of occasionally driving to town is not compelled to pay as high a tax on the same make of car as the man in town who drives hundreds of miles every week.—Exchange.

HOLDING UP YOUR END

Years ago when taxes were "practically nothing" in comparison with what they are today, people nevertheless made a big cry against "high taxes." Municipal, county and school district expenses were always considered too high by many, and there was a constant demand for retrenchment. Today we would consider that the people of the former generation were left off pretty easy despite all their clamor. It seems to be human nature to begrudge any contribution towards benefits in which our neighbors share equally with us.—Exchange.

CAMERON PASS ROAD WILL BE COMPLETED THIS YEAR

A steam shovel and over 50 men and teams are working on the last unit of the Cameron pass highway, and it is to be completed this year. When it is put in use next season, this new road across the Medicine Bow range will become one of the most popular routes between Steamboat Springs and Denver, as it is devoid of all heavy grades.

From Walden to the summit of Cameron pass is 28 miles, and from there to Fort Collins is 70 miles, making the total distance from Walden to Fort Collins 98 miles, compared with 126 miles by the present route via Laramie, Wyo. From Walden to Denver will be 166 miles, or practically the same as between Steamboat Springs and Denver, and by the new route there are no grades necessitating the changing of gears.

The distance from Steamboat to Walden is 62 miles, via Rabbit Ears pass, and by way of the new Cameron pass highway it will be 160 miles to Fort Collins and 228 miles to Denver.—Steamboat Sentinel.

IMPORTANT DATA DEVELOPED BY TRAFFIC SURVEYS

Analysis of the character of travel over a given route not only develops specific data regarding that particular road, but often reveals interesting facts of a general nature, applicable to highway problems in other localities. For example, the average number of vehicles per day passing over a certain trunk line may vary widely in defferent parts of the country, but the proportion of pleasure and commercial cars, the size and loading of motor trucks, and the speed of automobiles, as determined in one district, will serve as a guide for other similar districts, because these relative figures disclose conditions that exist to pretty much the same degree on all modern highways.

An instructive transportation survey in Connecticut, conducted jointly by the State Highway Department and the U. S. Bureau of Public Roads, brought out some noteworthy points with respect to the actual traffic service which a road has to bear. The period of observation covered the last three months of the year from September 11 to December 2.

The study of the passenger vehicles indicated that 35 per cent were used for business purposes and 65 per cent for recreation. The average business mileage amounted to about 30 per cent of the total, and the recreation mileage about 56 per cent. The number of passengers per business vehicle average 1.7, and per recreation vehicle, 3.

In reference to motor trucks, it was found that approximately one-fourth of the total net tonnage carried was transported over the highways for a distance of less than ten miles; one-half the tonnage from 10 to 69 miles, and one-fourth over 70 miles.

The analysis of the 10,465 trucks, during three months' time, showed that *more than 29 per cent were overloaded beyond their rated capacity.* It proved also that with the increasing width of truck bodies being used, the percentage of overloaded vehicles is becoming still greater.

All this goes to show that, with the tremendous growth in the quantity and density of traffic, our roads are being called upon to stand still greater burdens in the form of impact from super-loaded trucks. If unopposed by restraining regulations, truck owners seem to strive for minimum transportation costs by means of maximum loadings, utterly unmindful of the damage occasioned to the road itself. In the endeavor to build roads which cannot be pounded to pieces even by the most severe traffic, vast sums are being wasted that might be employed to more general advantage in constructing sensibly serviceable highways that would carry normal traffic indefinitely, if protected from abuse by enforced road rules.

NO DOUBT ABOUT IT

Waiting a minute at a dangerous crossing may extend your life many years.

—Stillwater Gazette.

A BILLBOARD FORECAST

"See your home billboards first," is a tourist slogan that may soon be discarded if the big companies continue to see the light and remove the objectionable signs from the highways.—Bemidji Pioneer.

MOTORISTS PRAISE COUNTY BUILT ROADS

(Continued from Page 6)

job almost every day. I feel sure that I had one of the best road foremen in Colorado in charge of the work. He has a splendid conception of how a road should be built to give the greatest amount of riding comfort, and I give him credit for the excellent result.

"Foreman Knisely paid particular attention to the banking of the curves and motorists say they have never driven over a road where the curves were as smooth and as well shaped. He was keenly interested in the project and made every effort to keep the cost as low as possible, with a result that we have a fine road constructed at a minimum of expense.

"In this connection I wish to express a deep appreciation of the assistance given us by Maj. L. D. Blauvelt, state highway engineer, and also for the wholehearted co-operation of Ernest Montgomery, division engineer of the highway department.

"Not once was I turned down when I made trips to Denver for help on the project. And I will say that I made several trips."

The Bailey-Shawnee project was constructed according to standard highway specifications. The road is twenty-four feet in width and runs along a grade not to exceed 2 per cent. It is a link in one of the main arteries of travel from Denver to the western slope and during the summer months is heavily traveled by tourists.

A few miles westerly the motorist starts his ascent over the famous Kenosha pass, which leads into the wonderful South Park country. Along the South Platte river there are a large number of summer resorts which are favored by fishermen and "week-end" parties from Denver.

It has been said by some motorists that the road from Bailey's to Fairplay is the smoothest and finest in the state. Those who have traveled between these two points will not deny the statement. A very efficient county maintenance force is responsible for this splendid condition.

Commissioner Singleton supervised the construction of the boulevard over Kenosha pass, which was built during the war, at a time when labor was scarce. This work was carried out under the most adverse conditions, but thru efficient management and perseverence of those in charge of the project, an unusually fine roadway was constructed.

As a result of methods that have been developed by the Park county officials in recent years, their roads are being kept in good serviceable condition at costs that are declared to be surprisingly low. A study of their methods shows that tneir maintenance units are constantly on the move on the road and that each covers an astonishing amount of surface, thereby reducing the average cost with each mile of improved road.

COUNTY COMMISSIONERS ORGANIZE

(Continued from Page 7)

A. L. Moses, Alamosa county.
Robert Ginn, Alamosa county.
C. P. Jensen, Conejos county.
A. Gonzales, Conejos county.
F. A. Espinoza, Conejos county.
R. L. Carr, Conejos county.
J. L. Morris, Costilla county.
W. D. Parish, Costilla county.
D. S. Jones, Saguache county.
George Woodard, Saguache county.
Williams, Saguache county.
Palmer, Saguache county.
R. A. Chisholm, Rio Grande county.
O. A. Lindstrom, Rio Grande county.
L. G. Carpenter, Mineral county.

The following standing committees were appointed:

Legislative

Alamosa County—Albert Moses.
Conejos County—Ralph Carr.
Saguache County—John I. Palmer.
Rio Grande County—Jesse Stevenson.
Costilla County—E. H. Ellithorp.
La Plata County—R. S. Clements.
Hinsdale County—John H. Hammond.
Mineral County—L. G. Carpenter.
Huerfano County—George H. Blickham.
Las Animas County—O. H. Dasher.
Dolores County—George Snyder.
Montezuma County—Fred Haller.
Archuleta County—John H. Gilbreath.
San Juan County—Wm. A Way.

Road

Alamosa County—John Fultz.
Conejos County—Frank A. Espinoza.
Saguache County—George Woodard.
Rio Grande County—O. A. Lindstrom.
Costilla County—S. N. Smith.
La Plata County—Wm. Tyner.
Hinsdale County—Wm. Christie.
Mineral County—B. C. Husselkus.
Huerfano County—G. A. Goemmer.
Las Animas County—Hal Barnes.
Dolores County—George Snyder.
Montezuma County—Fred Hallar.
Archuleta County—T. S. Reavis.
San Juan County—Ed Myer.

Advertising

Alamosa County—John Fultz.
Conejos County—A. Gonzales.
Saguache County—Dan Jones.
Rio Grande County—R. A. Chisholm.
Costilla County—J. L. Morris.
La Plata County—J. A. Bell.
Hinsdale County—D. S. Baker.
Mineral County—Jas. A. Soward.
Huerfano County—Thomas Martinez.
Las Animas County—Joe Ray.
Dolores County—George Snyder.
Montezuma County—Fred Hallar.
Archuleta County—W. E. Colton.
San Juan County—Clay Johnson.

THE MIDLAND HIGHWAY

(Continued from Page 4)

The eastern portion of the highway from Leadville is a splendid road, with a minimum width of 18 feet. Another advantage seldom found in mountain roads is the easy grades—the greatest between the two points being 1.8 per cent. There are many steeper grades within the limits of Colorado Springs.

From the west portal of the tunnel toward Nast the road is approximately 95 per cent completed, according to a report received from H. L. Jenness, engineer of that highway division.

The old railroad right-of-way has to be put to grade only between the west portal and Nast, two-thirds of the distance between the tunnel and Glenwood Springs. From Nast to Glenwood Springs there is a county road over the old right-of-way. It is in excellent condition and has been open to travel for some years.

A most important advantage of the new route from the east to west slope is the Busk-Ivanhoe tunnel at Hagerman pass. In place of the steep grades on the Pikes Peak Ocean to Ocean highway over Tennessee pass and the road over Berthoud pass, the tunnel affords a direct and easy mode of travel.

The bore is two miles long. Some indication of the easy grade thru the tunnel may be realized from the fact the west end is but 139 feet higher than the eastern portal.

The bore is 18 feet wide and 24 feet high. The supporting timbers reduce the average width to 16 feet—wide enough for two lines of traffic. There are numerous large turnouts, blasted out for storage purposes when the tunnel was under construction.

Under present conditions this tunnel could not be duplicated for less than $3,000,000. Thru the public-spirited generosity of the donors it was made available to the motoring public without construction cost to the state, other than the expense involved in changing the roadbed to a highway.

When first planned, it was intended to cover the floor of the tunnel with four-inch planks and to run a considerable volume of water thru it from the west to east slopes. Those plans have since been modified.

Instead of the plank road, the highway thru the tunnel will be graded and surfaced with gravel. A smaller amount of water than was originally planned will be run thru, probably in an open ditch for a while. Eventually the ditch will be covered.

The only obstacle encountered in the tunnel work thus far has been a cave-in near the east portal. Debris and gravel cover the tunnel for a short distance as a result. Much of this gravel is of such a nature that it was removed and used for surfacing.

C. A. Switzer has the contract for the tunnel part of the project. The state was loaned a half dozen specially dump wagons and these are being taken from Fairplay to the tunnel.

It is estimated the tunnel work will be finished about the middle of September and in the meantime the highway completed from the west portal to Nast. That will give motorists a full month, possibly longer, during which the road can be easily negotiated. Thereafter, drifting snows, prevalent at that altitude, will probably block travel for the winter months.

The state is availing itself of the gift of the Midland right-of-way by constructing another link in the east-west highway system between Florissant and Howbert, thru the beautiful Eleven-Mile canon. Like the Leadville-Glenwood Springs route, easy grades prevail thruout.

The Florissant-Howbert section was opened for travel the middle of August. This project will cost in the neighborhood of $90,000 when finally finished.

The Florissant-Howbert and Eleven-Mile canon route eliminates the present difficult climb over Wilkerson pass. It is somewhat longer than the present road, but the advantages of easy grades and wonderful scenery offset the greater distance.

ARKANSAS VALLEY COMMISSIONERS TO MEET IN PUEBLO ON SEPT. 22

The next meeting of the Arkansas Valley Association of County Commisioners will be held in Pueblo during the week of the Colorado State Fair, Sept. 22 to 27. More than 100 county officials from Pueblo, Las Animas, Crowley, Otero, Huerfano, Fremont, Baca, Chaffee, Prowers, Kiowa, and Custer counties are expected to attend.

Special displays of highway equipment will be found at the state fair. After a short business session, the commissioners and their families will go to the fair as the guests of the Colorado State Fair Commission. Exact date of the meeting has not been announced by President Joe Ray of Trinidad.

Contractors' Column

Structural steel for the new bridge over the Santa Fe tracks in Pueblo, which forms a part of the Conservancy district program, will be furnished by the Minneapolis Steel & Machinery Co., of Denver. Contract for the steel was signed on August 17. The bridge will be erected by the Pueblo Bridge & Const. Co. The Minneapolis company's bid was $93.80 per ton, and 355 tons of steel will be required. Other bidders were the Mt. Vernon Bridge Co., Mt. Vernon, Ohio; Kansas City Structural Steel Co. and the American Bridge Co., Denver. The bridge will be located on Union avenue and will span the new river channel.

Traffic started moving over the new highway through Eleven Mile Canon, which extends from Florissant to Howbert, on August 17. The roadbed of the defunct Colorado Midland Railway is used on this stretch of highway. Levy Bros. Const. Co., of Denver, were the contractors.

Contractor W. K. Johnson has a force of 100 men at work on a new piece of road work running through Ironton park on the Ouray-Silverton highway. A dragline is being used to throw up the dirt on the roadway, which traverses a swamp. The new roadway runs across the swamp a distance of 7,200 feet. Johnson expects to finish the job before snow flies.

Work has been started by Contractor W. C. Christensen on twelve miles of new roadway along the Conejos river, which forms a part of the recently completed highway over Cumbres Pass. Christensen built the section of this road over La Manga Pass. The highway connects the San Luis Valley with the San Juan Basin.

Robt. Hinds & Co., Denver contractors, have completed a one-mile link of concrete highway east of Boulder, connecting with the North-South highway. The road is now open to traffic. Hinds did this work on a sub-contract from J. Fred Roberts & Co.

Excavation has been started by Winterburn & Lumsden on their contract near Debeque. Ed. Winterburn is in active charge of the work. C. J. Mapes is foreman of the concrete gang. A dragline will be used on some of the work.

CONCRETE POURING ON WOLHURST ROAD FINISHED BY CONTRACTORS

Brodie and Anderson, contractors, finished pouring concrete on the four-mile extension of the pavement on the North and South highway south from Wolhurst, in Douglas county, during the last week in August. As soon as the shoulders have been laid this piece of pavement will be thrown open to traffic, motorists making use of the old crossing at Wolhurst, to get on the pavement, until such a time as the double underpass crossing under the D. & R. G. W. and Santa Fe railroads at Wolhurst has been completed.

Unless there is some unforeseen delay the underpass under both sets of tracks will be finished late this fall. The crossing under the D. & R. G. W. tracks is finished, and a crew of expert bridge builders is now engaged on the abutments of the Santa Fe underpass.

Contractor M. J. Kinney late in August finished taking out the dirt from under the latter road's tracks. Another large bridge crew of the Santa Fe railroad has finished putting in place the falsework on the underpass at Breed, five miles north of Colorado Springs.

Highway department officials say that the Breed underpass, together with some six miles of concrete pavement north of Breed, will be open to traffic before snow flies again.

PUEBLO COUNTY INSTALLS GUARD FENCE TO PROTECT AUTOMOBILISTS

Pueblo county commissioners have installed 2,500 feet of "Hi-Way Guard" fencing along dangerous places of the county highways. The heavy wire netting is three feet wide and is fastened to four-inch steel posts embedded in two feet of concrete. The wire is two feet above the ground. Vehicles striking the fence are kept from going thru it and the elasticity of the material tosses it back into the roadway. The fence has been installed on Beulah, Rock Creek and other dangerous hills, at approaches to narrow bridges, at bad curves and other places where it can be a safeguard to human lives. It is painted white and commands attention at night. It has been placed on the Colorado Springs, Canon City, Beulah, Walsenburg, Ordway and La Junta roads.

The Bulletin Board

SIPHON CONSTRUCTION RIVERTON PROJECT U. S. RECLAMATION SERVICE

The photograph illustrates the general layout for the construction of a siphon constructed by the U. S. Reclamation Service near Riverton, Wyoming.

This siphon was 110 ft. long on the level section; the siphon is 14 ft. in diameter; the walls, 16 in. of concrete, contained 1680 cu. yds. of material, 200,000 lbs. of steel, excavation 6,000 yds., back fill 2,800 yds.; estimated cost about $85,000.00.

Practically all equipment used on this siphon was sold by The Herbert N. Steinbarger Company. Two Russell 40-ton bins were used, one on each end; Rex Concrete mixers were used; Archer concrete spouting was used to place the material; two Domestic single diaphragm pumps were used, keeping the water out of the excavation. The excavation was dug with a Bucyrus dragline, the steel was placed with this dragline and the dragline was also used for back-filling.

On the bottom or level section the concrete was poured by chuting it to a hopper and then in carts on a platform constructed over the steel work to other short chutes, which put it in place. The sides were placed direct by chutes from the mixer to the form.

The dragline is Bucyrus, shop No. 354. W. Reeves being Chief Engineer and W. J. Montgomery master mechanic. This is a class 14 gasoline dragline.

P. & H. UTILITY MACHINE

An unusual demonstration of the utility of the P. & H. dragline was given recently in the excavation for the new building of the Colorado National Bank in Denver, according to Paul Fitzgerald, distributor. The P. & H. employed on this job, which is owned by J. Everett Young, was used as a clamshell, a dragline and also for unloading steel from trucks.

At the same time another P. & H. owned by Young was being used for driving piling on a state highway job near Wolhurst. The P. & H. dragline owned by Arvid Olson, general contractor, is now being used to raise materials on the new East Denver High School building. All of these machines are of the convertible type.

LIBERTY REPRESENTS FWD TRUCKS

Announcement is made by Richard Carlson, manager of the Liberty Trucks & Parts Co. of Denver, that hereafter this firm will represent the Four Wheel Drive Truck Co. in the distribution of FWD trucks in Colorado and three western counties in Nebraska. Formerly the FWD was represented in Colorado by Paul V. Jenness, who recently organized the Colorado Haulage Co.

The FWD has had quite a run in Colorado and the Liberty firm will carry a large stock of parts in Denver, thus reducing shipment of replacements to a minimum.

TRENCH PULL SHOVEL

The Northwest Engineering Company of Chicago manufactures what it calls a trench pull shovel, which it claims combines the advantage of the dragline (in that it backs away from its work) with the digging ability of the power shovel.

The shovel is driven by a gasoline motor and is mounted on crawler treads and is highly mobile. As it backs away from its work it is always on firm ground and never has to straddle the trench. It is steered and operated by one man from the cab. On sewer work it digs a square, even sided ditch, slightly wider than its dipper, which comes in sizes of 22, 33 and 42 inches. It has a long reach and it is claimed that it will dig any depth up to 16 feet and deposit on spoil banks with the same ease as a standard shovel.

By a change of booms it can be converted to a dragline in a few hours. If desired, it can be changed to a crane by the use of the dragline boom; and with still another change and an additional boom it can be made into a standard shovel.

BAY CITY BULLETIN

Bay City Dredge Works, Bay City, Mich., has issued bulletins No. 13, 14, 15 and 16, which are devoted to descriptions of the new Model 16-B Bay City convertible crane excavator, with its various attachments, including a ¾-yd. shovel type dipper, skimmer scoop for stripping or road and street excavation, clamshell bucket and ditcher scoop, for sewer, trench and ditch excavation. This convertible machine has attracted considerable attention from contractors on account of its wide range of service in the field. Each bulletin is illustrated with from one to five photographic reproductions of the machine at work, showing the ease with which it operates under trying circumstances.

BARBER-GREENE DITCHER

A new type (44A) Barber-Greene trenching machine has been purchased by the Mountain States Telephone & Telegraph Co. from the H. P. Wilson Co., Colorado distributors. At present this machine is being used in the digging of trenches for new conduits in the Park Hill district of Denver. It digs a trench 18 inches wide and 5½ feet deep. The machine is the first of its kind used in Colorado.

PENROSE BUYS OSGOOD SHOVEL

An Osgood steam shovel has been purchased by Spencer Penrose, Colorado Springs capitalist, to be used in the construction of the new Cheyenne Mountain toll highway, according to Barney Miller, representative of the Osgood company in Colorado. All bids for the construction of the road were rejected as being too high, and it was decided by Mr. Penrose to do the work with local forces. Jerry Coogan, well-known railroad builder, will supervise the work. The road will be fifteen miles in length. Most of it is heavy rock work.

SOME DRIVER

"Are you a good driver?"

"Motor, golf, charity, pile, or slave?"

Showing Equipment Layout on U. S. Reclamation Service Siphon Project near Riverton, Wyo.

BIDS RECEIVED

Proj. No.	Length	Type	Location	Low Bidder	Bid Price
262-A	2.186 mi.	Gravel Surfaced	West of Walsenburg	Central Const. Co., La Veta	$ 19,367.96
270-A	3.429 mi.	Gravel Surfaced	East of Monte Vista	Stamey-Mackey Const. Co., Trinidad	17,667.00
267-A	2.594 mi.	Gravel Surfaced	Model-Trinidad	Pople Bros. Const. Co., Trinidad	25,583.50
272-B	12.920 mi.	Gravel Surfaced	Pueblo-Fowler	Shields & Kyle, Pagosa Springs	103,768.50
279-A	1.439 mi.	Concrete Paved	Denver-Morrison	A. J. Collins, Denver	42,155.50

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

Proj. No.	Length	Type	Location
213-A	3.538 mi.	Gravel Surfaced	Hesperus-Mancos
271-A	3.286 mi.	Gravel Surfaced	Florence-Pueblo
277-A	3.840 mi	Concrete Paved	South of Colorado Springs
278-A	8.409 mi.	Sand-Clay Surf.	Cheyenne Wells, easterly

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

Proj. No.	Length	Type	Location
2 R. Div. 2	1.922 mi.	Paved	North of Trinidad
2 R. Div. 3	0.55 mi.	R.R. grade separation	North of Trinidad
243-B	3.5 mi.	Gravel Surf.	Piedra-Pagosa Springs
253-B	3.065 mi.	Gravel Surf.	Steamboat Springs, west
262-B	0.2 mi.	Concr. Girder Bridge	Alamosa, east
262-C	3. mi.	Gravel Surf.	La Veta Pass, west
272-A	0.2 mi.	Steel Bridge	Apishapa
275-A	7.008 mi.	Paved	Castle Rock-Gann
276	0.2 mi.	Overhead R.R. Cross.	North of Colorado Springs
279-B	6. mi.	Graded	Conifer, south
286-A	0.2 mi.	R.R. grade separation	Between Nunn and Dover
937	2-125' spans	Steel Bridge	Kremmling

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1924

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
2-R	Trinidad, north	3 mi.	Asphalt Pavemt.	Strange-Maguire Const. Co.	$121,934	83	2-R
17-R	Breed-Husted	2.339 mi.	Conc. Paving	LaNier, Selander & White	81,399	79	17-R
102	Ouray-Red Mountain	1.06 mi.	Mtn. Grading	Johnson & Johnson	58,972	100	102
116-A	Colorado Springs paving	4.18 mi.	Conc. Paving	Standard Engr. & Constr. Co.	238,944	81	116-A
116-B	Breed-Husted	0.892 mi.	Conc. Paving	J. L. Busselle & Co.	51,001	57	116-B
116-C	North of Breed	3.163 mi.	Paving and Bridge	LaNier, Selander & White	139,038.45	10	116-C
125	Sapinero-Cimarron	11.3 mi.	Grav. Surf.	Dale Hinman	36,797	76	125
135	Denver-Morrison	5.3 mi.	Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	32	153
174	Red Mountain	3.03 mi.	Mtn. Grading	Pickering Bros.	82,071	91	174
190	Summit County Bridge and Road	1.45 mi.	Grad. & Bridge	Colo. Bridge & Constr. Co.	40,154	84	190
207	Dillon-Kremmling	100 ft.	Truss Bridge	Rogers & Pickard	28,831	76	207
210-B	Grand Valley-Debeque	7.507 mi.	Grading	Winterburn & Lumsden	94,267	1	210-B
213-B	Durango-Hesperus	5.26 mi.	Grav. Surf.	J. Edd. Hansen	72,960	74	213-B
214	Durango-Bayfield	3 mi.	Gravel Surf.	Dale Hinman	53,411.05	90	214
222-C	Broomfield-Lafayette	2.82 mi.	Conc. Pavement	R. M. Larsen	134,933	72	222-C
223-A	Kremmling-Rabbit Ear	2.88 mi.	Grav. Surf.	Henry Shore	30,565	75	223-A
224	Morrison-Baileys	5 mi.	Grading	M. J. Kenney Const. Co.	59,781	79	224
226-B	Brighton-Greeley	2.86 mi.	Conc. Paving	White & Johnson	89,993	86	226-B
226-C	Platteville-Greeley (Div. 1)	4.4 mi.	Conc. Paving	Engr. Const. Corp	120,114	100	226-C
226-C	Platteville-Greeley (Div. 2)	6.335 mi.	Conc. Paving	J. Fred Roberts & Sons	175,647	61	226-C
230-A	Wolhurst, south	0.852 mi.	Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	72	230-A
230-B	Wolhurst, south	3.99 mi.	Conc. Pavement	Brodie & Anderson	153,971	83	230-B
240	Gypsum-Dotsero	5.185 mi.	Gravel Surf.	O. L. Hackett	66,178	58	240
242-A	Grand Junction-Fruita	7.703 mi.	Gravel Surf.	Dale Hinman	81,255	14	242-A
243-A	Bayfield-Pagosa Springs	1.6- mi.	Gravel Surf.	Shields & Kyle	48,311	71	243-A
245-B	Hadley, East	2.711 mi.	Grading	W. A. Colt & Son	21,680	49	245-B
246-A	East of Pueblo	2.537 mi.	Conc. Paving	R. A. White	78,431	77	246-A
246-B	Vineland-Pueblo	0.787 mi.	Conc. Paving	W. A. Colt & Son	29,453	100	246-B
248-A	Buena Vista-Salida	12. mi.	Grading & Surf.	Western Const. Corp.	93,533	19	248-A
251	Lafayette-Boulder	1.1 mi.	Conc. Paving	J. Fred Roberts & Sons	32,670	93	251
252	Loveland-Berthoud	3.2 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,676	81	252
253-A	Steamboat Springs, west	6.50 mi.	Gravel Surf.	Northwestern Cons. Co.	126,374	23	253-A
254-A	Byers Canon	1.057 mi.	Grading	Pioneer Const. & Engr. Co.	72,408	31	254-A
255-A	Ft. Morgan-Brush	2.70 mi.	Conc. Paving	Colo. Bridge & Constr. Co.	85,763	100	255-A
255-B	Brush, west	2.944 mi.	Conc. Paving	W. F. Pigg & Son	92,486	7	255-B
256-B	Merino, northeast	2 mi.	Conc. Paving	W. F. Pigg & Son	53,702	83	256-B
257	North of Denver		Conc. Viaduct	C. C. Madsen	12,178	95	257
258-A	Gunnison-Sapinero	3.239 mi.	Gravel Surf.	R. P. Morrison	34,900	14	258-A
266-A	Durango, south	3.03 mi.	Gravel Surf.	Mishon, Engler & Teyssier	22,223	30	266-A
269-A	Cortez-Dolores	2.172 mi.	Gravel Surf.	Engler & Teyssier	21,215	0	269-A
273	East of Lamar	4.047 mi.	Grav. Surface	W. A. Colt & Son	42,305.30	23	273
281-A	Lafayette, South	1.249 mi.	Paving	Sims & Boston	55,373	2	281-A
281-B	South of Longmont	3.068 mi.	Paving	J. Finger & Son	102,502.40	5	281-B
283-A	Loveland-Berthoud	2.530 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,829	10	283-A

QUESTIONS—

we are asked about

KEYSTONE [Copper-Steel] vs. Iron

Q. Does the Colorado State Highway or their contractors buy iron culverts? A. NO.

Q. Does the United States Bureau of Reclamation buy iron culverts? A. NO.

Q. Does the United States Forest Service buy iron culverts? NO.

Q. Does the United States Indian Service buy iron culverts? A. NO.

Q. Does the United States National Park Service buy iron culverts? A. NO.

Q. What do all these Departments buy? A. *Copper-Steel* culverts, mostly KEYSTONE.

Q. Why do they buy *Copper-Steel?* A. Because exhaustive tests by independent investigators have shown it better than pure-iron.

Q. Then WHO *does* use iron culverts? A. The buyers of iron culverts are divided into two classes—

1st. Those who don't know that Copper-steel is better.

2nd. Those who have full information but won't accept the facts.

Q. What is the result of the misleading "pure-iron" propaganda? A. Those who fall for it pay about 40 PER CENT MORE for an *inferior article.*

Q. Why do we sell only KEYSTONE Copper-steel? A. Because after 15 years experience with various metal (since 1909), we have found KEYSTONE the best; the metal runs even and is easier to form; the spelter coating is uniform and passes the 2 ounce test better, and it also sticks tighter and does not flake in forming.

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The Colorado Culvert & Flume Co. — PUEBLO

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Heavy Duty Pavers

Holds Batch with Room to Spare

FOR proper mixing action Koehring drums not only hold rated capacities but do so with room to spare.

Drums are constructed of two heavy drumhead castings of special composition metal and center shell of high carbon steel, joined in permanently water-tight construction.

Drumhead castings act as flywheels, storing power to meet the sudden load when batch enters the drum, preventing jerking strains on the power line.

Perfectly rounded corners and elevated blades and brackets prevent fouling. Pivoting of inner end of chute well inside the drum makes possible the Koehring re-mixing action, the chute operating on brackets which turn in protected extra long bearings.

Runways are part of the special metal drumhead casting of highest known resistance to rust and abrasion—are machined to perfect fit with drum rollers.

This, with the smooth rolling action of Koehring double gear drum drive, insures both minimum and uniform wear, doing away with the often unnoticed, unbalanced or jerky drum motion that is a principal cause of heavy vibration, crystallization, strains and breakages in every part of the mixer!

Paver Capacities

7, 10, 14, 21, 34 cu. ft. Mixed Concrete

Steam, gasoline or electric power. Steel rim or rubber tired wheels or half or full length multiplanes. Boom-and-bucket or spout distribution.

Single or double adjustable derrick on 21E. Auxiliary water tank optional on 21E and 32E. Batch meter.

Construction Mixers

10, 14, 21, 28 cu. ft. Mixed Concrete.

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Dandie Light Mixers

4 and 7 cu. ft. Mixed Concrete.

These are only a few details of Koehring Heavy Duty construction. Write for Catalog 15

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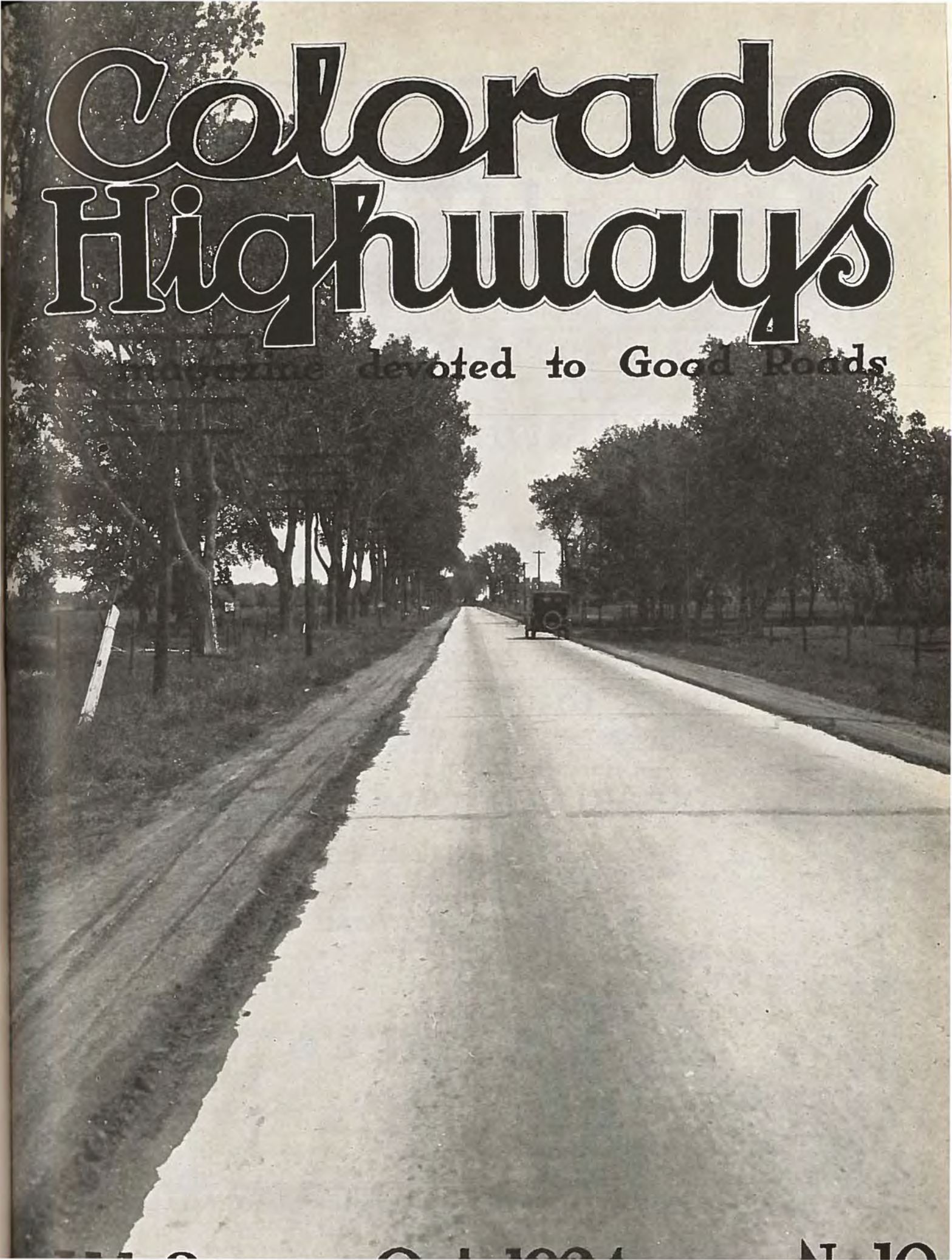
Colorado Highways

A magazine devoted to Good Roads



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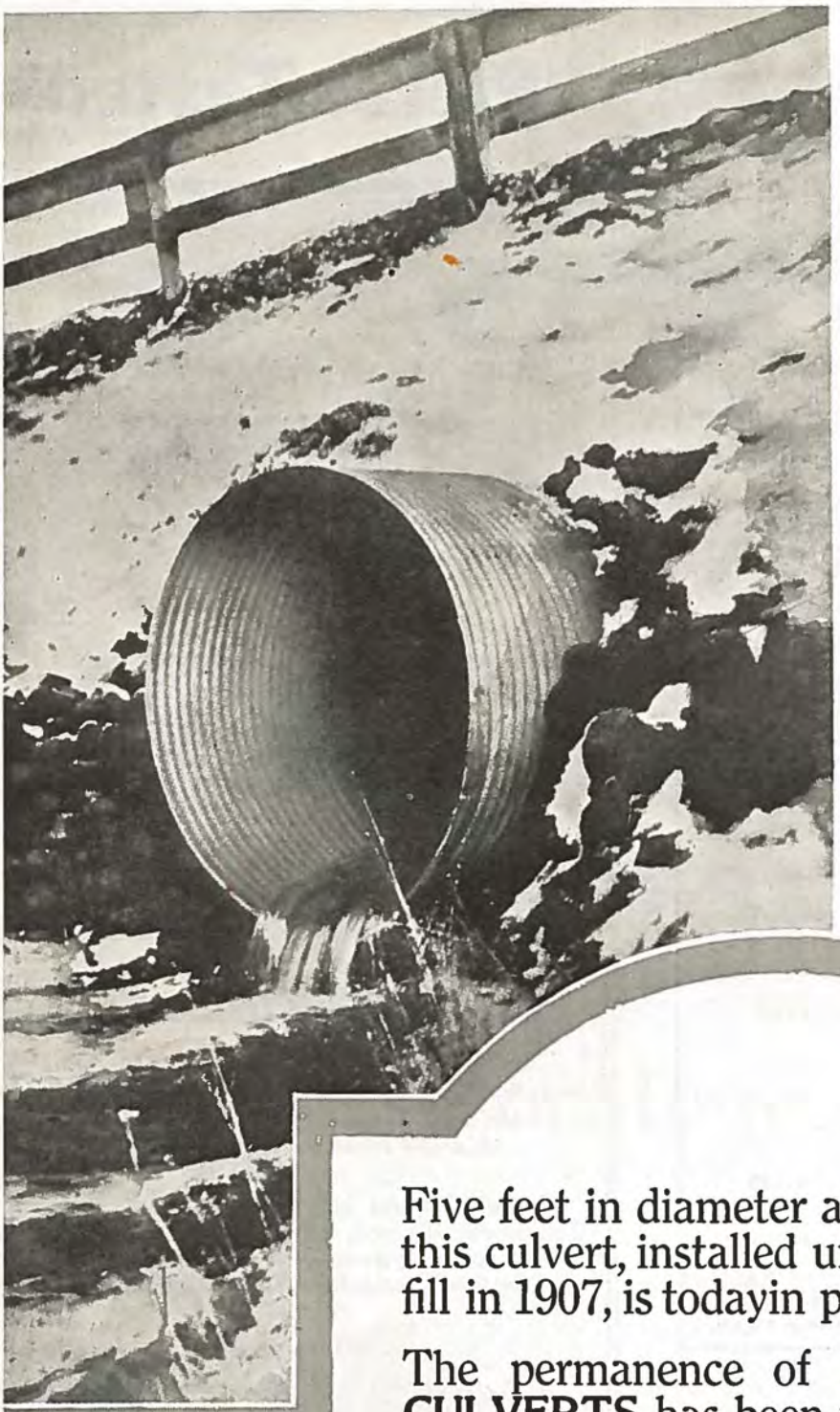
10 CENTS A COPY. **$1.00 A YEAR.**

OUR COVER PICTURE

The view on the front cover of Colorado Highways for the October issue was taken on the new Denver-Greeley concrete highway, the completion of which was attended by a big celebration in Greeley a few weeks ago. The scene in the picture is located near Brighton.



a dozen years have made no impression on this ARMCO IRON CULVERT

Five feet in diameter and 60 feet long, this culvert, installed under this 12 foot fill in 1907, is todayin perfect condition.

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Colorado Highways
"BETTER ROADS"
VOLUME III. OCTOBER, 1924. NUMBER 10

The Denver-Greeley Highway

By HARVEY T. SETHMAN

THE first regular north and south traffic thru Colorado started in 1862, when frontiersmen, trying to open up the vast resources of this state and establish communication with other parts of the territory, backed a stage line between the points that now are Denver and Pueblo.

Soon afterward followed the famous Barlow and Sanderson stage lines—some still living will remember them—and faint lines of wheel tracks began to show on the prairies just east of the foothills, dimly marked routes of travel that later were to merge and grow into one great artery, carrying three quarters of the traffic of a great state.

One of these stage trails headed northward from "Cherry Creek, Kansas Territory," and at a point near the junction of the South Platte and Cache la Poudre rivers joined the old Overland route, where Ben Holiday's stages were running mail regularly from the Missouri river to California.

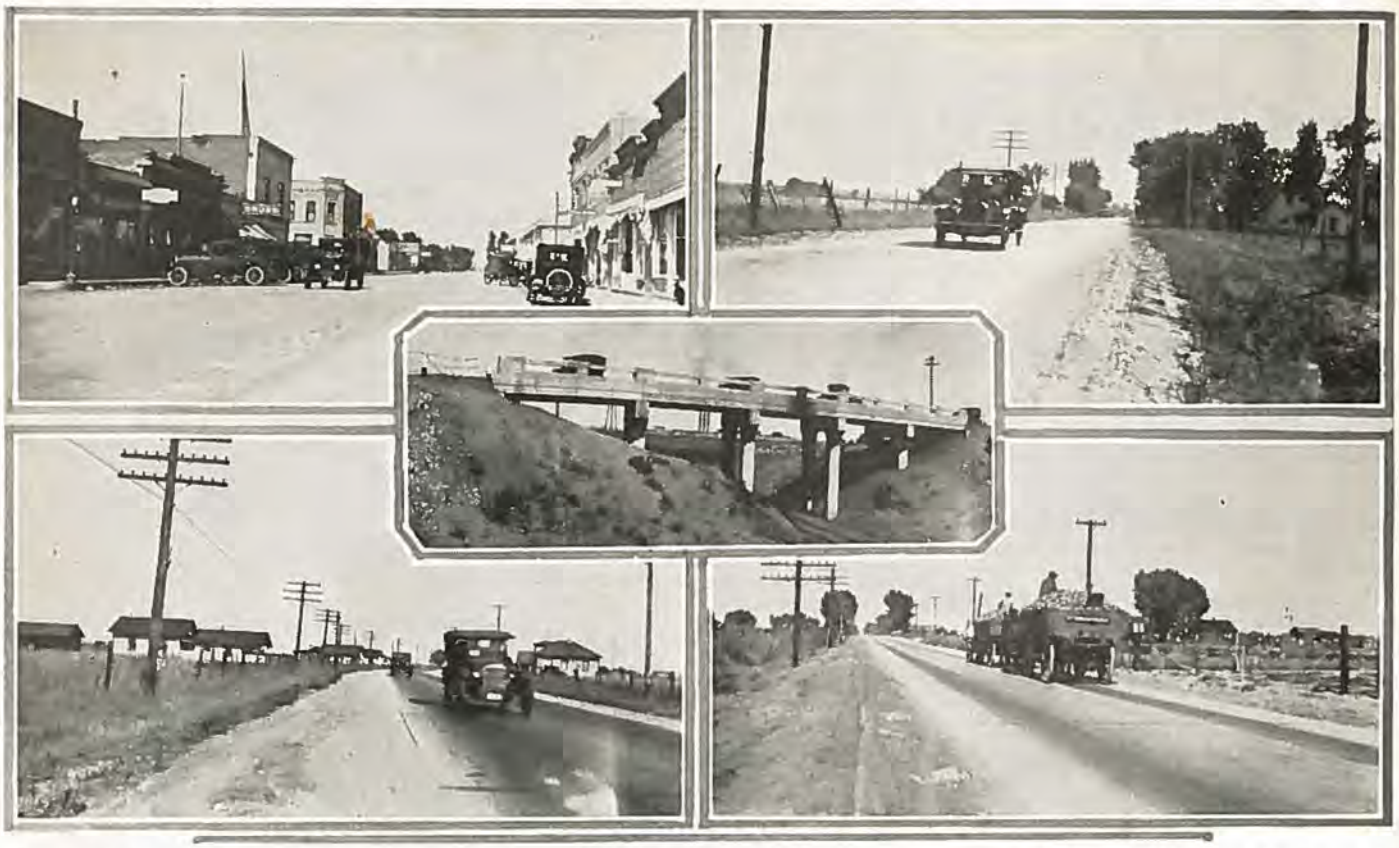
Pioneers will remember the lumbering old stages and the picturesque covered wagons that might be seen on the trail, perhaps one every few days. Hundreds can picture with ease the scenes of fifteen to twenty years ago, with scattered surries, victorias, and lumber wagons wending their way slowly along the little-cared-for and badly rutted road between Denver and Greeley, and can picture the occasional, now old-fashioned, automobile struggling thru mud and sand or being pulled laboriously from a slough by a farmer's team.

But who of the pioneers, forty or fifty years ago, or who, fifteen years ago, could have conjured up the picture of today, driving forever into the discard all other pictures of the route: Colorado State Highway No. 2, a continuous unbroken ribbon of concrete, joining the Queen City of the Plains with the growing center of one of the West's richest agricultural districts?

History was made in Greeley a few days ago when all leading business men, the Chamber of Commerce, business men's clubs, and city and state officials joined to celebrate the completion of this highway. Denver business men and officials entered into the affair, headed by Mayor Benjamin F. Stapleton. The state was represented by Governor Sweet, Secretary of State Carl S. Milliken, Maj. L. D. Blauvelt, state highway engineer, and Oliver T. Reedy, first senior assistant highway engineer.

More than 5,000 motorists from Denver drove to Greeley over the new highway on Saturday, October 4, and participated in the public celebration, which was featured by a barbecue in Greeley park. For the event the entire highway was decorated over its forty-seven miles of length

Scenes along the Denver-Greeley concrete highway. Upper left—Truck farmer's stand near Henderson. Upper right—Town of Henderson. Center—Scene near LaSalle. Lower left—Scene in Brighton. Lower right—City limits of Greeley.



Upper left—Street in Fort Lupton. Upper right—Looking south from Platteville. Center—New highway bridge over Moffat tracks east of Denver. Lower left—Town of DuPont. Lower right—Hauling sugar beets to Fort Lupton factory.

with flags and streamers. The Denver Motor club took part and arranged carnival features for the evening to wind up the fete. The entertainment involved almost all of Greeley's population before the day was over, and in many ways proved the biggest celebration of its kind ever held in the state.

Well it should be, for these enthusiastic residents of Denver and Greeley were opening formally the first complete, unbroken concrete highway between two Colorado cities of the prominence and importance from the trade and traffic standpoints of their home cities.

Today the great north and south highway thru Colorado, State Highway No. 1 south of Denver, and State Highways No. 1 and 2 north of Denver, form beyond all doubt the most important artery in the state. Directly south of Cheyenne, Wyo., Highway No. 2 starts at the state line and passes directly thru Greeley, Denver, then by Highway No. 1 on southward thru Colorado Springs, Pueblo, and Trinidad and to the state line again on the way to Raton, Santa Fe, and Albuquerque, N. M. Besides the five principal cities in Colorado mentioned, this highway artery passes thru thirty-two lesser towns and villages.

One might not at first see the reason for this. It is a simple one. Look at any state highway map of Colorado. The north and south artery is not only fed by the traffic of the five main cities on its route. The countless thousands of tourists passing east and west thru Colorado are automatically "fed into it" from all sides. Coming thru from Nebraska, traffic feeds into this highway by way of Julesburg or Holyoke, Sterling and Fort Morgan, entering the north and south highway at Greeley. From Kansas City, they enter the highway at Denver after passing thru Limon and either Cheyenne Wells or Burlington. By the same two routes traffic turns southwest from Limon and enters the big artery at Colorado Springs. Or it comes from Kansas City thru Dodge City, Kan., thru Lamar and La Junta, and then either to Pueblo or Trinidad. The cross-continent traffic, east and west, cannot avoid this great highway even should it want to. It is a natural consequence, for the traffic from the west feeds into it just as does the traffic from the east.

No wonder then that the state highway department of Colorado is bending all its efforts to put this entire north and south artery in concrete. The first great stretch of it is now complete, Denver to Greeley. The other half of the long narrow fork north of Denver, Denver to Fort Collins, is well on the way, and still a third, Denver to Colorado Springs, is approximately one-third in concrete, and still going.

The story of the Denver-Greeley paved highway is a story of the vision of men who might be called highway pioneers, who fought and tussled and battled until they convinced the proper officials and the legislatures that money spent laying concrete on this greatest traffic artery in Colorado would return two-fold to all the state.

All but one short stretch of 1.7 miles has been paved with concrete under the federal aid system. That first piece of concrete was laid in 1918 by the state, starting north from the city limits of Denver. It cost $42,000, and Arthur Hewitt was the contractor for this work. That was all for a year, and then the first federal aid project on this highway was outlined, another 1.7 miles in Adams county, F. A. P. No. 10. M. J. Kenney of Denver won the contract and put in the concrete at a cost of $47,213, finishing the work in 1920.

Project No. 12 was contracted, and another mile of the road, this time starting south from the city limits of Greeley, was laid in concrete about the same time. The Engineers Construction Corporation of Greeley did the work, which cost $27,851. With these stretches as a starter, the demand for a complete concrete highway between Denver and Greeley, serving not only them but the many intervening towns as well, grew steadily more insistent, and the work went on as fast as adequate finances were available for the state highway department.

The next stretch of road concreted on this highway was a longer one. Connecting with Project No. 10, F. A. P. No. 32, comprised almost six miles, extending northward to Henderson. The contract was awarded to the Colorado Bridge and Construction Company of Denver, and when this part of the road was finished in 1921 it had cost $183,711. Virtually at the same time two more federal aid projects were developed and contracts were let for concrete on the same highway. One was Project No. 35, another Colorado Bridge and Construction Company job, for 1.2 miles of concrete south from Platteville, and the other was No. 89, carried out by the same company again,

for 4.4 miles north of Henderson, connecting with No. 32. Both projects were completed in 1921, the shorter one at Platteville costing $46,169, and the four-mile job south of Brighton costing $142,188.

With these stretches finished and in use, the "Denver-Brighton paved road" became a by-word with Denver motorists and for that matter, with thousands of automobile drivers thruout the northern part of the state. The natural consequence was simple. Everyone was asking, "When will they finish that road on up to Greeley now—quite a lot of it is done, and it's sure a peach from Denver to Brighton."

While these questions were being asked back and forth among Denver and Greeley autoists, Major Blauvelt and his engineers and aides were not idle. They were poring over blue-prints and (to the layman) a hopelessly jumbled mass of apparently meaningless figures and estimates. But before many months newspapers carried announcements of new highway contracts, Denver-Greeley travelers were met by detour signs, and graders and plows and concrete mixers were again in evidence along the route.

H. H. Phillips of Denver won one of the new contracts, and he laid 2.08 miles of concrete on the highway south of Greeley, connecting with the mile of pavement already in. That was F. A. P. No. 146. It was completed in 1922 at a total cost of $113,737. While Mr. Phillips and his men were working there, Project No. 148 was become an accomplished fact between Brighton and Fort Lupton under the direction of Albert Dobie of Boulder, the successful bidder. Thus 4.9 more miles were made permanently smooth for the ever-increasing traffic along this highway before the end of the year.

The next contract let on this highway was the biggest of all, longer, and more expensive than any other. It was F. A. P. No. 226-A, and the contract was finally awarded to White and Johnson of Denver. Beginning where Mr. Dobie's contract ended north of Brighton, it extended for 8.22 miles northward, thru Fort Lupton and heading toward Platteville. It was completed early this year and the final cost was $216,629.

White and Johnson won another contract, and worked on it at about the same time. F. A. P. No. 226-B included 2.87 miles of concrete north and south of Platteville. This project was also completed early this year, and it cost $77,417.

When state highway engineers saw the completion of these projects, they breathed a sigh of relief, for they were at a point where they could see their goal ahead and easily obtainable. Weather conditions this last summer, while hotter and dryer than many industries of the state liked, were more favorable to highway construction. Project No. 226-C No. 1 was outlined, calling for 4.4 miles of concrete embracing La Salle, Peckham and Gilcrest. The Engineers Construction Company won the contract, and the work cost $120,114. Project No. 226-C No. 2 was a longer one, comprising 6.3 miles, and connecting with the first division of the project. J. Fred Roberts of Denver did this big job at a total cost of $193,212, the second largest single project on the highway.

Upper—A Motorway bus passing thru Ione. Center, left—New concrete guide post. Center, right—Looking west toward Riverside Cemetery, Denver. Lower—Concrete bridge over irrigation canal near Platteville.

The last one, F. A. P. No. 226-D, was for 1.1 miles, thru the town of Platteville. The state highway department is advertising for bids on this work now, and dirt will begin to fly before the ink on this issue of Colorado Highways is dry. The state engineer's estimate of the cost is $43,000.

Thus the federal aid part of the Greeley-Denver highway has cost approximately $1,360,700, including the stretch thru Platteville which is not yet completed, and on which definite figures are not available. The state's share of this cost is approximately half that figure, and, when the original $42,000 job that was purely a state project, just north of Denver, is added, Colorado will have paid something more than $720,000 for having a concrete highway complete between Denver and Greeley, the longest continual stretch of paving in the state so far.

Is it worth it? Ask any one of the thousands of Denver citizens who drove over the new highway a week ago to attend the opening celebration in Greeley park. Ask them if they believe their share of the taxes that went into this work have been well spent. Ask them how they like such a road, about which we could write enough to fill this entire magazine, a road with grade crossings eliminated, with blind curves eliminated, a road that fairly invites the throttle to open right up to the speed limit and stay there for its entire length, a road unsurpassed and unequaled by any of its kind for its sweeping mountain views, with the sentinels of the great front range always towering in a staggering array to the west. Ask any of the farmers along the route. Ask any of the business men in any and all of the towns what it means to them to have this highway, bringing to them always an increasing flow of business. Ask the hotel men, vitally concerned because the tourist follows the paved road where he can. The answer is the same everywhere, "Good Work."

Showing a stretch of the new constructed concrete pavement south of Wolhurst.

Engineers Rush Federal Aid Program

MORE progress in the improvement of the state's highway system is being made in 1924 than during any other year since Colorado has had a State Highway Department. Indications are that when the snow begins to fly again and cold weather puts a stop to the work, more miles of road will have been built than during any other single year during the state's history.

The records of the state department show that during the past four months not less than nineteen Federal Aid projects have been completed. These nineteen projects involved an expenditure of nearly $1,500,000, more than half of which is borne by the United States government. In addition, scores of small state projects, none of them large, but aggregating a good many thousand dollars, have been finished.

Everywhere in the state contractors and engineers of the department are working with might and main to push to completion many other projects. If only the weather remains favorable the end of the year will see the completion of many more projects. It is a safe prediction that the close of the state fiscal year on November 30 will see less unexpended balances in the coffers of the highway department than any previous year.

It now begins to look as if the department will succeed in cleaning up all of the projects which "hung over" from previous years. The budget for 1924 contained a considerable number of projects taken over from 1922 and 1923. All of these will have been finished by November 30, according to present indications. Not only that, but a majority of the 1924 Federal Aid projects will be completed. Major L. D. Blauvelt is authority for the statement that every 1924 project will be under contract when the books are closed on November 30.

The nineteen projects which were completed between May 15 and September 20 are widely scattered thruout the state, but each one of them is located on an important interstate highway. Slowly but surely the main arteries of travel in the state are being improved. The work of the highway department has reached a stage where the people of Colorado are beginning to see what the department is trying to do. Whenever a project is completed the department is one step nearer its goal; the completion of a modern, well drained system of highways, of easy grade and sufficient width, which will connect all of the county seats and also connect with principal highways of the adjoining states.

The following table shows the nineteen projects completed during the summer months, together with their length, the type of each project, contractors, and the cost. It was prepared from official records of the highway department:

Proj. No.	Location	Length	Type	Contractor	Cost	Date Completed
225	Fitzsimons Hospital Road	1.00 mi.	Bit. Pavement	W. A. Colt & Son	$36,453.43	5-15-24
245-A	Las Animas-Hadley	4.54 mi.	Gravel Surfacing	Miller, Douglas & Hanes	57,517.21	5-24-24
208-C	Grand Junction-Palisade	4.75 mi.	Gravel Surfacing	Northwestern Const. Co.	68,945.72	5-27-24
231	Six-Mile Creek Bridge	0.45 mi.	Steel Bridge	McCormick & Brockway	32,720.71	5-28-24
119-B	Cochetopa Pass	7.5 mi.	Grad. and Surf.	Girardet-Hotchkiss Engr. Co.	57,628.81	5-30-24
221	Loveland, North	4.05 mi.	Concrete Pavement	F. C. Dreher Const. Co.	145,496.07	5-31-24
226-A	Brighton-Ft. Lupton	8.23 mi.	Concrete Pavement	White & Johnson	238,034.47	6-25-24
157-B	Buena Vista-Leadville	4.20 mi.	Grading	J. V. Stryker Const. Co.	82,067.06	6-30-24
247-A	Rocky Ford-Swink	1.33 mi.	Concrete Pavement	J. Finger & Son	46,017.26	7-2 -24
120	Denver-Arvada	150 ft.	Truss Bridge	Colo. Br. & Const. Co.	34,452.32	7-11-24
255-A	Ft. Morgan-Brush	2.70 mi.	Concrete Pavement	Colo. Br. & Const. Co.	83,562.84	7-19-24
246-B	Vineland-Pueblo	0.787 mi.	Concrete Pavement	W. A. Colt & Son	33,749.02	7-19-24
102	Ouray-Red Mountain	1.06 mi.	Mtn. Grading	Johnson & Johnson	77,304.43	7-26-24
251	Denver-Boulder	1.014 mi.	Concrete Pavement	Giggey & Hanes	32,670.00	8-14-24
257	Denver-Brighton		Concrete Viaduct	C. C. Madsen	12,178.00	8-11-24
230-B	Denver-Colorado Springs	3.995 mi.	Concrete Pavement	Brodie & Anderson	153,971.00	9-22-24
2-R	Trinidad, North	3.0 mi.	Concrete Pavement	Stanley & Mackey	121,934.00	9-15-24
190	Dillon-Kremmling	1.643 mi.	Grading and Bridge	Colo. Br. & Const. Co.	40,154.00	9-3 -24
256-B	Atwood-Merino	1.799 mi.	Concrete Pavement	W. F. Pigg & Son	59,072.00	9-20-24
					$1,413,930.75	

Shale As Shoulder Material

THE road officials of this county are certainly to be congratulated upon the use of crushed brick-bats for their roads. I think they make the finest surfacing in the world.

Thus spoke a good roads booster while driving along one of Boulder county's splendid highways. His statement prompted us to make an investigation of the material used. And, much to our surprise, we found that the fine surfacing material wasn't crushed brick at all, but is a shale material taken from a hill located near the city of Boulder.

Several years ago an old coal mine working under the hill caught fire. It burned itself out after several months. The heat from the burning coal turned the shale formation covering the seam of coal a reddish brown.

As an experiment the county commissioners crushed some of the shale and used it on five miles of road leading into Boulder from the Black Diamond mine. The experiment proved a huge success. The material packed down and developed a wearing surface that almost equalled concrete. The bulk of Boulder's coal supply is hauled over this road.

About twelve miles of Boulder county's roads are surfaced with this material, according to Commissioner E. B. Hill. Other roads are being surfaced from time to time by the county's maintenance forces.

Recently fourteen hundred yards of the material was placed on the shoulders of the two and one-half mile stretch of concrete pavement extending east from Boulder. Because of the reddish color motorists find that it acts as a "guide line" for night driving. It also eliminates the glare from white limestone sometimes complained of by drivers on bright days.

The rock is taken from the side of the hill by means of the county's steam shovel. It is run thru an ordinary crusher and hauled on the roads in dump trucks. The material was hauled a distance of five miles to the Arapahoe pavement east of Boulder.

It was rolled with a ten-ton roller first while it was dry, and later rolled again when the ground was wet. The cost of placing the material on the road was about eighty cents per yard.

Some of this material has been on Boulder county roads for eight years and is still in good condition, despite the heavy usage which it has been subjected to. This red rock is especially adaptable to wet weather driving. It also lends itself well to maintenance, because it packs hard and does not blow away like some ordinary gravel surfacing when put under heavy traffic.

Motorists have been loud in their praise of the material placed on the shoulders of the Arapahoe pavement, because they have found that it does not give way, as in the case of gravel, when cars run off the concrete onto the shoulder. The skidding of cars on soft shoulders has been the cause of many accidents on concrete pavements of the state, and it was with an idea of eliminating this danger that the Boulder county commissioners adopted the red shale material for shoulder surfacing.

TO DETERMINE THE VALUE OF TOURIST TRAFFIC

Estimates of the value of the tourist and resort trade to Michigan are varied and many, and the sources, or basis on which the estimates are formed, are equally diversified, according to officials of the East Michigan Tourist and Resort Association.

This association is approaching one phase of this valuation from an angle which, if the co-operation is forthcoming, will be mighty interesting to residents of the eastern side of the state. Recently the association sent out charts to a large number of gasoline filling stations, asking them to keep a check for one week of the out-of-the-state cars stopping at each of the stations.

The charts are printed and ruled, with spaces for each state and for Canada. A similar check was made at one central point last year, and the results shown were surprising and most conclusive that the advertising sent out by the East Michigan Tourist Association drew the tourist to this section, for the greatest number of the out-of-the-state cars were from those states in which the association had placed the most advertising.

This year, with more than 300 gasoline filling stations participating in the check on foreign cars, the combined results will be much more complete, and therefore a great deal more satisfactory to the officers of the association. The results of the check are to be made public in a short time.—Michigan Roads and Pavements.

Looking east from Boulder showing new "shoulders" made of crushed volcanic rock.

Information counter and view of Exposition Avenue at Overland Park, Denver.

Selling Colorado Nationally

By WARREN E. BOYER

IMPROVED highways in Colorado back up the state's welcome to automobile travelers to "Come Up!" With the rapid strides in permanent highway construction comes the challenge to counties and cities to make the most of the visits of these travelers coming from all parts of the United States. Literature, letters of information, road maps, magazines and newspapers play their part in heralding the delights of the Centennial State to prospective motorists of other regions. Once here, it is the duty—and privilege—of chambers of commerce, counties and other organizations and societies to point out to these vacationists the state's resources, climatic conditions, school facilities, commercial and agricultural successes and possibilities, mineral and oil development.

Thirty counties of Colorado were represented in a mammoth free display at Overland Park, Denver's municipal camping ground, this year. It was the initial effort on the part of Colorado—and, it is said, of any state—to sell a commonwealth to transcontinental travelers. It was arranged by the Tourist Bureau of the Denver Chamber of Commerce, through the courtesy of the City and County of Denver, and with the indorsement and moral support of many societies and organizations, including the Colorado Association of County Commissioners. E. B. Hill of Boulder, H. B. Tiffany of Brighton and William Bartell of Colorado Springs, comprised a committee of county commissioners to co-operate with the City of Denver and the Denver Tourist Bureau in fostering and launching this state-wide movement.

The exhibit space allotted the counties in Exposition Hall was free, a nominal expense taking care of the erection and maintenance of the booth for the season. The counties furnished exceptional exhibits, and, in many instances, prepared special literature for distribution.

An idea of the results of this venture may be calculated in the general total attendance of 53,501 persons from every state in the Union, as campers; 41,233 inquiries over the information counter of the Denver Tourist Bureau maintained in Exposition Hall where the county exhibits were installed; 168,000 pieces of literature distributed to inquirers, including the literature sent in by the counties; and an attendance of 36,873 motorists at the free night lectures given by the Denver Tourist Bureau in one end of the Exposition Hall.

Freeman H. Talbot, manager of the Exposition Hall, was in direct charge of the county exhibits and the scenic, historic, livestock, and agricultural lectures. Splendid entertainment features were provided through the generosity of musicians and artists of Denver and nearby towns, and the success of the lectures can be attributed to the loyalty of a dozen men from all walks of life, who volunteered their services in the cause of a greater Colorado. Mayor Stapleton of Denver, Secretary of State Milliken, and Fred K. Syman, president of the Denver Tourist Bureau, were among the prominent citizens of Denver who welcomed the visiting motorists on various occasions.

The display of county exhibits, it was shown, in no way interfered with the state fair, or county fairs, but stimulated attendance at these places throughout Colorado. While the county exhibits at Overland Park in a measure were typical of what might be anticipated in the regular fairs held in the respective counties, they served to arouse a desire in the minds of many to see more, particularly if interested in corn, wheat, sugar beets, minerals, or livestock. Hundreds visited these fairs before leaving Colorado.

The outstanding difference, perhaps, between the attendance at state and county fairs is that they are attended largely by the home folks and surrounding states, while an array of exhibits such as was installed this year at Overland Park, and which promises to include every county of Colorado next year, has the advantage in not only a greater attendance, but a class of people that contains prospective settlers and investors. They may make

only two or three stops after leaving the Denver camp ground, but they will carry with them in memory the impressions gained in the Exposition Hall, and this, according to Harry N. Burhans, secretary of the Denver Tourist Bureau, often times proves the assertion, that: "The tourist of today is the potential citizen of tomorrow."

The following counties had exhibits in the Exposition Hall: Adams, Arapahoe, Boulder, Cheyenne, Costilla, Delta, Denver, Douglas, Elbert, El Paso, Fremont, Grand, Huerfano, Kiowa, Kit Carson, Lake, Larimer, Las Animas, Logan, Montrose, Moffat, Otero, Pitkin, Pueblo, Rio Blanco, Rio Grande, Routt, Sedgwick, Washington and Yuma.

Other exhibits were placed by the Colorado Mountain Club, Colorado-Made Goods Club, United States Forest Service, Rocky Mountain National Park, Mesa Verde National Park, Colorado School of Mines, Denver Music Week Association, Denver Art Association, Denver Union Stock Yards and the Tourist and Publicity Bureau of the Denver Chamber of Commerce.

Adams and Boulder counties had special night programs. Others included programs by the Kiwanis, Lions, Rotary, Gyro, and Civitan Clubs, and the Retail Merchants Association, Colorado-Made Goods Club, Community Players, and the Sons of Colorado, Daughters of Colorado, Good Indian Club and other historical and pioneer societies.

Thousands of commendations were written into the registration book at the camp ground. Here are five picked at random, showing how the visitors were impressed:

"A very interesting exhibit for which the city and its agents are entitled to great credit. A. C. Burnett, Enid, Okla."

"I commend you on your excellent exhibit, your tourist park and your method of entertainment. W. J. Beard and Wife, Paragould, Ark."

"You have a better class of tourists this year than before and a nice set of officers. I was never treated better. G. C. Linzy, Wichita, Kansas."

"Just fine, we greatly appreciate it all. Rev. D. Earl and Wife, 2615 Victor St., Kansas City, Mo."

"We were very glad to enjoy the lectures and camping accommodations at Overland Park. Mr. and Mrs. Elmer Weminger, 104 Sycamore St., San Antonio, Texas."

In addition to the foregoing comments, many others contained the indorsement of the pay camp idea, put into effect for the first time this year, and operated on the basis of 50 cents a night a car, or $2.50 a week. This revenue is primarily intended for camp improvements and to offset the overhead in the park.

Many counties were unable to prepare and install their exhibits this year, but are arranging for representation when the camp ground re opens next May. They believe that selling motorists through transcontinental travel—and "selling" in this instance may be likened unto "impressive"—is an invaluable medium of national advertising, predicated as it is on the permanent improvement of the broad highway.

Showing county and National Park exhibits in Exposition Hall, Overland Park.

DENVER-PUEBLO TRUCK LINE IS GRANTED STATE PERMIT

Permission for issuance of a permit to operate a truck line between Pueblo and Denver was recently granted the Denver-Pueblo Transportation Company by the Pueblo county commissioners. Although the board is opposed to the granting of such a permit by the public utilities commission, the members voted to grant permission in this instance, inasmuch as all other county officials on the route had signified their willingness. The permit could not be issued by the public utilities commission until all offcals enroute were agreeable.

According to the commissioners, the heavily loaded trucks damage the roads so extensively that this added fleet will make it necessary for installation of another maintainer of the twenty miles of highway traversed in Pueblo county, according to O. G. Smith, commissioner of highways.

County commissioners of the entire state are combined through the Colorado Association of County Commissioners in seeking legislation this year to place a tax upon the truck and bus lines. J. Arthur Phelps, former Pueblo county attorney, has been engaged by the state association as its legal representative in this matter.

INDEPENDENCE PASS ROAD CLOSED FOR SEASON

The Independence Pass highway has been closed for the remainder of the season because of construction work now going on near Aspen, according to an announcement from the Denver office of the United States department of agriculture. A two-mile stretch of the road eight miles from Aspen is being constructed by the United States bureau of publis roads, necessitating the blocking of the highway. All persons are warned not to use the highway, according to the announcement.—Breckenridge Journal.

REPORTS FROM THE DIVISIONS

DURANGO-SILVERTON TRIP BEST SAY BROOKLYN EAGLE TOURISTS

Residents of southwestern Colorado should be more than pleased to know that members of the recent Park Development Tour, brought through this section of the state by the Brooklyn Daily Eagle, pronounced the day over D. S. O. highway as the most wonderful trip of the tour and the best day of the forty-two days spent by the party in the southwest and western part of the United States.

Quoting from the Brooklyn Eagle's account of the trip, that portion covering the day in the San Juan country is reprinted:

"All tourists agreed that the day of June 27, dedicating the new Durago-Silverton-Ouray mountain highway, was by far the most wonderful as regards scenery. This fine, new road through southern Colorado can vie with the most famous mountain roads in Switzerland. As a matter of fact, it holds more variety of scenery.

"Be it great blue mountain lakes like Lake Electra, just out of Durango; majestic bold mountains and canyons, as on the drive to that old mining town, Silverton; rushing waters through romantic canyons, as at Bear Creek falls, where three rivers coming down three mountain sides unite in one lovely fall; or the magic blue, green and red coloring of the great mountains that enclose the little mountain town of Ouray; or just before reaching Telluride, the wonderful view of the San Juan mountain range, its snow covered tops tinged with the warm glow of the setting sun, nowhere in the world can finer scenery be found.

"The fact that twenty-seven votes were for this ride and only four for Tioga pass, three for Pike's peak and two for the drive from Gallup to Inscription Rock and Zuni proves definitely that the Durango-Silverton Ouray highway motor drive was the best one day motor ride."

NEW STEEL BRIDGE ON ROAD NEAR DILLON IS COMPLETED

A new 100-foot steel and concrete bridge over the Blue river located ten miles north of Dillon has been opened to traffic. This bridge was constructed by the Colorado Bridge & Const. Co. The contract included one mile of grading and surfacing on approaches.

Forty-five teams are employed by the Northwestern Const. Co. on six miles of gravel surfacing west of Steamboat Springs.

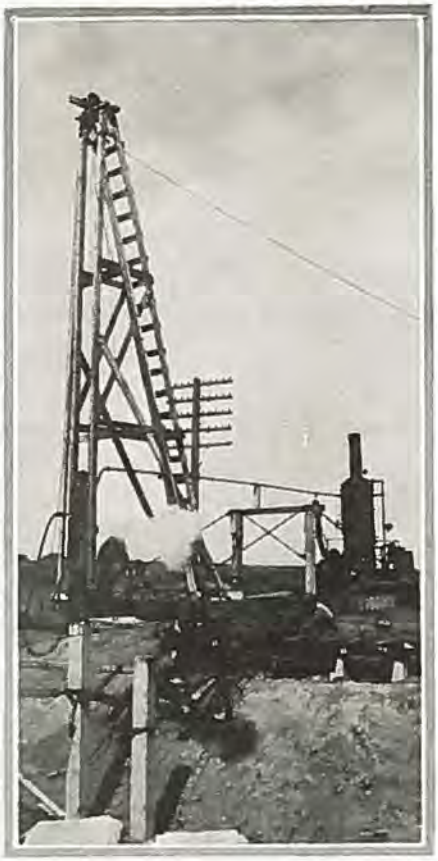
Steam shovel breakdowns has slowed progress of the work in Byers canon near Hot Sulphur Springs. All shooting on the project has been completed. A finishing crew is now at work on a portion of the road. Date set for the completion of the project is March 1, 1925.

Plans for the gravel surfacing of 16½ miles of roadway between Rifle and Grand Valley have been completed.

Three miles of grading work on Cameron Pass started in June, 1922, has been finished by Henry Shore, contractor.

A party of engineers under W. A. Whitney are engaged in surveying a new road from Wolcott to State Bridge.

On September 25, S. Renard, contractor, completed three miles of grading on Willow Creek Pass, near Rand.



Driving piles for concrete bridge near Lafayette in State Highway No. 1.

LEVY MAKES RECORD ON PILE DRIVING JOB NEAR LAFAYETTE

An unusual construction feat was staged on the R. M. Larsen paving project near Lafayette this past month. It was in connection with the construction of a concrete bridge over Rock Creek on State Highway No. 1.

The problem involved the driving of 750 feet of concrete piling. After going over the ground very thoroughly, Larsen contracted with the M. J. Levy Construction Co., also of Denver, to drive the piles for this bridge. The piles are reinforced concrete, in accordance with the specifications of the State Highway Department, 30 feet long, and were driven to a penetration of from 15 to 28 feet in very hard clay and soft shale.

The driving was done with a No. 2 Vulcan steam hammer. The average penetration per blow was about 1/30th of an inch. No serious trouble was encountered in driving the piles, all going down steadily and at a uniform rate and to proper grade.

The piles weigh approximately three tons apiece, and were driven in very close alignment, although the material into which they were driven was unusually difficult. Not one of the piles was damaged.

The entire crew was furnished by the Levy Const. Co., under charge of Robert Davis, one of their old employes, and the work of driving the 750 feet of pile was completed in less than nine actual working days, a record in this district for work of this sort.

FORT MORGAN-BRUSH PAVEMENT FINISHED ON SCHEDULE TIME

On September 15, the last batch of concrete was poured on the new stretch of pavement between Fort Morgan and Brush. An adequate force of men are now engaged in completing the gravel shoulders. It is expected the entire project will be ready for final acceptance by the Highway Department by October 15.

"W. F. Pigg and Son, contractors on this work, are to be commended for the excellent manner in which their work has been conducted; the uniformly good pavement which has been produced, and the general appearance of their completed work," says A. B. Collins, division engineer.

"The contractors have taken advantage of every opportunity after getting started to hasten the work to completion, and I am inclined to think that their average of 540 feet per day during concrete days comes near constituting a record for this class of work, at least in the Seventh Division."

The concrete pavement between Loveland and Berthoud should be completed the latter part of October, says the engineer's report. This work is being done by the F. C. Dreher Const. Co. under two contracts, totaling five and one-half miles. The first contract of two miles has been opened to traffic, while the concrete on the second stretch which passes thru the town of Berthoud is practically finished.

Construction of gravel shoulders on the two projects will be carried on simultaneously. Two concrete pavers were used on both projects.

When these two contracts are completed all Federal Aid projects in Division No. 7, except the proposed overhead crossing at Nunn, will be finished.

COUNTY OFFICIALS CONDEMN PROPERTY FOR NEW HIGHWAY

Condemnation proceedings may be instituted against 35 acres of land along the proposed right-of-way of the Santa Fe Trail in Pueblo county, between Huerfano river and the Otero county line, according to E. M. Fuller, resident engineer of Fowler. Efforts to purchase the needed land at reasonable prices seems futile. One man wants $3,000 for two acres. In making the $105,000 gravel surface improvement the state highway department intends to have a solid foundation for concrete paving to be laid in the future. The new right-of-way will cut off three-fourths of a mile, making a great saving of maintenance and original cost.

The work of the Pueblo county commissioners in cutting down the number of accidents and speeding by employment several months ago by T. I. Jarrard as county traffic officer, a few weeks ago was strongly commended by the Pueblo Commerce club which adopted resolutions favoring the plan.

DEATH OF H. A. EDMONDS BRINGS BIG LOSS TO GOOD ROADS CAUSE

The Good Roads cause in Colorado lost one of its best friends and most enthusiastic supporters in the death of Herbert A. Edmonds, of Fort Collins. Mr. Edmonds died in Cincinnati, O., on September 10, as he was returning to Colorado from Europe whither he had gone in the summer in a vain effort to regain his health. Death was due to heart trouble of which Mr. Edmonds had been a sufferer for many years.

Few men in the movement for better roads in Colorado were better known and more beloved than Mr. Edmonds. Many years ago he recognized the value of good roads, and he threw himself enthusiastically into the fight for good roads and for a modern-up-to-date state highway department. He devoted practically the entire time of the last three years of his life to the good roads movement.

Mr. Edmonds was the first chairman of the state highway advisory board under the present state highway law. He was instrumental in the passage of the law. Governor Shoup, recognizing his services in the cause, appointed him a member of the board from the seventh district and he served as such until the expiration of his term in May, 1923. His advise and counsel were prominent factors in the upbuilding of the highway department to its present state of efficiency.

In 1919, when the rapidly increasing demand for good roads made the procuring of additional funds more necessary, Mr. Edmonds suggested the levying of a state gasoline tax. His suggestion that the automobile owners be called upon to furnish some of the money for the road of which they were the chief beneficiaries, met a responsive chord. The legislature incorporated his idea into law which has since become the model for similar laws in other states.

The fact that one of the finest mountain roads in the state is being built up the Cache La Poudre river and over Cameron pass, from Fort Collins to Walden, is almost solely due to Mr. Edmonds' activity. Long before he became connected with the highway department he saw the commercial importance of this road. He did not rest until the business men of Fort Collins, then the commissioners of Larimer county and finally the highway department gave money for the construction of this road. He himself gave liberally of his own money to get the work started. It was his wish—a wish not to be fulfilled, however—to see this road finished.

Mr. Edmonds was sixty-four years old. He was born in Three Rivers, Mich., and came to Colorado in 1883. He engaged in the dry goods business in Denver, Greeley and Fort Collins, making the latter city his home since 1906. He is survived by his widow and one daughter.

The funeral was held in Fort Collins on Sunday, September 14. The last rites were attended by Major L. D. Blauvelt, state highway engineer, John Donovan, Edmonds' successor as member of the advisory board, and Edwin Mitchell, department auditor, and other state officials.

EAGLE COUNTY'S ROAD IMPROVEMENTS

With the construction work now under way and contemplated next year completed, the state highways in Eagle county will compare favorably with those in other sections of the state. The new Gypsum-Dotsero road, nearing completion, the five-mile stretch to be built yet this fall from Red Cliff to Pando, and the building of the road from Wolcott to State Bridge, now being surveyed, will eliminate the worst pieces of road in the county along the state highways. The terrors of Battle mountain have already been done away with. The highway from Minturn to Gypsum is crooked and narrow in places and off grade, but is passable and no worse than the average highway in this part of the state, while the two or three miles approach to Tennessee Pass on the west slope could be made much better. While on this subject we want to suggest that before thousands of dollars are thrown away in keeping the Pass "open 365 days in the year" that a passable summer road be built over the Pass. There has been more complaint of this portion of road this year than of any other section in the county.—Eagle Enterprise.

Every Day In Every Way

Exasperated Subscriber: "Say, operator, are you all crazy down there?"

Operator: "I'm sorry, madam, but we are not allowed to give information."—Lampoon.

Road News, Views and Gossip

CORRUGATED PIPE UNDER PAVEMENTS

By HENRY JOHNSON

Twelve or fourteen years ago, when the movement for paved highways first got well under way, there were some engineers who took the position that corrugated pipe was not a satisfactory stable construction for use under expensive pavements. It has already demonstrated its great usefulness in caring for waterways in the numerous locations where it was difficult or impossible to secure completely rigid foundations. But there was some doubt in the minds of many of those who were making good use of corrugated pipe under macadam roads whether it was the appropriate culvert installation under layers of concrete or asphalt.

There were, however, thousands of these culverts already in place under county roads which were being taken over as portions of the state highway systems. Since they were in perfect condition, it was obviously an almost criminal waste to remove them in favor of other construction, so in a majority of cases they were allowed to remain. In this way they seem to have justified themselves completely, for practically all of them are in service today, and those made of high-grade metal seem to be in very much the same condition as they were when the pavements were laid. Indeed, experience has demonstrated that a good grade of corrugated pipe is often more durable than the pavement which has been laid over it. In many instances these culverts are doing duty under the second or third pavement surface.

All through the western and far western states the state highway commissions have used great quantities of corrugated pipes under their improved highways. In the same region the municipalities, large and small, employ them extensively under asphalt or concrete streets, both in the full circle and the part circle form. When good engineering judgment has been utilized, these installations have invariably proven successful, and the outcome is that in this portion of the country at least, engineers and highway officials have ceased to ask whether galvanized corrugated metal can appropriately be placed under expensive paved surfaces. Their answer to any such question is that "the proof of the pudding is the eating."

STATE HIGHWAY EMPLOYES MARCH IN DEFENSE PARADE

A splendid showing was made by the employes of the Denver office of the State Highway Department in the Defense Day parade in Denver on September 12th.

Forty-two members of the Denver office staff, which included engineers and clerical workers, headed by Maj. L. D. Blauvelt, state highway engineer, and Maj. John P. Donovan, head of Division No. 1, marched in the procession.

State Highway Engineer L. D. Blauvelt is commissioned as Lieut.-Col. of the Engineer Officers Reserve Corps, and attached to Headquarters XVIII Corps Engineers United States Army. Division Engineer John P. Donovan is commissioned Major Engineer Officers Reserve Corps, and assigned as executive officer of the same unit.

When the Chief of Staff of the 103rd Division United States Army asked different citizens and civic organizations in Denver to fill up the ranks of the various units marching in the Defense Test parade with volunteers from their associations, Col. Blauvelt asked the employes of the State Highway Department in the vicinity of Denver to join his unit in the parade. Practically 100% of the employees of the engineering, accounting and maintenance division at the Denver Headquarters of this Department, together with the employees of Engineering Division No. 1 responded to his request by turning out in the parade. Of the 41 who turned out 15 were ex-service men, including 5 commissioned officers. They were organized as a platoon, using ex-service men as guides and pivot men, and marched like veterans, making an appearance that was second to that of no organization in the long line of marchers.

The following list is a roster of those who marched: W. R. Douglas, Geo. W. Gross, Earl Kelly, Edwin Mitchell, R. S. Harvey, F. A. Crowfoot, W. M. Montgomery, C. T. Brock, O. T. Reedy, Roy F. Smith, Roy J. Randall, Harry C. Livingston, Arthur J. Strong, H. O. Wagner, A. F. Fraker, S. B. Lamb, A. M. Haynes, C. A. Patterson, E. O. Scherrer, R. S. DuBois, R. M. Adams, H. G. Strauss, L. A. Hartman, J. C. Loughlin, N. L. Copeland, Geo F. Davis, P. M. Wallace, J. H. Hood, J. W. Graham, Jr., R. Clark, L. Beckett, E. Hoffman, B. T. Miller, T. L. H. Fribourg, W. E. Griffith, C. H. Green, Al Ferguson, Elmer Sims, Glen McEldowney, A. J. Davidson, Dan Rosenzweig.

In addition to the above, Lieut. John S. Marshall, Chief Draftsman, marched with his unit, 103rd Tank Company.

The Defense Test Parade in Boulder was participated in by Captain G. B. Wilch, of Engineering Division No. 1, who led Company F, of the 157th Infantry, in the parade; and by Captain F. W. Miller, of Engineering Division No. 1, who is assigned to the 348th Engineers, and who occupied a post of honor in the reviewing stand.

COUNTY HIGHWAY OFFICIALS DISCUSS ROAD PROBLEMS

More than ninety county commissioners were in attendance September 24 and 25 at the meeting of the Arkansas Valley Association of County Commissioners held in Pueblo. The commissioners were high in their praise of the Colorado state fair, which they visited in a body on Wednesday. One of the topics discussed was the value of county and state fairs, and the commissioners agreed that the county and state fairs are worth far more than the amount of time and money expended to put them over.

The present primary laws were attacked by the commissioners. Various means of revision were suggested, but no action was taken.

State highways, different kinds of permanent construction, methods and results were discussed at length. Robert H. Higgins, superintendent of maintenance of the state highway department, was one of the speakers; also Assistant State Highway Engineer Reedy.

The next meeting will be held in Canon City, Fremont county, in December, the exact date to be announced later. A banquet and dance was given in honor of the county officials the night of September 25 at the Congress Hotel.

All of the counties in the district were represented. The district is made up of Pueblo, Otero, Kiowa, Huerfano, Las Animas, Bent, Baca, Prowers and Crowley.

ROAD BUILDERS SHOW ARRANGEMENTS NOW IN PROGRESS

The 1925 Road Show and Convention of the American Road Builders' Association will be held at Chicago, January 5 to 9, inclusive. C. M. Upham, business director of the association, announces that much better arrangements have been made for both the show and convention than in any previous years. The preliminary plans also are already as far along as has been usual at a much later date. Every indication, therefore, is that these two big annual events in the road-building industry will in every way eclipse all past records. Every effort is being directed to this end.

The program committee, which will have charge of the convention, will be headed by Prof. T. R. Agg. He expects to have the organization of his committee completed soon. Professor Agg has had such a variety of experience in the highway field that he will be able to produce a well balanced program of general interest to those attending the road show and convention. The convention sessions will be held at the Congress Hotel.

Nearly 17,000 sq. ft. of additional floor space suitable for heavy exhibits will be provided at the Coliseum. This additional space is being obtained by the extension of the Coliseum to the north.

J. L. Brownlee, of Denver, assistant district engineer of the U. S. forest service, recently completed the survey of the proposed government road leading from Rye to Beulah, two popular summer resorts in the southern and western part of Pueblo county. The building of the road has been definitely approved by the government and work will start as soon as practicable.

San Diego County Adopts "Pay-As-You-Pave" Policy to Finance New Highways.

Editor's Note—The remarkable success achieved by a number of other states in the handling of their road work on a "Pay As You Go" basis has prompted a prominent good roads booster to devise such a plan for the financing of the Colorado State Highway Department on such a plan commencing in 1926.

The plan also will provide for the retirement of all highway bonds now outstanding by the end of 1936. Under the present arrangement these bonds, already issued, would not be paid off until 1951, carrying heavy interest charges.

This important measure, sponsored by public spirited citizens, will probably be presented to the next general assembly for its consideration. It is claimed a material reduction in state and county taxes will result from its adoption.

It has been announced by the backers of this "Pay As You Go" plan that they will give out full details of their proposed measure at a later date.

The first and major advantage claimed for the "pay-as-you-pave" plan is that it reduces the cost of construction of concrete roads at least 50 per cent. Concrete roads in California cost about $25,000 a mile cash, or, if built by a 40-year, 5 per cent bond issue, $51,275 per mile. This method of paying for roads is receiving a three-year trial in San Diego County, Calif., which is paving ten miles of roads each year for three years to try out the scheme which was devised by George Heston, County Treasurer. Since the adoption of this plan early in 1923, the Poway Grade Highway has been completed and the plan has been found to work exactly as predicted.

Saving Interest on Bonds

According to an outline of the system in the Christian Science Monitor, the plan is based on the conclusion that it is better business to increase the tax rates for the purpose of obtaining funds for highway building than to increase the taxes for interest on a paving bond issue, since the ultimate cost of the improvement under the increased tax rates will be approximately one-half of that under the bond issue. This tax rate also takes care of the maintenance of the highways when they are paved. The bond issue does not do this. The Heston plan releases future generations from the burden of paying for bonds the receipts of which were used for building roads that have been worn out and rebuilt by the time the bonds are paid.

San Diego County, outside the corporate limits of the city, has 174.4 miles of paved roads, with 57 miles more to be completed under present plans. Approximately 30 miles will be paved and paid for in three years under the Heston plan. By using longer units of time—say 5, 10 or 15 years—the cost a mile can be further reduced by uniform construction of 10, 20, 30, or any other fixed number of miles a year. The Poway Grade, 30 miles northeast of San Diego city, is the first section to be built under the "pay-as-you-pave" plan. It is of 5-inch concrete in the center, with 8 inches on the side, so as to withstand heavy traffic along the edges of the road. The highway is 20 feet wide, and is in every way standard, yet it cost, complete and paid for, $25,000 a mile (exclusive of grading and drainage structures), compared with $51,275 a mile, the cost of other similarly paved highways, built under the bond issue plan in San Diego and other counties.

San Diego, like all other California counties, receives annually a share of the fees paid into the state for automobile licenses. In this instance, the county's income from these fees last year was $125,000 and it is increasing every year. Twenty cents in the tax rate for roads, the figure decided on by the Supervisors, will raise $160,000, making a total of $285,000 a year with which to pay for the highways as paved. Out of this, the Supervisors are allowed $35,000 a year for maintenance, and have placed the cost of paving at $25,000 a mile, the admitted net cost under the bond issue plan, but not the total cost, as will be shown in a moment. At this figure the $250,000 remaining in the fund after the $35,000 for maintenance has been deducted, will pay for 10 miles of the best improved and paved highway a year—and the highway will be paid for at the end of the year. Five years of this means 50 miles of paved highway, paid in full, and with its maintenance paid for as well.

Before adopting this new and revolutionary method of road financing, the Board of Supervisors worked out the following comparative table of costs of 50 miles of paved highway under the bond issue plan and under the Heston "pay-as-you-pave" plan:

BOND ISSUE METHOD

Cost of 50 miles of paved roads under the bond-issue plan, the $1,250,000 bonds to run 40 years at 5 per cent, the usual rate:

Year	Principal	Interest	Tax Rate
First	$31,250	$62,500	12½c
Second	31,250	60,937	12½
Third	31,250	59,375	10
Fourth	31,250	57,813	10
Fifth	31,250	56,250	10
	$156,250	$296,875	
End of 40 years	1,093,750	996,875	
	$1,250,000	$1,293,750	

Principal	$1,250,000
Interest	1,293,750
Election	20,000
Total cost	$2,563,750
Fifty miles, cost a mile	$51,275

Maintenance extra

"PAY-AS-YOU-PAVE" METHOD

Cost a mile of paved road under the "pay-as-you-pave" plan, including maintenance:

Source	Income	Tax Rate
First year auto tax	$125,000	
First year direct tax	160,000	20c
Second year auto tax	125,000	
Second year direct tax	160,000	20
Third year auto tax	135,000	
Third year direct tax	150,000	18
Fourth year auto tax	135,000	
Fourth year direct tax	150,000	18
Fifth year auto tax	150,000	
Fifth year direct tax	135,000	17
	$1,425,000	
Less maintenance	175,000	
Total cost	$1,250,000	
Fifty miles, cost a mile	$25,000	

Maintenance included.

These two tables, which have been proved to be accurate, in practice as well as in theory, give the taxpayer, whether he be in San Diego County or elsewhere, something to think about. Instead of ultimately paying out more than $50,000 a mile for his highway, he is paying $25,000 and paying it right now, with an actual maximum increase in his tax rate over the bond-issue rate of 7½ cents. It will be noted that on the bond-issue side of the above comparison more money is paid out for interest on the bonds than in actual highway building. That is to say, for every dollar which the taxpayer puts into road building, he also takes $1.05 out of his pocket and hands it over for interest and for the cost of the election whereby he voted himself into a debt whose interest is greater than its principal.

San Diego County has a road problem somewhat different from those of the other counties of California, since a part of these roads are built or will be built through the barren desert connecting the fertile Imperial Valley with the coast; part through the mountains, part through rolling hills, part in sloping valleys, and part on the sandy foundation of the immediate shore of the sea, where the cost of permanent, adequate construction is higher than in other sections.

Construction tests have proved, however, that the average cost throughout the county will be $25,000 a mile for paved highway, 20 feet wide, concrete 5 inches thick in the center and 8 inches on the edges. On the desert, where the subsoil is hard and building materials plentiful, and in the mountains, where the road often follows the bed rock for many miles, the cost will be considerably below this average figure, while in the rolling foothills and the valleys it will about maintain the average so that paved highways throughout the county may be built at this rate.—Reprinted from American City Magazine, January, 1924, issue.

FIRST SNOW OF YEAR IS REGISTERED AT SILVERTON

The high passes around Silverton have had their first snow fall of the year. It is probable that these passes will be closed for the winter by the end of October.

The rainfall has been so light in this district during the past summer that oldtimers are expecting an unusually heavy snowfall during the winter months.

Three federal aid projects are due for completion in this district the current month. They are: Three miles of gravel surfacing between Durango and Bayfield; one and one-half miles of gravel surfacing east of Pagosa Springs, including a steel bridge over the Piedra river, and three miles of gravel surfacing south of Durango.

During September five state projects were completed in Division No. 3.

STEINBARGER FEATURES REX PORTABLE TILTING TYPE MIXER

A new Rex mixer, known as No. 243, being a portable quality-bilt tilting type mixer, with a capacity of 3 cubic feet mixed concrete or mortar, is being featured by the sales force of H. N. Steinbarger Co., Denver. This mixer is designed especially for sidewalks, curbings, bungalow foundations and other small work where easy portability is desired. It is extremely light in weight, fast in action and built like a paver for strength. The tilter contains several new features.

LETTERS TO EDITOR

October 3, 1924.

To the Editor and Publisher of "Colorado Highways":

My attention was recently directed to an article in a magazine devoted to the cause of better advertising, from which I quote as follows:

> "It is unfortunately true that much of the responsibility for good advertising rests upon the publisher. The selfish interests of the individual-advertiser sometimes obscure the fact that attacking competition is not the best way to get business. Because of this, the advertiser oftentimes would like to say things in his copy that should not be said, but would be printed if the publisher were not on the job endeavoring to protect the interests of subscribers and advertisers alike."

If you will pardon my so saying, I wish to express the opinion that the publisher was certainly "not on the job" or he would have refused to print a full page advertisement which recently appeared in your magazine—I refer to the inside cover of the September, 1924, issue. This page not only violates the principle of good advertising, but makes a number of false statements as to the practice of our State Highway Department and also a number of Bureaus of the National Government. The advertiser states that the Highway Department and these Bureaus do not buy a certain product sold by its competitors, when, as a matter of fact, they all do so, when proposals are requested on a competitive basis, and the bids are such as to warrant acceptance. In some cases users of culverts are precluded by regulations from purchasing a patented article at a price higher than an unpatented article.

He certainly "covers a good deal of territory" because the users of the certain class of articles referred to include practically every railroad west of the Mississippi River; the state highway departments in large majority of states in the union, including our own; the U. S. War Department; the U. S. Indian, and National Park Service; as well as counties, cities, and municipalities, almost without number.

I have no fault to find with an advertiser who truthfully extols the merits of his own product, but I consider it an affront to the readers and subscribers of your magazine to have the implication above mentioned hurled at the extensive and reputable class of buyers which I have enumerated.

Yours very truly,

C. L. CHATFIELD.

Editor's Note—Censorship of advertising by the publisher sometimes assumes difficult aspects. Broadly speaking, a publisher has no right of censorship except in cases of flagrant misrepresentation, or where statements pass the bounds of ethical conduct or transgress good morals.

Too close scrutiny of advertising matter submitted would be impertinent. If advertisers transgress against each other, the publisher must be held immune from blame; in other words: it's the advertiser's funeral.

IMPROVED TRANSVERSE JOINT FOR OHIO HIGHWAYS

A new type of joint for concrete roads, designed to overcome roughness, one of the main difficulties on this type of highway, has been incorporated into the 1924 specifications of the Ohio State Division of Highways.

According to A. Stellhorn, chief engineer of construction, roughness of the transverse joints is a major problem i concrete construction.

The new design calls for a thickened edge at the contraction joint, starting some six inches back on either side, with an 18-foot gauge parting strip, which follows very closely the Illinois tongue and groove longitudinal joint. No reinforcing is to be carried through the joints, which will be spaced 300 feet apart, eighteen joints per mile being necessary.

The additional cost of the new joint to be required on all future new roads let under contract will be only $100 per mile, and this will be cheaper, it is claimed, than the cost of expansion material under the old specifications.

The fellow who said that the play he saw was called "Asbestos," thinks "Detour" is the name of the next town.

STATE HIGHWAY DEPARTMENT, STATE OF COLORADO
THIRD QUARTERLY STATEMENT OF THE HIGHWAY AND BOND FUNDS AS OF AUGUST 31, 1924

Balances, December 1, 1923			
Highway Fund	$1,142,405.80		
Federal Aid Bond Fund	998,031.24		
County Bond Fund	123,687.14		
Total Balances		$2,264,124.18	
Receipts:			
One-half Mill Levy	$ 652,936.81		
Gasoline Tax	595,747.99		
Internal Improvement	52,400.00		
Federal Aid	753,321.47		
County Aid	44,207.85		
Excess War Supplies	50,758.56		
Sale, Part of 1924 Bonds	500,000.00		
Total		$2,649,372.68	
Total Balances and Receipts			$4,913,496.86
Disbursements:			
Federal Aid Projects	$2,147,700.14		
State Projects	615,092.03		
Maintenance	576,088.57		
Property and Equipment	76,488.54		
Administration, General Office	46,806.29		
Administration, Engineering	61,790.25		
Road Signs and Traffic Census	15,843.70		
Refund to Yuma County	128.50		
County Bond Projects	72,027.95		
Total Disbursements		$3,611,965.97	
Balances, August 31, 1924			
Highway Fund	$1,245,900.63		
Federal Aid Bond Fund	3,971.07		
County Bond Fund	51,659.19		
Total Balances		$1,301,530.89	
Total Disbursements and Balances			$4,913,496.86

The Bulletin Board

CONTROL OF PUEBLO CULVERT FIRM CHANGES IN STOCK SALE

Through purchase of the stock of A. A. Weiland, control of the Colorado Culvert & Flume Co., Pueblo, is now in the hands of L. R. Shallenberger and J. P. Sanderson. Until recently Mr. Weiland has held the position of president of the concern. With the transfer of the Weiland stock, Mr. Shallenberger was elected president and general manager, while Mr. Sanderson is treasurer and secretary.

The Colorado Culvert & Flume Co. are manufacturers of corrugated culverts and irrigation flume and supplies, being one of the largest concerns of its kind in the West.

Mr. Shallenberger in the future will have charge of the plant in Pueblo, while Mr. Sanderson will act as field sales representative.

The company was started in a small way in 1909 and has since grown rapidly and firmly. Shallenberger became connected with the firm in 1915.

NEBRASKA CONTRACTOR BUYS GRAVEL PLANT NEAR DENVER

M. D. Welsh, former contractor of South Sioux City, Nebr., has taken over the plant of the Federal Sand & Gravel Co., located on Clear Creek on the outskirts of North Denver. In the future the firm will carry on its operations under the name of "Welsh, Sand & Gravel." Tracy Hall will be general manager of the new plant.

Mr. Welsh has installed a new Sauerman Cableway excavator, purchased through the H. N. Steinbarger Co., Denver. The plant is equipped with a Sauerman two-speed electric hoist. It has a 600-ft. span, with a capacity of 45 cubic yards of material per hour. This is the same type of plant recently installed by the Bear Creek Sand & Gravel Co., near Morrison, Colo.

Mr. Steinbarger announces that there are now seventeen Sauerman power scraper and cableway outfits installed in the Rocky Mountain territory.

MIDWEST BUYS FLEET OF FWD TRUCKS FOR FIELD OPERATIONS

The Midwest Oil Company recently purchased seven FWD trucks, according to Richard Carlson, sales manager of the Liberty Trucks & Parts Co., Colorado distributors. These trucks will be used by the Midwest in connection with drilling operations in the Wyoming oil fields.

Liberty recently took over the FWD sales organization in Colorado. Manager Carlson and Paul P. Bliss, factory sales agent, have just returned from an inspection trip of the Western Slope lasting three weeks.

MANGANESE STEEL PARTS

American Manganese Steel Co., Chicago Heights, Ill., whose trade name, "Amsco," is so well known throughout the country, have just issued a very handsomely illustrated catalog of manganese steel castings. The contractors' catalog, No. 3, as it is known, tells the whole story of manganese molding as an art and a science. In addition to their line of buckets for shovels and dredges and parts therefor, they show crane and barrow wheels, wearing parts for screens dredge pumps, gear and pinions, etc.

GRADING AND EARTH MOVING EQUIPMENT

The Russell-Grader Manufacturing Company, of Minneapolis, Minn., issues a large, profusely illustrated catalog covering the many kinds of grading equipment made by them. Among the items are scrapers, wagons, blade graders, elevating graders, plows, screens and bins.

DRAGLINE AND SCRAPER

The August issue of Sauerman News, published by Sauerman Brothers, of Chicago, contains an interesting account of the way in which a Crescent power scraper operated by a Sauerman two-speed electric hoist greatly increased the production of screenings in a New York plant. In addition, this number contains several other articles of interest on the use of dragline scrapers.

KOEHRING BOOKLET

Koehring Co., Milwaukee, manufacturers of pavers, mixers, cranes, drag-lines and gasoline shovels, have just issued one of the most novel booklets, covering their products, that has appeared for some time. The booklet is of twenty pages, on heavy tinted paper, which brings out the illustrations of their products in a striking manner. It is made up in pocket size for handy reference, and at the back is a post-card to be used by anyone interested for obtaining from the company more complete information as to any particular piece of equipment shown. The Koehring Co. announces that it will be glad to furnish a copy of the booklet to any interested person.

OSGOOD STEAM SHOVELS

The Osgood Co., Marion, Ohio, has recently issued a folder setting forth in detail its ¾-yd. heavy duty clamshells and draglines. The catalog is illustrated with eight cuts showing the sturdy equipment in different classes of work. In addition to being put up on interchangeable, continuous tread, these machines can be furnished in traction or railroad trucks as desired, and can be used as a clamshell or dredge. There is given also a table of ordinary working ranges.

YOUNG BUYS NEW EQUIPMENT FOR BIG PAVING CONTRACT

Everett Young, general contractor of Denver, probably holds the record in this territory for the amount of equipment purchased at one time to be used in carrying out the terms of a paving project. Until recently Young has directed his efforts to handling big sewer and water-works contracts. Early in September he bid low on paving for five districts in Denver. His bid was in round figures $200,000 for approximately 100,000 square yards of asphaltic paving.

Time being an important factor in the contract, Young purchased two Merriman asphalt plants, four Kelly-Springfield rollers, one Holt tractor and a large Stockland scarifier-grader. He will also use on the project three draglines, two P & H, and one Link Belt, which he had been using on his digging contracts.

The total cost of the new equipment which he purchased for the paving contract was about $75,000.

NORTHERN DESIGNS DEVICE FOR HANDLING SUGAR BEETS

A new piece of equipment designed for the handling of sugar beets has been brought out by the Northern Conveyor & Mfg. Co. of Milwaukee, Wis. It consists of a portable conveyor and wagon dumper, and is said to be a big labor saver. Several of the western sugar factories are now trying out the new device, according to Paul Fitzgerald, Denver distributor.

WONDER ENGINEER VISITS DENVER ON WESTERN TOUR

A. L. Locke, chief engineer of the Construction Machinery Co., Waterloo, Iowa, manufacturers of Wonder concrete mixers, was a visitor in Denver on October 2. He was the guest of M. A. Wogan, president of the H. P. Wilson Co., local distributors of the Wonder mixer line.

Mr. Locke reported business as unusually good thruout the western territory and predicted unprecedented sales of construction equipment during the coming year. Everywhere in this section of the country building is on the boom, he said, and there is every indication of continued activity during 1925.

HARRY WILSON ORGANIZES NEW EQUIPMENT FIRM IN DENVER

Announcement was made this month that Harry P. Wilson has withdrawn from H. P. Wilson & Co., with which concern he was connected for several years, and has organized the Wilson Machinery Company, located at 1526 Sixteenth street, Sugar building, Denver. The new firm have been appointed distributors of C. L. Best Tractors and road-building machinery. Mr. Wilson was one of the organizers of the H. P. Wilson Co. several years ago and is one of the best known equipment dealers in the Rocky Mountain territory.

A SELF-EVIDENT FACT

With the vast number of autos on the road every day, and every holiday, it is evident that the failure to build good roads is going to be much more expensive than building them.—Carlton Vidette.

PROJECTS ADVERTISED FOR BIDS

Proj. No.	Length	Type	Location	Bids Opened
213-A	3.538 mi.	Gravel Surfaced	Hesperus-Mancos	Oct. 3, 1924
262-C	2.897 mi.	Crushed Rock Surf.	La Veta Pass, Westerly	Oct. 3, 1924
904-B	1.9 mi.	Gravel Surfaced	Petersburg-Ft. Logan	Oct. 10, 1924
253-B	3.064 mi.	Gravel Surfaced	Brookston-Milner	Oct. 17, 1924
275-A	7.008 mi.	Concr. Paved	Sedalia, North and South	Oct. 17, 1924

CONTRACT AWARDED

Proj. No.	Length	Type	Location	Successful Bidder	Contract Price
278-A	8.409 mi.	Sand Clay Surfaced	Cheyenne Wells-Arapahoe	Holly, Burshears & Dobbins, La Junta	$16,016.00

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

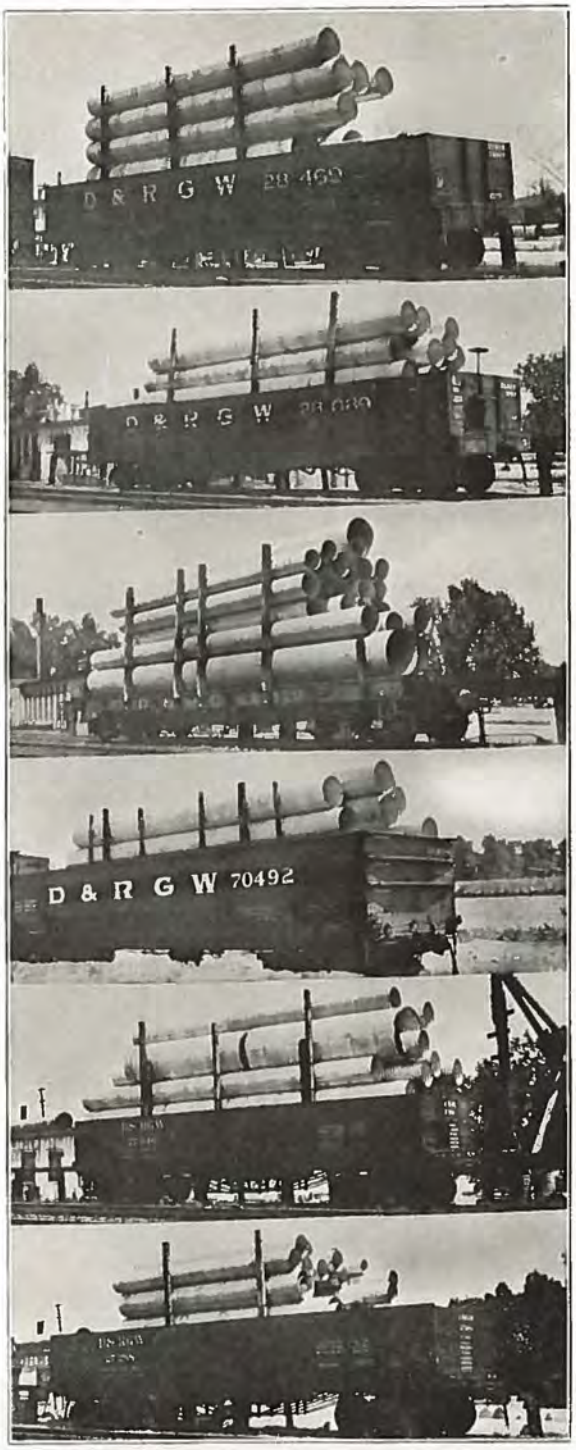
Proj. No.	Length	Type	Location
2 R. Div. 2	1.922 mi.	Paved	North of Trinidad
226-D	1.155 mi.	Concr. Paved	Platteville
271-A	3.286 mi.	Gravel Surfaced	Florence-Pueblo
277-A	3.840 mi.	Concrete Paved	South of Colorado Springs

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

Proj. No.	Length	Type	Location
2 R. Div. 3	0.55 mi.	R.R. grade separation	North of Trinidad
243-B	3.5 mi.	Gravel Surfaced	Piedra-Pagosa Springs
261-A	16.4 mi.	Gravel Surfaced	Rifle-Grand Valley
262-B	0.2 mi.	Concr. Girder Bridge	Alamosa, East
272-A	0.2 mi.	Steel Bridge	Apishapa
276	0.2 mi.	Overhead R.R. Cross.	North of Colo. Springs
279-B	6. mi.	Graded	Conifer, South
286-A	0.2 mi.	R.R. grade separation	Between Nunn and Dover
288-A	16. mi.	Gravel Surfaced	Brush-Merino
289-A	2 125' spans	Steel Bridge	Kremmling

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1924

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
2-R	Trinidad, north	3	mi. Asphalt Pavemt.	Strange-Maguire Const. Co.	$121,934	100	2-R
17-R	Breed-Husted	2.339	mi. Conc. Paving	LaNier, Selander & White	81,399	92	17-R
116-A	Colorado Springs paving	4.18	mi. Conc. Paving	Standard Engr. & Constr. Co.	238,944	81	116-A
116-B	Breed-Husted	0.892	mi. Conc. Paving	J. L. Busselle & Co.	51,001	74	116-B
116-C	North of Breed	3.163	mi. Paving and Bridge	LaNier, Selander & White	139,038.45	41	116-C
125	Sapinero-Cimarron	11.3	mi. Grav. Surf.	Dale Hinman	36,797	76	125
135	Denver-Morrison	5.3	mi. Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	32	153
174	Red Mountain	3.03	mi. Mtn. Grading	Pickering Bros.	82,071	95	174
190	Summit County Bridge and Road	1.45	mi. Grad. & Bridge	Colo. Bridge & Constr. Co.	40,154	100	190
207	Dillon-Kremmling	100	ft. Truss Bridge	Rogers & Pickard	28,831	76	207
210-B	Grand Valley-Debeque	7.507	mi. Grading	Winterburn & Lumsden	94,267	1	210-B
213-B	Durango-Hesperus	5.26	mi. Grav. Surf.	J. Edd. Hansen	72,960	83	213-B
214	Durango-Bayfield	3	mi. Gravel Surf.	Dale Hinman	53,411.05	97	214
222-C	Broomfield-Lafayette	2.82	mi. Conc. Pavement	R. M. Larsen	134,933	85	222-C
223-A	Kremmling-Rabbit Ear	2.88	mi. Grav. Surf.	Henry Shore	30,565	85	223-A
224	Morrison-Baileys	5	mi. Grading	M. J. Kenney Const. Co.	59,781	85	224
226-B	Brighton-Greeley	2.86	mi. Conc. Paving	White & Johnson	89,993	100	226-B
226-C	Platteville-Greeley (Div. 2)	6.335	mi. Conc. Paving	J. Fred Roberts & Sons	175,647	82	226-C
230-A	Wolhurst, south	0.852	mi. Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	79	230-A
230-B	Wolhurst, south	3.99	mi. Conc. Pavement	Brodie & Anderson	153,971	100	230-B
240	Gypsum-Dotsero	5.185	mi. Gravel Surf.	O. L. Hackett	66,178	67	240
242-A	Grand Junction-Fruita	7.703	mi. Gravel Surf.	Dale Hinman	81,255	22	242-A
243-A	Bayfield-Pagosa Springs	1.6	mi. Gravel Surf.	Shields & Kyle	48,311	80	243-A
245-B	Hadley, East	2.711	mi. Grading	W. A. Colt & Son	21,680	69	245-B
246-A	East of Pueblo	2.537	mi. Conc. Paving	R. A. White	78,431	80	246-A
248-A	Buena Vista-Salida	12.	mi. Grading & Surf.	Western Const. Corp.	93,533	19	248-A
251	Lafayette-Boulder	1.1	mi. Conc. Paving	J. Fred Roberts & Sons	32,670	100	251
252	Loveland-Berthoud	3.2	mi. Conc. Paving	F. C. Dreher Const. Co.	84,676	83	252
253-A	Steamboat Springs, west	6.50	mi. Gravel Surf.	Northwestern Cons. Co.	126,374	40	253-A
254-A	Byers Canon	1.057	mi. Grading	Pioneer Const. & Engr. Co.	72,408	31	254-A
255-B	Brush, west	2.944	mi. Conc. Paving	W. F. Pigg & Son	92,486	7	255-B
256-B	Merino, northeast	2	mi. Conc. Paving	W. F. Pigg & Son	53,702	100	256-B
257	North of Denver		Conc. Viaduct	C. C. Madsen	12,178	100	257
258-A	Gunnison-Sapinero	3.239	mi. Gravel Surf.	R. P. Morrison	34,900	21	258-A
262-A	West of Walsenburg	2.186	mi. Gravel Surf.	Central Const. Co.	19,367	22	262-A
266-A	Durango, south	3.03	mi. Gravel Surf.	Mishon, Engler & Teyssier	22,223	64	266-A
267-A	Model-Trinidad	2.954	mi. Gravel Surf.	Pople Bros. Const Co.	25,583	1	267-A
269-A	Cortez-Dolores	2.172	mi. Gravel Surf.	Engler & Teyssier	21,215	4	269-A
270-A	East of Monte Vista	3.429	mi. Gravel Surf.	Stamey-Mackey Const. Co.	17,667	1	270-A
272-B	Pueblo-Fowler	13	mi. Gravel Surf.	Shields & Kyle	103,768	0	272-B
273	East of Lamar	4.047	mi. Grav. Surface	W. A. Colt & Son	42,305.30	58	273
279-A	Denver-Morrison	1.439	mi. Concrete Paving	A. J. Collins	42,155	1	279-A
281-A	Lafayette, South	1.249	mi. Paving	Sims & Boston	55,373	6	281-A
281-B	South of Longmont	3.068	mi. Paving	J. Finger & Son	102,502.40	7	281-B
283-A	Loveland-Berthoud	2.530	mi. Conc. Paving	F. C. Dreher Const. Co.	84,829	48	283-A



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Write for Bulletin C. E. 15

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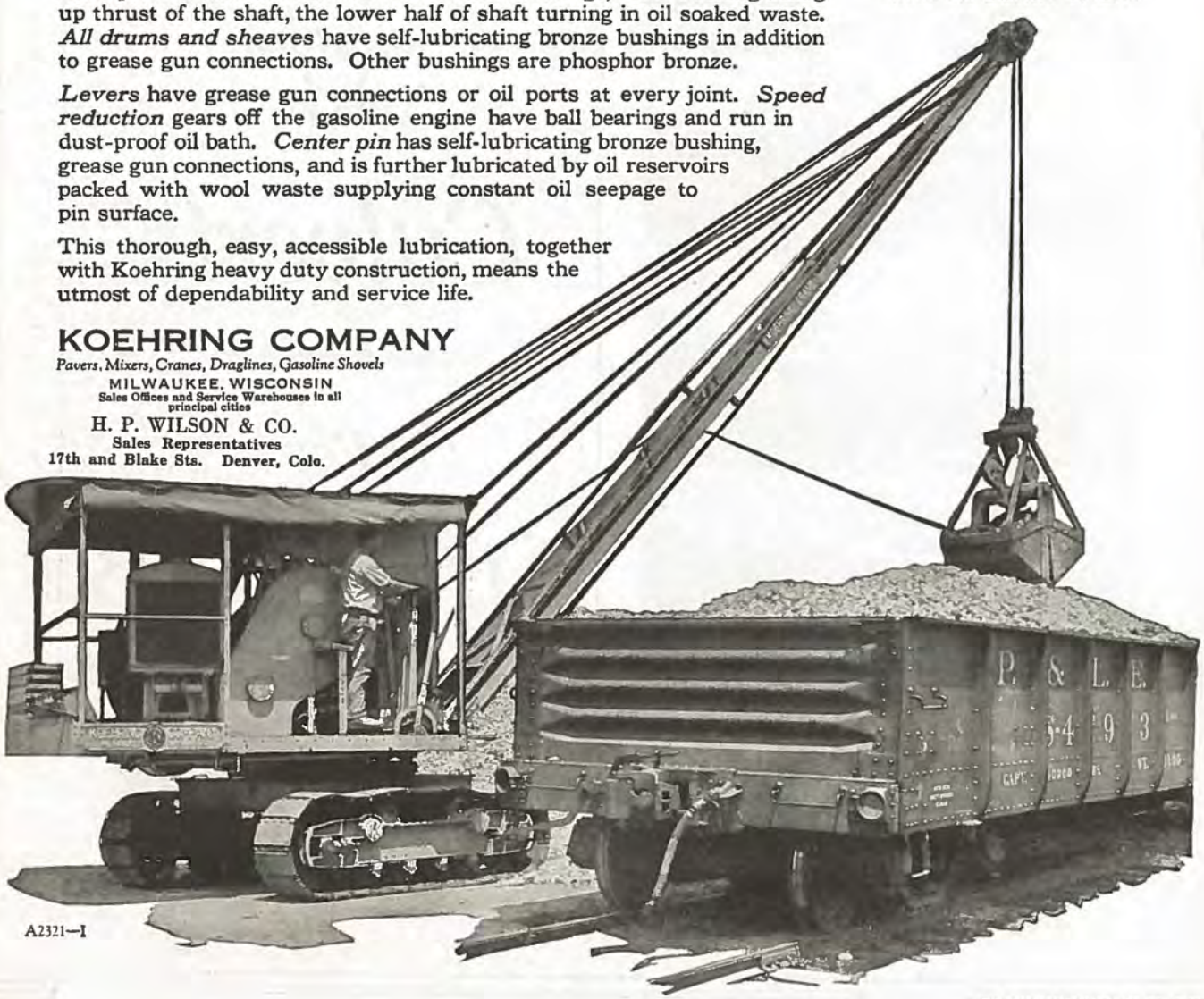

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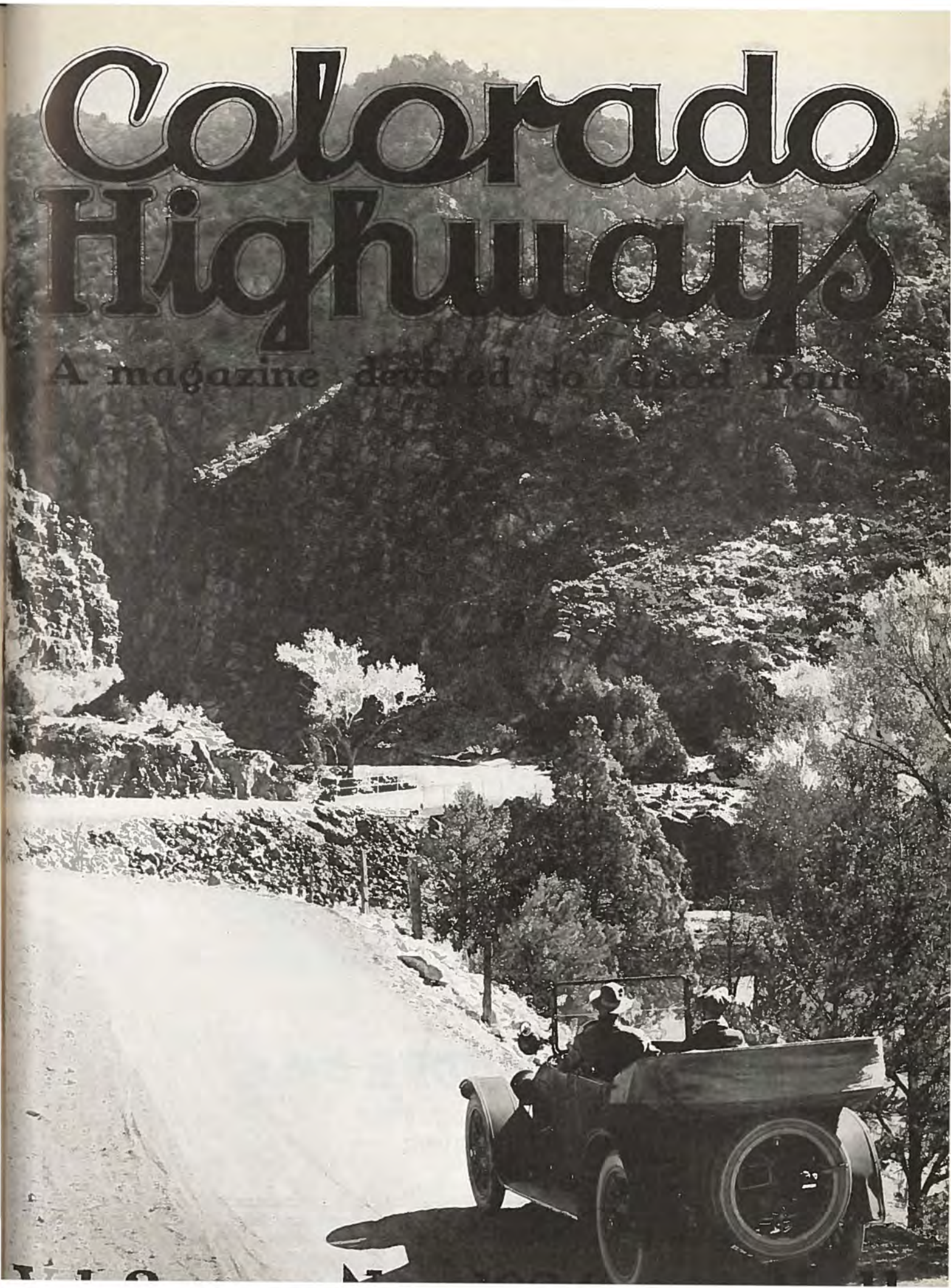
THE BRADFORD-ROBINSON PTG. CO., DENVER

Colorado Highways

A magazine devoted to Good Roads



Colorado Highways

Official Publication of the
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

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10 CENTS A COPY. **$1.00 A YEAR.**

OUR COVER PICTURE

The picture on the front cover of Colorado Highways this month shows a beautiful stretch of roadway in Fremont county along the upper Arkansas river. This is one of the most important highways in the state and carries a large amount of thru traffic all year round. It is highly improved and is gravel surfaced.

Colorado Highways
"BETTER ROADS"
VOLUME III. NOVEMBER, 1924. NUMBER 11

Denver-Morrison Paved Road

BACK in 1914 there was a stretch of mud on the Morrison road west of Sheridan Boulevard that was the bugaboo of motorists traveling to and from the Denver mountain parks. It was made particularly bad by seepage from an irrigation ditch which ran along the north side of the roadway.

During the winter months this short stretch of road was at times impassable to automobile traffic. Hundreds of dollars each year was spent by the state and Jefferson county in maintenance work. As traffic increased the condition of the road grew worse.

Finally one day members of the Jefferson county board of county commissioners came to the State Highway Commission for relief.

"We have gone the limit in trying to keep that piece of road out there by the Holstein Dairy in shape for traffic," they said. "We have reached the conclusion that the only thing to do is pave a mile of the road starting at Sheridan Boulevard."

Commissioner T. J. Ehrhart, in charge of the state highway work at that time, concurred in their opinion. Arrangements were made whereby the state would co-operate with the county in financing the pavement.

The following year the pavement was laid. It was the first stretch of concrete roadway constructed in Colorado. A marked increase in the traffic over the Morrison road was noted. Motorists went out of their way to drive to Morrison in order to try out the pavement. Some of these cars have long since gone to the scrap heap.

Since that time thousands of automobiles have traveled over this particular piece of pavement. Today there are no signs of the old mudholes that once were. Traffic has increased by leaps and bounds. Experts have figured that the pavement has paid for itself in the saving that has been made on maintenance costs alone, to say nothing of the savings that have accrued to auto owners using the road.

One day last summer a traffic man employed by the State Highway Department counted 6,000 vehicles that passed over this road. It was on a Sunday, and it seemed as though the whole population of the state was out for an outing.

During the last four years 9½ miles of concrete pavement have been laid on the road between Denver and Morrison. On December 1 the entire stretch of pavement will be thrown open to traffic, eliminating the present detour around Soda Lakes, near the town of Morrison.

With the completion of the Denver-Morrison road, both entrances to the Denver Mountain Parks will be accessible to the state's capital by paved highways. The link between Denver and Golden leading to Lookout Mountain was paved several years ago.

The ten and one-half miles of pavement on the Morrison road was constructed under five contracts. The first stretch was constructed by "Jerry" Stack, a Denver contractor. Stack was a partner with Andrew Collins in the construction of the last mile and a half extending westerly from the city limits of Denver to a connection with the original project at Sheridan Boulevard.

Construction of the second link was started by the Colorado Bridge & Const. Co. in 1920. This consisted of two miles and was completed the following year.

In 1923 one mile of pavement east of Morrison was completed by Peterson, Shirley & Gunther, contractors. The same year a contract was let to the Colorado Bridge & Const. Co. for the building of five miles, connecting their previous contract with the Morrison project. It is this project that will finally be opened to traffic on December 1.

On November 8 the paving extending west of the Denver city limits was opened to traffic.

Engineers who have inspected this road declare that it is one of the finest pieces of concrete pavement in the state. Special attention has been given to drain-

(Continued on Page 15)

A stretch of the new concrete highway between Denver and Morrison, connecting with the Denver Mountain Parks, recently opened to traffic.

A view of the Colorado river near Hot Sulphur Springs, as seen from State Highway No. 2.

Morrison Paved Road Complete

AFTER conferences with the state highway deparment advisory board at the board's preliminary budget meeting recently, the legislative committee of the State Association of County Commissioners tentatively agreed upon the following plan for financing the highway department's construction program after 1926:

An increase in the state gasoline tax from two to three cents a gallon, which, it is estimated, would produce increased revenues of about $800,000 a year.

An increase in the minimum motor vehicle license fee from $6 to $12, which, it is anticipated, would provide about $1,000,000 annually.

A restoration of the one-half mill tax levy, which would net about $750,000 a year.

These proposals, which were tentatively approved at the conferences, pending final approval at the December 10 meeting of the advisory board, would therefore provide a total annual increase in highway revenues of $2,550,000.

However, the $1,000,000 increase anticipated annually from a doubling of the motor vehicle license fee would be used exclusively in retiring state highway bonds according to Major L. D. Blauvelt, state highway engineer, who announced the details of the above program.

This would leave a total of $1,550,000 a year for meeting Federal aid and carrying out the highway department's construction program generally.

"This would provide only the minimum amount we shall need to proceed with our program of highway construction after 1926," said Major Blauvelt.

"The increase in motor vehicle license fees from $6 to $12 would not unduly burden the Colorado motorist. Even then he would be paying less than is actually paid, on the average, by motorists of the United States."

It is the intention of the legislative committee of the State Association of County Commissioners to finally agree upon the above plan, or some similar scheme, in December, with the approval of the state highway advisory board, and present it before the coming session of the Colorado legislature for favorable action.

The three proposals were generally accepted as the most advisable and feasible at the preliminary conferences.

Several suggestions for another state highway bond issue were made, and other schemes of financing were proposed, but they were all discarded in preference of the plan to increase the gasoline tax, the motor vehicle license fees and restore the one half mill levy.

Complete details of the 1925 state highway department budget will not be announced until after the final meeting in December, after which the budget will be sent to Governor William E. Sweet for his signature not later than December 15.

A total expenditure of about six and one-half million dollars is contemplated by the department during 1925. The budget figure itself is $4,550,000, and the remainder is the sum carried over from 1924 to complete the unfinished part of the 1924 program.

Generally speaking, Major Blauvelt said the tendency will be to continue construction work on the main north-and-south highway through the state.

In the outlying districts, he said, the sentiment expressed by members of the advisory board seemed to favor the allocation of funds available on the principal highways of the respective districts.

The new financing plan is necessary, since funds derived from the sale of the state highway bond issue will have been spent in 1926.

Pueblo county commissioners recently ran up against a different kind of problem when they were confronted with the sign, "Don't close this road any more or your death is sure." The commissioners rounded up the two factions of farmers of the community and conferred on ways and means of taking care of the highway which had been closed by a certain farmer.

Traffic Shows Big Increase

RESULTS of highway traffic counts taken by the State Highway Deparment during the past summer show a decided increase over 1923. In some instances the count runs as high as 50% over the previous year.

The heaviest increases of traffic was noted on roads which have been paved during the past two years. It appears that the concrete pavements have attracted the largest number of cars. On holidays and Sundays the traffic in some sections has increased a hundred fold.

A count of the cars traveling over the roads of the Western Slope was made last summer for the first time. The results of these counts are now in course of tabulation. The figures will be published at a later date.

The work of counting the traffic on Colorado's highways was started in 1923, and was placed under charge of J. R. Furlong, as Census Supervisor.

A group of twenty young men was organized and started their field work on July 1st, continuing the census until the middle of September, when all but four were laid off.

From September to December 1st two men were employed in the office totaling and tabulating the returns. Two men were used in taking the winter traffic counts at some of the more important stations in the vicinity of Denver.

As it was not practical to take the census throughout all the state in 1923, arrangements were made to continue the work during 1924 in order to cover the western portion of the State. The force necessary for this work was organized in June, and the census of the main State Highways on the Western Slope was taken during July, August and September. The men employed in this work were mainly from our colleges and high schools—local men being employed in many cases.

It was decided to obtain a partial count of three or four days in each month on the different stations east of the main divide, and not attempt to take a complete count for a full month at any of these stations. With this in view, the force was organized to start from Denver as a center and take the count on the road north to Fort Collins and Greeley, swinging around to Julesburg from Greeley, then from Denver to Limon and Burlington, and from Limon to Colorado Springs, then swinging south from Denver to Colorado Springs, then from Colorado Springs to Pueblo and to the State line, taking in also the Santa Fe Trail from Pueblo east to the State line.

At the same time, with the co-operation of the Division Engineers in the different districts, counts were taken in the San Luis Valley and the valley of the Colorado as far as Rifle. A few observations were taken at Craig and Steamboat Springs on the North highway, and also at Rabbit Ear Pass.

About three days were spent at each station. At many of the stations, such as Greeley, Loveland, Fort Collins, Denver, Colorado Springs, etc., occasional twenty-four-hour counts were taken, but at the other stations, eight-hour counts were taken, from eight o'clock in the morning until four o'clock in the afternoon. The twenty-four-hour counts give a proper percentage from which the eight-hour counts can be prorated, so as to give a full day's traffic at any station.

The count was taken so as to separate the Colorado cars from the out-of-state cars; also to separate the trucks, motorcycles, horse-drawn vehicles, and other classification of the traffic. Motor cars and trucks were classified as to weight. The weight was determined by the census-taker's observation.

When the traffic census was started it was hoped to be able to obtain some absolute checks on weights carried by the trucks and cars by installing scales for the purpose of weighing the vehicles, but this involved a great deal more extensive and expensive organization, and the idea was abandoned, but in the segregation of the traffic the department has information upon which an estimate of the weight can be based.

Comparate figures for 24 hours on State Highways No. 1 and 2 are as follows:

STATE HIGHWAY No. 1

	—1923—			
STATION	June	July	Aug.	Sept.
N. Fort Collins	....	1223	822	....
S. Fort Collins	....	1943	1735	....
S. Loveland	....	1821	2239	....
N. Denver	....	3359	3712	....
S. Denver, Petersburg	....	3201	3330	....
N. Colorado Springs	....	1746	1699	....
S. Colorado Springs	....	1244	1240	....
N. Pueblo	....	1057	1103	....
S. Pueblo	....	629	624	....
N. Trinidad	....	1601	1403	....
S. Trinidad	....	1222	712	....
Morley	....	557	657	....

	—1924—			
STATION	June	July	Aug.	Sept.
N. Fort Collins	595	1558	....	743
S. Fort Collins	1779	2327	....	1700
S. Loveland	1575	2524	....	2783
N. Denver	2924	4361	3757	....
S. Denver, Petersburg	3624	4135	4859	....
N. Colorado Springs	1652	1905	....	1522
S. Colorado Springs	811	1196	1417	....
N. Pueblo	834	1131	1560	....
S. Pueblo	1233	977	....	760
N. Trinidad	1144	....	1528	1096
Morley	361	....	454	713

STATE HIGHWAY No. 2

	—1923—				
STATION	June	July	Aug.	Sept.	Oct.
E. Julesburg	....	167	237	....	....
N. Sterling	....	598	604	....	....
S. Sterling	....	1004	1207	....	....
E. Ft. Morgan	....	796	980	....	....
N.W. Kersey	....	454	736	....	....
S. Greeley	....	1588	1616	....	....
S. Brighton	....	1665	2246	....	....
N.E. Denver	....	....	2722	....	....
W. Denver	....	....	....	....	1443
Bergen Park Jct.	....	....	745	....	....
E. Idaho Sprgs.	....	....	711	....	....
Empire	....	....	....	....	....
W. Steamboat Springs	....	....	....	....	....
E. Craig	....	....	....	....	....
W. Craig	....	....	309	....	....

	—1924—				
STATION	June	July	Aug.	Sept.	Oct.
E. Julesburg	....	332	379	....	....
N. Sterling	....	....	....	....	....
S. Sterling	....	956	1771	1792	....
E. Ft. Morgan	....	832	1399	994	....
N.W. Kersey	....	....	....	....	....
S. Greeley	1700	2284	2256	....	....
S. Brighton	....	....	....	....	....
N.E. Denver	2721	2993	3980	....	....
W. Denver (Sunday)	9269	6020	5918	....	3632
Bergen Park Jct.	....	....	....	....	....
E. Idaho Sprgs.	269	....	....	....	....
Empire	....	309	253	....	....
W. Steamboat Springs	....	....	....	311	....
E. Craig	....	....	485	221	....
W. Craig	....	....	525	....	....

DISTRICT NO. 2 ROAD OFFICIALS HOLD MEET IN GLENWOOD SPRINGS

Eight of the eleven counties which comprise the Colorado Highway District No. 2 were represented at the semi-annual meeting held in Glenwood Springs on October 27. The counties which had representatives at the meeting were Garfield, Delta, Pitkin, Mesa, Montrose, Rio Blanco, Gunnison and San Miguel.

Commissioner R. P. Coulter, of Garfield county, who is president of the District No. 2 association, presided at the meetings. Mayor W. G. McDonald, of Glenwood Springs, delivered the address of welcome, and Dr. George Sullivan, of Gunnison, responded for the commissioners.

Among the speakers before the convention were William Weiser, chairman of the State Highway Advisory Board; Joseph C. Bell, member of the State Industrial Commission; Grant E. Halderman, of the State Utilities Commission; Congressman E. T. Taylor; and F. J. Hartman, of Montrose.

Mr. Weiser discussed highway problems and explained something of the future plans of the highway department.

The regular annual meeting of the association will be held in Meeker next June.

Otero county commissioners have appealed to the State Highway Department regarding the proposed routing change of the Santa Fe Trail thru the garden of Eden. The proposed change would route tourists thru an undesirable and unproductive part of the state and would also add another road to be kept in repair, valley residents claim. The object in changing the road is said to be elimination of grade crossings. Subways or viaducts seem to be preferred by the commissioners and most of the residents of the county.

Construction of three and one-half miles of gravel surfacing east of Monte Vista has been let to the Stamey-Mackey Const. Co. This concern has just completed three miles of asphalt paving north of Trinidad.

Showing screening plant mixing materials for concrete highway near Brush. (Lower picture)—Shows workmen finishing top of pavement.

Contractor Makes Paving Record

THE breaking of paving records by contractors employed by the Highway Department became somewhat of a habit during the past summer. First there was a contractor who finished up a project on the Santa Fe Trail in the Arkansas Valley so fast that he got off the job before road officials found out that he was gone.

Then came another project north of Denver that was completed in record time. This job caused the engineers to scratch their heads and ask if wonders would never cease. Here was a contractor who had scraped together an outfit that was turning out an average of 350 feet of concrete per day. The progress on this job was described as "going like a house afire."

During the time the project north of Denver was under construction, the Highway Department let contracts for two strips of pavement in northeastern Colorado. One of the contracts called for two miles of pavement northeast of Merino, being an extension of the pavement from Sterling. The other called for the construction of three miles of pavement west of Brush, completing the ten-mile stretch of concrete between Fort Morgan and Brush.

These two contracts were awarded to W. F. Pigg & Son, Denver contractors. At the time the contracts were awarded this firm had several alley paving contracts under way in the city of Denver. The firm had done alley paving for a number of years, but never before had tried their hand at highway paving.

Due to this fact, and also to the fact that their equipment was not suited to highway paving, the State Highway Engineer at first was a little hesitant about awarding the two contracts to them. But after looking over their record on the alley jobs, and being given the assurance that all necessary equipment required for the execution of the two road contracts would be purchased, he finally gave them the work.

If the other jobs had gone "like a house afire," these two went like a hurricane. Never before had the highway engineers seen such speed in the pouring of concrete. It required exactly twenty-one working days to pour the concrete on the two miles out of Merino.

Immediately after this job was finished the plant was moved to the Brush project. The crew started pouring concrete on this job on August 7 and finished on September 15. The average run per day on the second project was 8¾ sixty-foot stones per day, with a high run of 11 stones, or 660 lineal feet of concrete in one day.

Both were Federal Aid projects, and upon final inspection by government experts were declared to be the finest examples of concrete paving to be found anywhere in the state. The concrete was laid with a longitudinal joint.

This splendid showing of speed and efficiency was the result of a perfect working organization, combined with the use of modern road equipment.

Lime rock was used as the coarse aggregate. This was shipped in from Guernsey, Wyo., a distance of 200 miles. Sand was procured locally and was hauled in trucks to stock piles with a maximum haul of five miles. On the Merino job the rock was handled with hopper bottom cars, dumped on the ground and fresnoed to the pile. This proved unsatisfactory because it dusted the rock. At Brush the rock was unloaded from the cars with a P. & H. clamshell.

With this exception the two jobs were handled in a like manner. The rock was piled on one side of a chute and sand on the other, loading a car with one batch at a time. This was loaded into trucks by means of a Clyde hoist equipped with a four-cylinder motor.

Each truck carried two batches. The trucks were turned on the grade by

(Continued on Page 15)

Prevention of Corrugations

By A. H. Hinkle
Superintendent of Maintenance, Indiana State Highway Commission

CORRUGATIONS are frequently found in gravel roads carrying a heavy traffic and these are a great annoyance to the comfort of occupants of machines. They are also a source of much financial loss to owners of machines and trucks as a handicap to transportation by forcing an undue slow speed and as a source of broken springs and other damage such as is done the machine or truck in going over a rough road.

A distinction should be made here between the corrugations, or harmonic waves, sometimes called "chatter bumps," and another class of failures in gravel roads made of the best "pot holes." Good stone roads and gravel roads made of the best material but because of lack of attention and proper maintenance, frequently fail by the promiscuous developing of "pot" holes in the surface with no special relation one to the other. The corrugations about which this article is concerned form as harmonic waves (ridges and troughs) crosswise of the line of traffic, at regular intervals about 26 in. apart.

How Corrugations Are Formed

The corrugations are formed by the swift moving self propelled vehicle. They are apparently formed by the combined action of the vibration of the vehicle and the spin or slip of the drive wheels. When the vibration partially removes the load from the drive wheel, the wheel slips slightly, thus displacing the gravel. The corrugations once started increase rapidly if let go, due to the increased harmonic vibration of the car caused by the incipient corrugations. Any bump in the road surface causing the many times repeated vibration of the car may be sufficient to start the vibrations; or the dragging or scraping of the road may be improperly done such that the dragging operation itself produces the incipient corrugations. The corrugations once started may develop rapidly under heavy traffic with certain conditions of the road metal and surface and lack of maintenance. The corrugations will continue to grow greater until they have become so bad as to slow down traffic or until they are eliminated by some treatment of the surface.

Such corrugations will apparently form on almost any gravel road when traffic reaches a certain density. They are not often found in stone roads except in the poorer grades of worn-out stone. Observation shows that they form sooner in poor grades of gravel and in the gravel that has been on the road long enough that it is practically worn out. They form quite readily in gravel containing a large amount of so-called "dead sand," which has no cementing value and little resistance to being displaced by traffic. An excess in the gravel of fine sand of most any grade always develops the corrugations more rapidly. They form much more readily under high speed traffic. They develop much faster on flat surfaces where the water stands on the road surface after a rain.

The above observations as to the cause of corrugations and their development suggest various means that may be taken to prevent or eliminate them.

Although the high speed, causing a greater tangential force on the gravel surface in order to drive the car forward, contributes greatly to the cause of the corrugations, it seems quite difficult to control this factor. However, if sufficient publicity is given to the fact that the use of our gravel roads as motor speedways greatly increases the cost of maintaining them, and at the same time causes them to be in much poorer condition for traffic, it would have a soothing effect on both the official and motorist in keeping the speed down to a more reasonable and safer rate.

Density of traffic can, of course, hardly be controlled. The principal relief from this cause of corrugations is to construct some other type of road surface when the traffic becomes so heavy that it is difficult and unduly expensive to longer maintain the surface as a gravel road.

The Necessity of Maintenance

The proper kind and sufficient maintenance of the gravel road is the best remedy for corrugations. If the displacement of the gravel does not take place too fast under a very heavy traffic, the replacing of the displaced gravel and leveling of the surface with a heavy, long base drag or heavy grader will go a great way toward keeping the corrugations from developing. This smoothing of the surface should be done as frequently as may be necessary to keep the surface smooth, this frequency depending on the amount of traffic, moisture in the gravel, and quality of the gravel. Gravel containing just the right amount of moisture to cause it to compact well will require less frequent dragging. It is for this reason that the best results come from dragging after a rain, when the gravel is drying. Heavily traveled gravel roads may require dragging every day in dry weather to keep them smooth and free from corrugations. On light traveled roads the dragging will be required much less frequently. Corrugations are not a source of much trouble on light traveled roads, as the gravel is not disturbed frequently enough to seriously break the bond in the gravel. Also, the rain will have a tendency to level off the surface where same has been disturbed and the time between disturbances gives the gravel time to "set" or bond together. For maintaining a gravel road there is no substitute for the long base drag or heavy grader, which has a long base because of the distance between its wheels. This long base will prevent the individual blades from dipping down into the depressions, and the drag rides on top of the ridges, scraping them off and filling up the troughs and depressions in the surface.

Material an Important Factor

The grade of gravel used in the road surface will have much to do with the inclination of the surface to corrugate. An excess of fine sand in the gravel which has no cementing properties will make the gravel much more susceptible to corrugations. Old worn-out gravel which has been on the road for some time and which is ground up by traffic offers little resistance to corrugations under traffic. A well-graded gravel ranging in size from 1¼ in. down, and containing 25 to 40 per cent material passing ¼-in. mesh and not over 5 per cent passing a No. 10 mesh sieve will be most satisfactory to resist corrugations and produce a smooth surface. The denser the mixture of gravel, the more stable will be the gravel surface. Frequently there is a surplus of sand and worn-out gravel on the old road surfaces, in which case the new gravel should have even less sand than given above.

Crushed boulders ranging in size from

(Continued on Page 11)

Maintenance outfit in Yuma county showing specially constructed road drag.

Road Officials Meet in Frisco

ON November 14 a delegation of fifty state and Federal highway officials from eastern states passed through Denver en route to San Francisco to attend the annual convention of the American Association of State Highway Officials on November 17 to 20.

T. H. McDonald, chief of the U. S. Bureau of Public Roads, headed the eastern delegation. They traveled in special Pullman cars. In Denver the delegation was joined by L. D. Blauvelt, Colorado highway engineer, who is chairman of the program committee and a member of the executive committee.

The party spent two hours in Denver between trains, and while here were entertained by Major Blauvelt and members of the State Highway Deparment staff. A short automobile ride through the city was one of the features of the entertainment.

The annual convention of this association is one of the most important gatherings of highway officials held in America each year. This is the first time that the convention has been held in a western city. Selection of a western city this year was the result of the efforts of Major Blauvelt at the convention held in New Orleans last year.

Oliver T. Reedy, senior assistant engineer, of the Colorado Highway Department, will be among the principal speakers before the San Francisco convention. He will discuss the subject of convict labor on road work.

General sessions of the convention will be held in the Italian Room, St. Francis Hotel, and committee meetings at the Hotel Manx. Most of the eastern delegates are going into California over the northern route and will leave the state via Los Angeles. This will give opportunity for a motor trip from San Francisco to Los Angeles following the convention.

California road enthusiasts will furnish sufficient automobiles to transport the entire convention over state highways between the two cities. The trip will be complimentary. Among the entertainment features planned include sightseeing trips to San Francisco's famous Chinatown.

The American Association of State Highway Officials is a national organization composed of the state highway departments and highway officials of the various states and Hawaii. Dues paid by the departments themselves, as members, and by individual members, officials and engineers of the various departments, constitute the only source of revenue of the association.

In the words of F. R. White, of Iowa, president, the association is not interested in selling anything, in contracts, or in anything else except the building of a great system of highways for the benefit of the people of the country.

The association provides a means for the states to deal collectively with the national government in matters of Federal aid; it also is a forum for the discussion of problems of engineering and administration. Through its officers, the association is constantly in touch with the Bureau of Public Roads, congressional committees and the progress of highway legislation. The convention to be held in San Francisco in November is its tenth annual meeting and the first to be held west of the Rockies.

Officers of the association are: F. R. White, Iowa, president; Frank F. Rogers, Michigan, vice-president; Frank T. Sheets, Illinois, treasurer; Chas M. Upham, North Carolina, secretary; W. C. Markham, Washington, D. C., executive secretary.

Executive Committee: C. M. Babcock, Minnesota; L. D. Blauvelt, Colorado; Wm. H. Connell, Pennsylvania; W. S. Keller, Alabama; Thomas H. MacDonald, Bureau of Public Roads; J. N. Mackall, Maryland; W. R. Neel, Georgia; P. D. Sargent, Maine; Z. E. Sevison, Wyoming; Harvey M. Toy, California.

RIBBON OF TNT STRETCHED ALONG FALL RIVER ROAD

Incased in a tube of lead a ribbon of powerful T. N. T., known as a Cordeau fuse, has been stretched along the trail of the Fall River road in the Rocky Mountain National Park west of Loveland.

This fuse is buried under snow drifts ranging from 15 to 25 feet deep on both sides of the Fall River pass, and in the spring the drifts of snow will be blown from the trail by this powerful explosive.

This is something new in the work of the park service. Heretofore the snow has been bucked and scraped from the mountain pass roads each spring. This has been the hardest and most expensive task the park service has had to handle.

The new instantaneous fuse, it is believed by Roger W. Toll, superintendent of the park, will solve the problem. Instead of being a burning fuse, Cordeau is set off by a blasting cap, so that its entire length explodes at the same instant. Fifty pound boxes of 20 per cent dynamite were placed at 20-foot intervals in one of the worst drift locations along the road. Each box was then opened, a box of Cordeau strung between them, after which they were sealed again.

The free end of the Cordeau is securely fastened 25 feet high, on a steel snow gauge pole. Each end of the fuse is made water tight.

This powder will be left to snow and drift under during the winter, and at the proper time next spring a blasting cap will be inserted in the pole end of the Cordeau and the entire charge detonated at once.—Loveland Herald.

NEW ROAD OVER MANCOS HILL READY FOR TRAFFIC

The new road over Mancos Hill is nearing completion, according to the Mancos Times-Tribune.

As a finished product, the road is eighteen feet wide and built on an even grade not exceeding seven per cent. The road bed is well drained and is surfaced, first, with four inches of coarsely crushed gravel, and top dressed with three inches of finely crushed gravel with a twenty per cent admixture of dirt and clay as a binder in all gravel. This makes a road that is always hard and firm and it is calculated to stand up under ordinary traffic in all kinds and conditions of weather. Tests already made on this road seem to indicate that it will do this and it is a road that we all may well be proud of. The road, with proper maintenance, will be serviceable for all time, and very useful in that it will be the neck of the bottle that must carry the east and west-bound overland traffic to and from Montezuma county and the country to the west and northwest, and the travel from the east to Mesa Verde Park.

A stretch of new concrete highway located east of Morrison, now connected with Denver with continuous pavement.

Colorado Scenic Wonders

By WALTER L. WILDER
Editor Pueblo Chieftain

Seventy-five miles west of Pueblo, on the Rainbow Route, there is a rock. It is about twenty feet high and nearly square upon its base. It has a flat top, and a perpendicular side toward the road, but on the other side it is sloping, which makes the top easily accessible. Close beside it grows an evergreen tree, a pinon or red cedar. It has always been a favorite spot for campers, and is still used for the same purpose, although a ranchman's fence now encircles it. Five miles beyond the Seventy-five Mile Rock is another tree, a red cedar, fully three feet in diameter, about the largest tree of its species I have ever seen.

This tree grows close to the river, and it makes an ideal camp ground, with wood and water, and thick shade, and a tree canopy over your bed that will protect you from all but the heaviest rain storms. There, after you have eaten your camp supper, you can lie in your blankets and watch the bright stars pass in slow procession above the mountains, and the great, dark crags and cliffs that shut in the little valley, and the stream making its music, and all the other night sounds of the wilderness.

* * *

It is about seventy miles further from Big Cedar camp to the bridge across Twin Lakes Creek, and in that distance, if you have kept your eyes open, and not been merely trying for speed, you have seen some of the best mountain views in Colorado. You have passed the flourishing little cities of Salida and Buena Vista, and numerous smaller towns. You have watched the dwindling snow banks on the higher mountains, and admired the three monarchs of the Collegiate Range, Princeton, Harvard and Yale. You have noted the beautifully cultivated fields of the Upper Arkansas Valley, and have seen the lettuce and cauliflower crates stacked at the little stations along the railroad.

Most of all, probably, you have commented upon the magnificent highways system, now in the making, and if the maintenance is not always to your liking, the grades and the foundations of the roads leave nothing to be desired.

* * *

With every little road that comes into the highway there stirs a desire to explore what lies off the beaten path, and more particularly when you cross the streams that rush under the bridges, and you catch glimpses of distant mountains from which they seem to come, you are tempted, almost as were the pioneer prospectors and land seekers of the earlier day.

At Currant Creek you might have followed the pioneer's trail to the Bayou Salado—what we call South Park; at Cotopaxi you might have turned to the Wet Mountain valley and the undeveloped mineral treasures of Custer county; at Salida you might have made your choice between Poncha Pass, that leads into the San Luis Valley, or the incomparable Monarch Pass, that opens a way into the Gunnison; and at Buena Vista you might have gone to the north into the South Park and on by branching roads, or by the main highway to Colorado Springs.

* * *

But not until you reach the Twin Lakes creek bridge beyond Granite, and the rising highway opens to the west the view of the lakes set in a circle of majestic peaks does the magnetism of the mountains become irresistible. And here it is that Colorado's newest highway leads up to the grandest of Colorado's high mountain scenery, the highest pass traversed by a main highway, the supreme accomplishment of Colorado's road builders.

Monarch Pass is well over 11,000 feet in altitude and Wolf Creek Pass comes up close to the 11,000 mark, and so is Milner Pass, at the head of the Fall River road in Estes Park, but Independence tops them all. For as you stand to write your name in the forest rangers' book for visitors, you are almost 12,200 feet above the level of the sea, and the majestic peaks that you have been gazing at all the day seem to be almost on your own level, while the snow banks on the barren slopes above timber line are actually below your feet.

* * *

From Twin Lakes the new highway, opened across the pass for the first time this summer, leads up a beautiful mountain valley and past a waterfall that has been locally famous since pioneer days. A great mountain seems to block the western end of the valley, but the road swings to the right on an easy grade and soon you notice a slanting scar across the face of the mountain wall, straight as a surveyor's sight, and soon you are at the foot of this shelf road, cut for much of the way in the solid rock. Those who have travelled the old shelf road between Canon City and Cripple Creek in the old days will have a good idea of this part of the Independence Pass road.

At the top of this slope, which presents at every step scenic views of increasing grandeur, one is at the level, approximately, of some of the higher passes of the state. But Independence has still its crowning glory. The highway follows a little valley for a short distance and then turns for a switchback on the mountain side, a long slope up to the right, a sharp turn, and then another similar slope to the left, which lands one at the summit of the pass. It is upon this upper switchback, even more than at the pass itself, that the climax of Colorado's mountain grandeur is reached. There are probably remote spots, inaccessible to the motor tourists, where the vistas of Independence Pass may be equalled or even excelled. But for the Colorado highways system and for the tourist who does his mountain climbing with the aid of gasoline, Independence Pass is the best of them all.

* * *

Over the top, where one rides comfortably in cushioned cars, are the remains of the old stage and freight road. For when the mineral treasures of Aspen were first discovered, in '82, there was no other way to the latest find of the prospectors than by this steep and rocky road. How they made it I don't know. It looks as though it would take six mules to pull an empty wheelbarrow up that grade, and on the other side they didn't go down the hill, they simply fell off. But the man at the Buena Vista garage who serves gasoline to passing motorists remembers well—and he is not so old at that—when the stages and freight wagons ran to Aspen, and the mountain slopes and the little remote valleys were scenes of feverish activity.

Some day the mines will come back, for the gold and the silver are there in the heart of the great mountains. But the freighters and the stage drivers and the prospectors who "went there first," they will never come back. In these days when Aspen still holds one of its two railroads and when one can easily drive over Independence in intermediate, one cannot help honoring the courage, the energy and the vision of the pioneers. And at night when the flames of the campfire die down, and the thick darkness settles in the narrow valley, in the noise of the rushing stream and the sigh of the wind through the spruces there are mingled ghostly voices of men who blazed the way through the wilderness and laid the foundation of the Colorado that was to be.

WHAT'S THE USE?

"What's the use!" exclaims the Waseca (Minn.) *Herald* with mixed disgust and despair in chronicling the fact that in 48 hours after new markers had been set out at several street intersections in that city, the flags surmounting them had been flattened out by reckless motorists driving over the top of the markers, which are of the low rounded cement type.

"What's the use? Not a darned bit of use," answers the Ellendale *Eagle*. "The flivver is more important than the baby these days and is allowed to run around in the same unrestrained manner.

"If one of these bird's grandmothers was set up at a street intersection with a flag or installed on a curb holding a light, Goddess of Liberty fashion, they'd run over her and never look back. Next time they came along they'd run over the corpse and never be aware that they had hit anything. They are blind, deaf and dumb to all interests but their own and they don't even look after them very well.

"'What's the use!' is right," the *Eagle* concludes.

The Otero county commissioners are making good use of the old bridge across the Apishapa on the Santa Fe Trail near Fowler. The old structure is being replaced by a new modern bridge through Federal aid. The old wooden bridge, which is credited with service since bridges were put into use in that part of the country, will be used to replace one which was washed away during the Apishapa dam flood one mile south of Elder. The saving will be about $3,000, the commissioners believe.

REPORTS FROM THE DIVISIONS

HORSESHOE DRIVE FROM LOVELAND TO FORT COLLINS FINISHED MONDAY MORNING

Loveland and Fort Collins have been linked by another highway.

The forest service Saturday opened for automobile traffic the horseshoe drive on which they have been working for the past four years, and which traverses some of the most scenic sections of the intermountain states.

Beginning at Fort Collins, travelers may now go over the Poudre Canon road to what is known as Federal Bridge, about thirty miles from Fort Collins, where the new road branches off.

Climbing upwards through the mountains from this point hundreds of feet, the forest road leads through the John Derby ranch, over the Bennett Creek trail, through Pingree Park and Pennock Pass to the head of the Buckhorn, where it joins the Buckhorn road into Loveland.

This new road passes through some of the wildest region in the West that abounds with game and where small mountain streams, laden with fish, find their way down the mountains into the Poudre and Buckhorn. It is a hunter's paradise and a delight for tourists and campers.

The road has been built by the forest service and no state or county funds have been used in its construction. There is still a crew of forty men working to put the road in better shape for traveling, but it is so far completed that autos now travel over it, the first car making the trip Saturday. The road had been built to Pingree Park from the Poudre last year and the balance of the work from the park to the Buckhorn has just been completed. The entire horseshoe trip, with Fort Collins on one prong of the horseshoe and Loveland on the other, takes the traveler through 100 miles of wonderful scenery.—Loveland Herald.

BRAINERD LAKE ROAD MOST SCENIC OF ALL NEARLY FINISHED NOW

"It all depends upon the weather," said R. C. Cronin, when asked if he was going to complete the Red Rock-Brainerd Lake road this year. "We have 4,000 feet of easy work ahead of us, but can't do it if we have many more snows. We have had four already, and the last one was of twelve inches. This storm extended only as far as Ward."

Mr. Cronin has thirty-five men in camp, and they are working every day that weather will permit. The road has been completed except for the 4,000 feet, all culverts, fine grading, etc., being done up to that point and considerable work on the 4,000 feet has been finished.

"This is going to make one of the prettiest roads in the country. I have been on twelve road projects, but know of no place that surpasses the views that are obtainable from this new road. At one point we can see Denver, Longmont and Lakeside. On a moonlight night the entire valley is visible, except Boulder, which is too close to the mountains."

Mr. Cronin had the contract for the Ward-Red Rock Lake road, and upon its completion was awarded the project from Red Rock Lake to Brainerd Lake. This road opens up the country in which the Seven Lakes Cottagers' Association was formed last summer.—Boulder Camera.

BUMBACK ROAD COMPLETED AT $25,000 COST

Although it has been completed and open to travel for about a month, a good many people do not seem to be aware that the Bumback Springs road on Parkdale hill is available for use.

The new highway, which obviates the dangerous curves and turns of the old road, was built under the supervision of Floyd Coleman and was the most important piece of construction of the kind done in that part of the county in several years.

It is about three miles in length from the point where it leaves the Fairplay road to its lower end at the foot of Parkdale hill. It was a state highway proposition and cost about $25,000.

Some extremely heavy rock work on the lower portion of the road and the erection of a steel and concrete bridge were responsible for a large part of the expense. The bridge is twenty-seven feet above the bed of Bumback Creek and has a span of fifty feet. It rests upon concrete abutments twenty-seven feet in length and seven feet in thickness at the base. It required 1,000 sacks of cement for the abutments alone.

It took fourteen months of almost constant work to build the road, which is highly picturesque during its course through the canon. The grade is an easy one and broad enough to permit the passage of automobiles at all points.—Canon City Record.

CAMERON PASS ROAD WILL BE COMPLETED THIS YEAR

A steam shovel and over fifty men and teams are working on the last unit of the Cameron Pass highway, and it is to be completed this year. When it is put in use next season this new road across the Medicine Bow Range will become one of the most popular routes between Steamboat Springs and Denver, as it is devoid of all heavy grades.

From Walden to the summit of Cameron Pass is 28 miles, and from there to Fort Collins is 70 miles, making the total distance from Walden to Fort Collins 98 miles, compared with 126 miles by the present route via Laramie, Wyo. From Walden to Denver will be 166 miles, or practically the same as between Steamboat Springs and Denver, and by the new route there are no grades necessitating the changing of gears.—Steamboat Sentinel.

CITY COUNCIL TO CHRISTEN ROAD BRIGHTON BOULEVARD

"Brighton Boulevard."

In the future, instead of having to ponder over a dozen devious roads going north out of Denver east of the stockyards, a specific, well-constructed thoroughfare will come to mind, and the Denver citizen and the northern visitor will go out of the city and into the city on "Brighton Boulevard."

The new road alluded to as above and a bill for an ordinance for the naming of which was introduced by Councilman Daniel R. Lucy, will extend from the Broadway extension viaduct northeast along Wewatta to Gilpin, thence north to the county road and to the subway under the Chicago, Burlington and Quincy railway tracks, and terminating at the junction with the Brighton road at the city limits.

PAVED HIGHWAY NOW CONNECTS NORTHERN COLORADO OIL FIELDS

A paved highway now links the great oil fields of northern Colorado. During the past month Contractor F. C. Dreher finished the pavement into the town of Berthoud, connecting with a continuous strip of concrete extending north through Loveland and to Fort Collins.

With the completion of this pavement the oil fields of Fort Collins, Loveland and Berthoud are easily accessible over a paved road. The wells in each of the fields are reached by short side trips from the pavement.

Plans are now under way by the state highway department for the extension of the pavement south of Berthoud, and also south of Longmont, to connect with the paving at Lafayette, which was finished this past summer.

The length of the projects to be constructed the coming year will depend upon the amount of money available in the 1925 budget. At present the paving north from Denver extends to the city limits of Lafayette.

Work also is in progress south of Longmont on a project which will extend the pavement from that town to what is known as the Six Mile Corner in Boulder county.

GREELEY ROAD SHOWS HEAVY TRAFFIC COUNT

A traffic census on the Greeley-Denver road, taken this summer, shows a total of 850 cars per day passing over this important highway. This would give an average of 25,500 cars per month, and 306,000 per year.

Taking two and one-half people per car as an average, this would give a total of 870,000 people who travel over this highway in a year.

Figures just compiled by the State Highway Department show an increase of about 30% in the traffic on this road since the completion of the concrete pavement between Denver and Greeley. Especially heavy has been the Sunday traffic, the count running as high as 7,000 cars in twenty-four hours.

"Jack's got a new siren for his car."

"Really. What became of the blonde one?"

Preventions of Corrugations

(Continued from Page 7)

1¼ in. down and containing all the dust incident to crushing will produce a much better surface to resist corrugations than the pure gravel. The better results secured from the use of this material are due to the angular fragments of the broken boulders and the cementing value of the dust. For this same reason crushed limestone offers greater resistance to corrugations than the uncrushed gravel. The tendency of a gravel to corrugate may frequently be eliminated by an application of a thin coat of crushed boulders or good limestone. It should be remembered that a well-graded aggregate so graded that the voids in the coarser material are just filled with the finer material or a gravel that will produce the densest mixture with some cementing properties, will offer the greater resistance to being displaced and hence will corrugate the least. Frequently a road on which the metal is badly worn and ground up and is inclined to corrugate badly needs nothing more than a coat of new and good material. This is the first and prime requisite if the road is lacking same.

Gravel surfaces on which water will stand corrugate much worse than those which have sufficient crown and grade to properly drain. That this lack of drainage on the surface is the cause of corrugations is readily shown by the corrugations being formed on the level grades when they may not be found on the steeper grades, and the frequency of the corrugations in the low flat place between two descending slopes. The corrugations develop more rapidly on a flat surface, due to perhaps two causes: (1) the water standing in a depression after a rain is splashed out by the wheels and carries with it some of the sand and gravel; (2) the water standing in the depression softens the bottom of the depression, permitting the wheel to cut deeper and more easily displace the gravel in the bottom of the trough than that on the ridge. While it is very objectionable and dangerous to have a high crown in a road, it is extremely desirable to have sufficient crown to permit all water that reaches the surface to flow therefrom. A gravel road 18 feet wide should have about 4 in. crown. The shoulders of the road should be kept sloping outward so as to permit all water to flow off the surface. Even a poorly-drained subgrade due to insufficient ditches may be the source of corrugations.

The method of reducing or preventing the corrugations in gravel roads may be summed up briefly as follows:

1. Drag road frequently with *heavy long base drag* or grader.
2. Make *frequent light applications of new material* to replace the worn-out material on the road, keeping a *thin* mulch of loose material on the surface at all times.
3. Use a graded gravel without an excess of sand in it. *Crushed boulders* or *limestone* mixed with the gravel will reduce tendency to corrugate.
4. Provide *good surface drainage* by keeping a reasonable crown and properly-sloped shoulders and ditches. Also provide a well-drained subgrade.
5. If possible, keep down the *speed* and *volume* of traffic. If these exceed the limit the gravel road is fitted for, some other type of road surface should be built.

ABANDON WORK ON BUSK-IVANHOE BORE FOR WINTER MONTHS

Owing to heavy snows, work on the new Midland highway through the Busk-Ivanhoe tunnel has been abandoned for the winter. The road over the old Midland roadbed will eliminate the necessity of crossing a mountain pass in traversing the Continental Divide.

It was planned to open the highway for travel for the start of the tourist season next year to enable motorists from Colorado Springs to reach the Western Slope without serious impediment. The road probably will be open for most of the next tourist season, however.—Colorado Springs Gazette.

NEW HIGHWAY BOSS

J. R. Cheney, state highway commissioner here, had his nose knocked clear out of joint, October 25, by the arrival of a real boss in the family, the arrival being an 8-pound boy born to Mrs. Cheney at Mercy Hospital. Mother and baby are fine and "pa" quite willing to give way to the new boss.

Road News, Views and Gossip

CONCRETE TEST ROAD IN PENNSYLVANIA

The Pennsylvania State Highway Department and the U. S. Bureau of Public Roads are co-operating in the construction of a concrete test road located on State Route No. 50, in the vicinity of Harrisburg, Pa. The project selected is approximately 1700 feet in length, and its site is on a silty loam soil through swampy land.

The purposes of the test road are as follows:

1. To determine the action of a concrete pavement with a 5-in. center thickness and 8-in. edge thickness (8-5-8 section) under a 26,000-lb. gross load.
2. To determine the influence of subgrade material on the strength of the pavement.
3. To obtain further data on balancing the cross-section design.
4. To determine the effectiveness of the tongue-and-groove type of longitudinal joint.

Six different types of subgrades have been prepared. They are as follows: Old macadam road scarified and rerolled, sandy loam, shale, clay, clay overlaid with 4 inches of sand-clay mixture, and clay overlaid with 4 inches of cinder-clay mixture.

Concrete construction is being carried out in the usual manner, and at approximately the center of each subgrade section a transverse expansion joint is being provided. Adjacent to this expansion joint and on one side of the longitudinal joint over a length of 20 feet inserts are being placed in the slab in such a manner that strain gauge readings may subsequently be obtained both for the top and bottom of the slab.

Control specimens, consisting of beams and cylinders, representative of the particular portion of the pavement in which the strain gauges are to be installed, are being made. These specimens are to be tested and broken at the ages of 15 days, 28 days, 6 months and 1 year, for the determination of the modulus of elasticity, the modulus of rupture, and the compressive strength of the concrete.

The pavement when completed will be subjected to heavy truck loads up to 26,000 lbs. gross. Stress readings will be obtained with the truck run near the edge and at the center of the road. The truck will be run during the summer and during the time of the spring thaw. Field determinations of subgrade moisture and bearing value of the soil will be made on the days stress readings are obtained.

From the results of the above tests it is hoped that answers will be supplied to the following questions:

1. Is an 8-5-8 section adequate for occasional 26,000-lb. traffic?
2. What influence has the subgrade on the strength of the slab?
3. Will a 4-in. layer of good material improve the strength of a concrete road when laid on a poor subgrade material?
4. Is an 8-5-8 section a balanced design, or should the center and edge thicknesses be adjusted?
5. How much of the load does the tongue-and-groove type of longitudinal joint transmit from one side of the slab to the other?
6. If an 8-5-8 section is not safe under a 26,000-lb. load, what is the safe load under spring conditions and under ordinary conditions?

Weak sections on through route highways necessarily limit the loads which can be hauled over such routes. Knowledge gained from this test road will be of value to all highway builders. The data which will be obtained should assist in solving the problems connected with the design and construction of highways over soft or swampy lands.

LIGHTS FOR ALL RIGS

Need of lights for all vehicles on the highways after dark is again demonstrated by the following incident reported in the Madison (Minn.) *Independent Press:*

A buggy without lights was struck on Highway No. 6 south of town recently. No one was hurt, but there are entirely too many vehicles which are not lighted in compliance with the state law. An automobile with one light is bad enough (and we have noticed many of them), but suppose a buggy without any lights should meet that car on any of these dark nights.

Better to repair your lights now than to be sorry afterwards.

NO PLACE FOR ADVERTISING

The recent ruling which banned advertising signs from the public highway applies also to all kinds of placards and posters which seem to be liberally attached to telephone poles in some places, says the Dassel (Minn.) *Dispatch.* These advertising signs are as much out of place as are the board signs erected, and it would be well for publicity men to bear this in mind now that the fall campaign is on. Posters advertising fairs, picnics, dances, etc., also are under the ban, and it is understood they are not to be tacked on poles along the highway.

HERE'S WHY LEFT TIRES OUTLAST THOSE ON RIGHT

The fact that automobile tires on the right side of the car wear out more quickly than those on the left side is one which many motorists are unable to explain.

A popular misconception is that turning corners more frequently to the right than to the left is responsible for this wear. Such, however, is not the case.

The reason that tires on the right side wear more quickly is that they carry a greater load than their brothers on the left. The natural slope of the street or road causes more of the load to rest upon the right side of the car.

In addition, the natural tendency of the car to slide because of the road slope must be counteracted more by the tires on the right than by those on the left.—The Golden Circle North Shore Motor Club, Chicago.

THE OLD ORDER CHANGETH

(From *Western Highways Builder*)

Rural communities are beginning to realize that routing through highways down Main Street brings many inconveniences as well as the dollars of tourists and some are casting a dubious eye on the once-sought-for main highway. Says the Palo Alto (Calif.) *Times:*

"There is satisfaction in knowing that the delegates at the highway conference held in Palo Alto were unanimous in the opinion that the proposed Bayshore highway should not be routed through the city of Palo Alto, but should be kept as far east as possible. As the recommendations of this group are to be made to the Committee of Nine appointed by the Governor, under authorization of the legislature, for the purpose of framing a highway policy with plans for its execution, we believe that we may safely count upon this point as to routing as being practically settled. The Committee of Nine has solicited the opinions of the localities affected by proposed highway systems, and therefore must be presumed to take them seriously when advanced.

"The earlier plan of having the Bayshore highway connect with Middlefield road was highly objectionable. It would mean multiplied dangers to school children and others in a section where existing dangers from traffic are already too numerous. It would mean serious depreciation of property values for residences in the section affected. It would mean dividing the city by a thoroughfare with traffic as incessant as that now seen on the peninsula highway.

"Keeping the Bayshore road out of the city proper will not only mean the prevention of these disagreeable conditions in Palo Alto, but will be a benefit to motorists who use the road, as their speed would not have to be cut down to urban limits when outside the urban zone."

RESEARCH COUNCIL TO STUDY PAVEMENT REINFORCING

Announcement is made by Chas. M. Upham, Director of the Advisory Board on Highway Research of the National Research Council, that Mr. C. A. Hogentogler, of the U. S. Bureau of Public Roads, has been granted leave of absence in order to conduct for that board a fact-finding survey of the economic value of reinforcement in concrete pavements. This survey is to be national in scope, and will be conducted in co-operation with agencies interested in this important subject. It is proposed to cover the various soils, traffic and climatic conditions throughout the United States.

Thy Brother's Keeper

(A Safety Editorial)

IT IS a far cry from the barbarous times when the physically imperfect child was put to death. This savage system of eugenics finds little favor today, when the value of human lives—even if physically imperfect—is far better understood.

Our modern social order knows that a cripple, like the late Charles P. Steinmetz, may be of extreme importance in the world's scheme of affairs. Yet the world still holds fast to the idea of a "sound mind in a sound body," and modern social and scientific effort is directed both toward the preservation of life and limb.

That is the basis of the "safety" movement in America, where the danger of accident is far greater than elsewhere because of the nation's prosperity and enterprise, with the consequent vogue of the motor driven vehicle. It is this, at least in part, which has led to the formation of the National Safety Council, a co-operative organization designed to promote the safety idea.

We boast of the number of cars in the United States, but we sometimes fail to realize the dangers these cars present, not only to motorists but pedestrians. Every city knows this, however, and every city has its acute "traffic problem."

In a recent editorial the *Engineering News-Record*, a leading scientific magazine, notes that the average city official concerns himself mainly with "opportunist" measures to promote safety. These have to do with traffic regulatory measures which at best are of merely temporary efficacy. The highway engineer, trained to larger problems, studies methods or permanent relief.

It is there that the real solution lies. Without abandoning the so-called "opportunist" measures, we must delve deeper and educate both men and communities along scientific lines.

We must understand that the human factor is not constant. We do not know what a driver will do under any given set of circumstances. There is the safe driver and the "fool" driver. It is all very well to say that the fool should suffer from his folly, but today's theory is to save the fool from his folly. It must be remembered that the "fool driver" may not be a fool in other things and that he may be a valuable member of society when he is not at the steering wheel of a car. Also, that his folly does not merely react upon himself, but upon others. His fool driving endangers other lives and bodies.

Therefore it is essential that all motorists be educated to the use of the most approved safety devices upon their cars. Chains, bumpers, stop-lights, proper windshield-cleaning equipment and other safety devices should be thought of immediately in the purchase of a car.

And communities should also afford protection. All traffic problems are not in city streets. Country roads are often more dangerous. Their danger spots should be protected by modern safety devices.

We are our brothers' keepers. We must save them from the danger of their own folly, and, in doing so, save others from the dangers of that folly.

Concrete mixer outfit which broke paving record on Fort Morgan-Brush highway project.

Contractor Makes Paving Record

(Continued from Page 6)

means of a turntable located just in front of the paver. This was a 14-E Rex type. Two Barnes two-cylinder force pumps were used for furnishing water to the paver and for puddling.

The maximum haul was five miles and the minimum one mile. With this arrangement the contractors made as high as ten 60-foot stones per day with ten Ford trucks over a five-mile round trip. The aggregate plant was located one-half mile off the roadway.

The work was directed personally by Howard Pigg, a member of the firm, who took over the job five days after it had been started, up to which time the average run had been about six stones per day. The first day he took over the work the crew made nine stones, and the second day ten stones.

During the entire time that the work was under way only two hours were lost from breakdowns on the mixer and other equipment.

William Lewis was resident engineer on the two projects for the highway department.

Denver-Morrison Paved Road

(Continued from Page 3)

age. Through relocation most of the twists and turns, which resulted in scores of accidents yearly on the old road, have been eliminated. The new road also has easy rolling grades.

In constructing the mile of pavement east of Morrison it was necessary to cut away a whole mountain-side in order to secure a foothold for the roadway. This operation required the removal of several thousand yards of solid rock and the moving of about 200 yards of railroad tracks. To date this piece of pavement holds the record in point of high cost. The contract price was $65,000. The project also involved the diverting of the waters in Bear Creek into a new channel and the construction of a long fill to eliminate a sharp curve.

If plans of the Denver Motor Club, which has a country home in Bear Creek Canon, materialize, in future years the Denver-Morrison paved road will become one of the most beautiful drives in the country. Members of the club have approved a scheme for planting trees alongside the road every fifty feet for its entire length.

Planting of the trees is expected to be started next spring under the direction of a noted landscape architect.

SPEAKING OF DETOURS

The detour, one of the motorist's pet bugbears, may be avoided in a good many cases where it was formerly common to close the road to make a certain type of repairs.

This has reference to cases where small bridge or culvert installations are being made—either because of failure of existing structures or because additional drainage has been found necessary.

Instead of tearing up the roadway to replace failed culverts, highway engineers in many states are now using sections of corrugated pipe which they simply slip inside the failed structure, and pour concrete or ram earth into the space between the pipe and the old culvert.

The result is a perfectly sound culvert, installed at far less cost than the previous structure and without any disturbance to traffic.

In cases where a new culvert is to be installed, instead of tearing up the road surface and digging a trench, the same long sections of corrugated pipe are jacked and tunneled into position without digging the usual trench. This operation is made easy because of the light weight and elasticity of the corrugated material.

Even small bridges made of one or more large sections of large-size corrugated pipe have been installed without detours, by installing and filling in one side at a time—an impossibility with most other types of materials.

Motorists, as well as highway officials appreciate the advantages of these methods which obviate detours. The resulting structures have several advantages over heavy, rigid materials.

WILL MAKE TRUCKS STOP OVERLOADING ON HIGHWAYS

The county commissioners have started a plan to force big trucks to keep from overloading and then traveling the public highway. There have been flagrant violations of late, according to the Montrose Press. The commissioners will also ask all truck drivers and owners to use more care in operating heavily loaded trucks over the highways during wet weather so the roads will not be cut up so badly.

HOT SPRINGS CONCRETE ROAD

Tourists contemplating motoring to the Arkansas Ozarks for the winter will be interested in knowing that one of the most important links of the Bankhead Highway, connecting Little Rock, the capital of the "Wonder State," and Hot Springs, the first national park reservation of the United States, is progressing at the rate of a half mile a week. Work was started July 2, 1924.

There are three construction gangs on the job, and while the contractors are allowed until July 4, 1925, the work is going forward rapidly and points to an earlier completion.

The road is being thrown open a section at a time as the work progresses. Special attention will be given to detours and a passable route maintained at all times.

"Bates Type" Highway

The road being built is an 18-foot concrete highway, with 24-foot superelevated curves. It is of the Bates type, which was designed by the state highway department of Illinois.

In accordance with the Bates specifications, the road is being made six inches thick in the middle and nine inches in thickness at the edges. The six-inch thickness is maintained uniformly to within two feet of the edges, where the thickness is graduated at an angle from six to nine inches, the latter being the depth at the extreme outer edge. A single rod of reinforcing steel runs laterally through the center of the thickened edges.

In the center of the roadway is a hinge joint designed to absorb the stress that occurs in cold weather, when the greater amount of moisture that accumulates at the edges tends to lift the edges under the action of frost.

Expansion joints will be used only at the top and bottom of hills on those portions of the road which will be built in the warm weather. These will be to take up the "creep" that occurs under such conditions. When the cold weather comes expansion joints will be placed at intervals of about 100 feet. The ends level by a series of ⅝-inch steel dowels, each three feet in length.

DOES EXCESS TAMPING CAUSE SCALING ON CONCRETE PAVEMENT?

Scattered cases of scaling occurring on Illinois highways have been brought to the attention of the Illinois Bureau of Materials during the past season. This phenomenon, quite commonly attributed by many highway engineers to the effect of calcium chloride curing, has been found in Illinois to occur as seriously on sections where calcium chloride was not used. In place of finding this scaling to be the fault of any method of curing, the Bureau of Materials believes excessive tamping to be a common cause, especially if any noticeable percentage of inert materials are present in the aggregates. This over-tamping, by causing segregation of coarse and fine aggregates, also destroys the homogenity of the resulting concrete.

"ABOLISH GRADE CROSSINGS"

"Abolish the grade crossings!" cries the man in the street, reading of "another family wiped out." But the thing is easier said than done.

On Class 1 railroads alone, there are in the United States 256,362 grade crossings. The net increase in 1922 was 3,855. To eliminate these would cost on an average of $75,000 each, or a total of $19,000,000,000, a sum on which the annual interest charges would be almost a billion dollars.

It is obvious that that is prohibitive. We haven't the money to spend in such quantity. But when the national government undertakes to build and maintain national highways, doubtless it will set an example for all states to follow to eliminate grade crossings from all its mileage.

That grade crossings will eventually be eliminated is sure; that it can be done in a few years by legislation is a futile dream.

LICENSE AUTOMOBILE DRIVERS

It is encouraging to find that there is a growing sentiment in Minnesota for a law providing for licenses for drivers of automobiles.

THERE ARE TOO MANY CARELESS AND INCOMPETENT DRIVERS.

It should be made a condition to the granting of a license that it should be forfeited should the holder even be found driving when intoxicated. Another great injustice could be removed by the simple expedient of requiring every automobile owner to carry liability insurance.

TRAFFIC AND ROADS

Highway construction is not keeping pace with motor vehicle production. The automobile has outgrown the road. While motor vehicle registration has increased 2,500 per cent in twelve years, as shown by the actual figures, expenditures for highway construction have increased only a little over 500 per cent.

This situation is causing much concern not only to manufacturers of motor vehicles, but to public officials and commercial organizations, who fear that unless more improved roads are provided the highways will become far more seriously congested, impeding traffic and making travel more dangerous. Now from 500 to 1,000 machines pass over a road that formerly accommodated only fifty in a day's time. Road revenues in one state ten years ago averaged $552 per vehicle. Today they average $50 per vehicle.

The motor vehicle is no longer looked upon as a luxury or as a mere pleasure car; it has become a necessity. The pleasure that a farmer gets from his automobile is very small in comparison with the service it renders him in his business. More than 30 per cent of the cars in this country, about one-third of the total number of cars, are owned by farmers and persons living in the country or towns of fewer than 1,000 inhabitants.

Approximately 4,000,000 automobiles and motor trucks were made last year and a very large per cent of this production was of the types usually purchased by farmers. In 1922, according to Automotive Industries, 77.5 per cent of the total production of automobiles cost less than $1,000. In the small communities of South Dakota there are 328 cars to each thousand of population. In towns with a population between 1,000 and 5,000, 20.1 per cent of the total of motor cars are owned by 9 per cent of the population.

Only 9.8 per cent of the total number of cars, it has been shown, are owned in cities of from 25,000 to 100,000 inhabitants, or in other cities where there are trolley cars and other convenient modes of travel. In cities of more than 100,000 population, comprising 21.5 per cent of the population, 25.9 per cent of the total number of motor cars are owned. In one state revenues for highway construction totaled less than one-third of the cost of the machines.

ROADS AND THE FARMER

The growing importance of dairy farming, poultry raising, truck farming and other forms of diversified farming in middle western states, where the agricultural population is getting away from the "one crop" idea, is depending heavily on road improvement for its success.

The paving of the Victory highway from Kansas City to Topeka, the national headquarters of the Victory Highway Assoc'ation and the focal point for hard surfaced roads leading in all directions, has amply proven this point in the stimulation of diversified farming which has resulted since the paving has been done.

Milk, cream, eggs, poultry and produce can be transported from outlying farms to an advantageous market over hard surfaced roads, in motor trucks when it would be impossible to get them to market by rail.

THE MOTORBUS BUSINESS

The motorbus is regarded as one of the most significant signs of the new transportation age. The motorbus business is rapidly developing into an industry itself. This expansion has been so rapid that standardization of design is being attained slowly. The early bus was simply any kind of body to accommodate as large a number of passengers as possible, mounted on a truck chassis. Manufacturers are taking into account in designing busses for city and inter-city use such elements as passenger comforts, rough roads, city street car tracks, hazards under bridges, trolley wires, shade trees, as well as mechanical factors of comfort, utility and speed.

With the exception of finishing shoulders and construction of a bridge over Kettle Creek, the new pavement between Breed and Husted, in El Paso county, is completed. An effort is being made to open this road to traffic by October 1.

Workmen also are rushing construction of the new underpass crossing at Breed. This forms a part of the newly constructed concrete roadway north of Colorado Springs. It is planned to turn traffic on the entire stretch of concrete between the Springs and Husted this winter, thus eliminating the long detour now in use.

The Bulletin Board

GRANNIS ACCEPTS POSITION WITH LINK-BELT ON COAST

L. R. (Larry) Grannis has accepted a position with the Link-Belt Company on the Pacific Coast. He will represent the company in the sale of Link-Belt cranes in the states of California, Washington and Oregon. Grannis was in business in Denver for about two years, representing several well-known eastern concerns in this territory. These lines he turned over to the Lindrooth-Shubart Co., Boston Bldg., Denver.

Larry will make his home in San Francisco. He made the trip to California by automobile, accompanied by his wife and two youngsters. His many friends in Denver wish him every success in his new venture.

The lines which the Lindrooth-Shubart Co. represent include Williamsport Wire Rope, Insley Shuting equipment and Link-Belt.

YE EDITOR GETS OFF ON WRONG FOOT IN REGARD TO TRACTOR

Colorado Highways made an error last month in stating that Everett Young had purchased a Holt tractor for use on his big Denver paving contract. The tractor he purchased was a Best "Sixty." This machine is now represented in this territory by the Wilson Machinery Co., of which Harry P. Wilson is president.

BUCKEYE TRENCH EXCAVATOR HAS BOOM STABILIZER

A new feature, offered only on chain and bucket type Buckeye Trench Excavators, is a stabilizer for the boom which gives absolute assurance of digging to grade in hard, dry clay or other difficult soil. This stabilizer also tends to reduce vibration tho that is not its primary purpose.

Two small pinion gears, one on each side of the boom, mesh with rack gears mounted on the A frame, as shown. These pinion gears are mounted on a floating shaft set in bearings fastened to the boom. At the center, inside the box girder boom, a large steel wheel fitted with brake bands is keyed to this shaft. The boom is set at the desired depth and locked in place by tightening the brake on the wheel. The brake is controlled from the operator's platform by means of a lever and cable. The brake wheel being located inside the box girder boom, dirt is excluded and long life assured for the brake lining.

Patents are pending on this stabilizer, which is controlled by The Buckeye Traction Ditcher Co., Findlay, Ohio.

PORTABLE AIR POWER

Ingersoll-Rand Co., 11 Broadway, New York. "One Hundred and One Ways to Save Money with Portable Air Power" is the title of a new 72-page catalog just issued by this company, which is completely illustrated and shows the surprising variety of uses to which its portable air compressor and its accessories may be put. This book is of interest to practically every industry and shows portable compressor uses by public service companies, municipalities, general contractors, road builders, in building construction and repair, on railways—steam and electric—in factories, etc. It describes the use of such tools as the Paving Breaker, Jackhammer, Rock Drill, Trench and Clay Digger, Backfill Tamper, Little Tugger Hoist, Tie Tamper, Pneumatic Drill, Riveter, Caulking Hammer, Drill Steel Sharpener, Sand Blast, Paint Spray, Cement Gun, etc. Copies of this book may be obtained from the head office of Ingersoll-Rand Co., 11 Broadway, New York, or from any of the branch offices.

BYERS CRANE BOOKLET

Byers Machine Co., Ravenna, Ohio, has issued two pieces of new trade literature. One is a new 24-page bulletin featuring the Byers' Model 10 crane, described as a full revolving crane of 10 tons capacity, the largest crane of the Byers line. The second bulletin is a new 16-page treatise on the Truckrane, a light crane furnished unmounted, for mounting on a motor truck chassis.

DU PONT BULLETINS

E. I. Du Pont de Nemours & Co., of Wilmington, Del., is issuing a series of bulletins on the safest and most efficient methods for using explosives, based on the experience of its experts. These are known as Explosives Service Bulletins and aim to give to explosives consumers the most thorough information on how to secure the best results in blasting. The bulletins issued to date include: *Safety Fuse*—Some suggestions for its handling and use to insure best results in blasting; *Some Practical Pointers on Blasting Coal; an Aid for Tunnel Driving*—an easy method for properly directing the holes for V cuts; *Firing Quarry Shots*—some practices which will increase breakage and prevent misfires; *Getting the Best Results with Permissible Explosives; Velocity of Detonation of Various Types of Explosives; Brands of Du Pont Explosives and Use to Which They Are Adapted; Danger in Using Permissible Explosives for Mudcapping in Dry and Dusty Coal Mines; Advantageous Practices in Tunneling*—some practical ways of securing greater progress in tunnel operation and lower costs; *The Production of More Merchantable Coal*—some important factors in blasting coal with permissibles which can be controlled by mine officials; *Springing Bore Holes*—recommendations for increasing the efficiency and safety of this operation; *Tamping Bore Holes in Metal Mines*—some arguments in favor of a practice too little used; *Care of Explosives from Storage Magazine to Bore Hole.*

A CONTINUOUS TREAD FOR STANDARD POWER SHOVELS

The Osgood Co., Marion, Ohio, has recently added continuous tread equipment to its line of mountings for standard shovels, supplementing the railroad truck and traction mountings. The mountings are made for shovels of dipper capacities ranging from 1½ to 6 cubic yards; they can be put on in the field to replace other mountings and easily removed when the shovel is moved by rail.

A first class earth road will be made by Pueblo county from Hanover, 27 miles northeast of Pueblo, to the El Paso county line. This road will give the farmers of the community a good road to the north.

Buckeye traction ditcher, showing new stabilizer.

BIDS OPENED

Proj. No.	Length	Type	Location	Low Bidder	Bid Price
2 R Div. 2	1.922 mi.	Paved	North of Trinidad	Stamey-Mackey Con. Co., Hutch's'n, Ks.	$72,956.30
213-A	3.538 mi.	Gravel Surf.	Hesperus-Mancos	Hooker & Hanson, Cortez, Colo.	40,422.50
226-D	1.155 mi.	Concr. paved	Platteville	Chris O'Neill, Platteville, Colo.	38,226.40
253-B	3.064 mi.	Gravel surf.	Brookston-Milner	Hinman Bros., Denver	66,583.70
262-C	2.897 mi.	Crush. rock surf.	LaVeta Pass west	C. M. Emerson & Sons, Hugo, Colo.	23,218.80
271-A	3.286 mi	Gravel surf.	Florence-Pueblo	Driscoll Trucking Co., Pueblo, Colo.	56,479.25
277-A	3.840 mi.	Paved	South of Colorado Springs	Stamey-Mackey Con. Co., Hutch's'n, Ks.	229,921.35
856	8 spans @ 19 ft.	Timber Pile Bridge	Aguilar	Greely C. Parham, Aguilar, Colo.	4,807.20
904-B	1.9 mi.	Gravel Surf.	Petersburg-Ft. Logan	Jas. Collier, Denver, Colo.	19,750.25

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

Proj. No.	Length	Type	Location
243-B	2.973 mi	Gravel surfacing & bridge	Piedra-Pagosa Springs
262-B	0.245 mi.	Bridges and approaches	Alamosa east, Rio Grande, Del Norte
272-A	0.322 mi.	Bridges and approaches	Apishipa River, east of Fowler
279-B	5.295 mi.	Graded	Conifer, south

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

Proj. No.	Length	Type	Location
2 R Div. 3	0.55 mi.	R. R. Grade Separation	North of Trinidad
261-A	16.4 mi.	Gravel Surf.	Rifle-Grand Valley
265-A	3. mi.	Gravel Surf.	West of Bayfield
276	.2 mi.	Overhead R. R. Crossing	North of Colorado Springs
286-A	.2 mi.	R. R. Grade Separation	Between Nunn and Dover
288-A	16. mi.	Gravel Surfaced	Between Brush and Merino
289-A	2 125 ft. spans	Steel Bridge	Kremmling

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1924

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
17-R	Breed-Husted	2.339 mi.	Conc. Paving	LaNier, Selander & White	$ 81,399	96	17-R
116-A	Colorado Springs paving	4.18 mi.	Conc. Paving	Standard Engr. & Constr. Co.	238,944	100	116-A
116-B	Breed-Husted	0.892 mi.	Conc. Paving	J. L. Busselle & Co.	51,001	91	116-B
116-C	North of Breed	3.163 mi.	Paving and Bridge	LaNier, Selander & White	139,038.45	76	116-C
125	Sapinero-Cimarron	11.3 mi.	Grav. Surf.	Dale Hinman	36,797	90	125
135	Denver-Morrison	5.3 mi.	Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	74	135
174	Red Mountain	3.03 mi.	Mtn. Grading	Pickering Bros.	82,071	100	174
207	Dillon-Kremmling	100 ft.	Truss Bridge	Rogers & Pickard	28,831	100	207
210-B	Grand Valley-Debeque	7.507 mi.	Grading	Winterburn & Lumsden	94,267	14	210-B
213-B	Durango-Hesperus	5.26 mi.	Grav. Surf.	J. Edd. Hansen	72,960	87	213-B
214	Durango-Bayfield	3 mi.	Gravel Surf.	Dale Hinman	53,411.05	97	214
222-C	Broomfield-Lafayette	2.82 mi.	Conc. Pavement	R. M. Larsen	134,933	88	222-C
223-A	Kremmling-Rabbit Ear	2.88 mi.	Grav. Surf.	Henry Shore	30,565	100	223-A
224	Morrison-Baileys	5 mi.	Grading	M. J. Kenney Const. Co.	59,781	100	224
226-C	Platteville-Greeley (Div. 2)	6.335 mi.	Conc. Paving	J. Fred Roberts & Sons	175,647	100	226-C
230-A	Wolhurst, south	0.852 mi.	Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	89	230-A
240	Gypsum-Dotsero	5.185 mi.	Gravel Surf.	O. L. Hackett	66,178	67	240
242-A	Grand Junction-Fruita	7.703 mi.	Gravel Surf.	Dale Hinman	81,255	43	242-A
243-A	Bayfield-Pagosa Springs	1.6- mi.	Gravel Surf.	Shields & Kyle	48,311	88	243-A
245-B	Hadley, East	2.711 mi.	Grading	W. A. Colt & Son	21,680	77	245-B
246-A	East of Pueblo	2.537 mi.	Conc. Paving	R. A. White	78,431	84	246-A
248-A	Buena Vista-Salida	12. mi.	Grading & Surf.	Western Const. Corp.	93,533	25	248-A
252	Loveland-Berthoud	3.2 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,676	84	252
253-A	Steamboat Springs, west	6.50 mi.	Gravel Surf.	Northwestern Cons. Co.	126,374	40	253-A
254-A	Byers Canon	1.057 mi.	Grading	Pioneer Const. & Engr. Co.	72,408	48	254-A
255-B	Brush, west	2.944 mi.	Conc. Paving	W. F. Pigg & Son	92,486	100	255-B
258-A	Gunnison-Sapinero	3.239 mi.	Gravel Surf.	R. P. Morrison	34,900	38	258-A
262-A	West of Walsenburg	2.186 mi.	Gravel Surf.	Central Const. Co.	19,367	51	262-A
266-A	Durango, south	3.03 mi.	Gravel Surf.	Mishon, Engler & Teyssier	22,223	100	266-A
267-A	Model-Trinidad	2.954 mi.	Gravel Surf.	Pople Bros. Const Co.	25,583	17	267-A
269-A	Cortez-Dolores	2.172 mi.	Gravel Surf.	Engler & Teyssier	21,215	15	269-A
270-A	East of Monte Vista	3.429 mi.	Gravel Surf.	Stamey-Mackey Const. Co.	17,667	8	270-A
272-B	Pueblo-Fowler	13 mi.	Gravel Surf.	Shields & Kyle	103,768	6	272-B
273	East of Lamar	4.047 mi.	Grav. Surface	W. A. Colt & Son	42,305.30	82	273
278-A	Cheyenne Wells, west	8.4 mi.	Sand Clay Surf.	Holly, Burshears & Dobbins	16,016	0	278-A
279-A	Denver-Morrison	1.439 mi.	Concrete Paving	A. J. Collins	42,155	39	279-A
281-A	Lafayette, South	1.249 mi.	Paving	Sims & Boston	55,373	24	281-A
281-B	South of Longmont	3.068 mi.	Paving	J. Finger & Son	102,502.40	18	281-B
283-A	Loveland-Berthoud	2.530 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,829	75	283-A

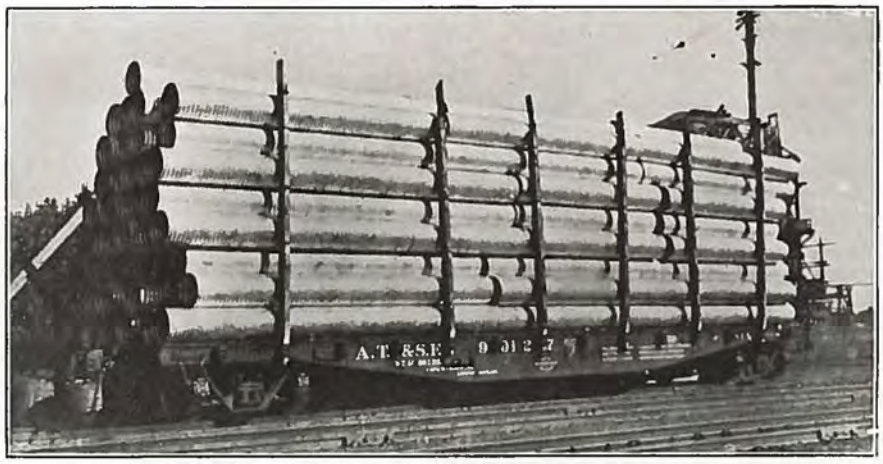
AUTO MAKES FARM PROFITS

(From Little Falls Transcript)

According to a survey submitted to the State Immigration department, more than half of the farmers of Minnesota own automobiles and use them for business purposes, not joy riding, as is frequently stated by alleged economic experts. On 923 farms surveyed it was discovered that 923 farmers owned 1,000 automobiles and trucks. It was established that from two-thirds to nine-tenths of the use of the machines was for farm business. More than two-thirds of the machines cost less than $500. The touring type of car is the most popular, and the average life of farm cars is between seven and eight years. The most significant fact developed by the investigators, according to the survey, is that farms equipped with an automobile are almost uniformly successfully operated. The conclusion drawn from this is that instead of being an expense, the farm car is a source of profit, in addition to the convenience and pleasure it affords farmers.

Keystone Culverts

KEYSTONE
COPPER STEEL



2,000 Lineal Feet of Eighteen-inch Culverts
30,000 Pounds

The Colorado Culvert & Flume Co. — PUEBLO

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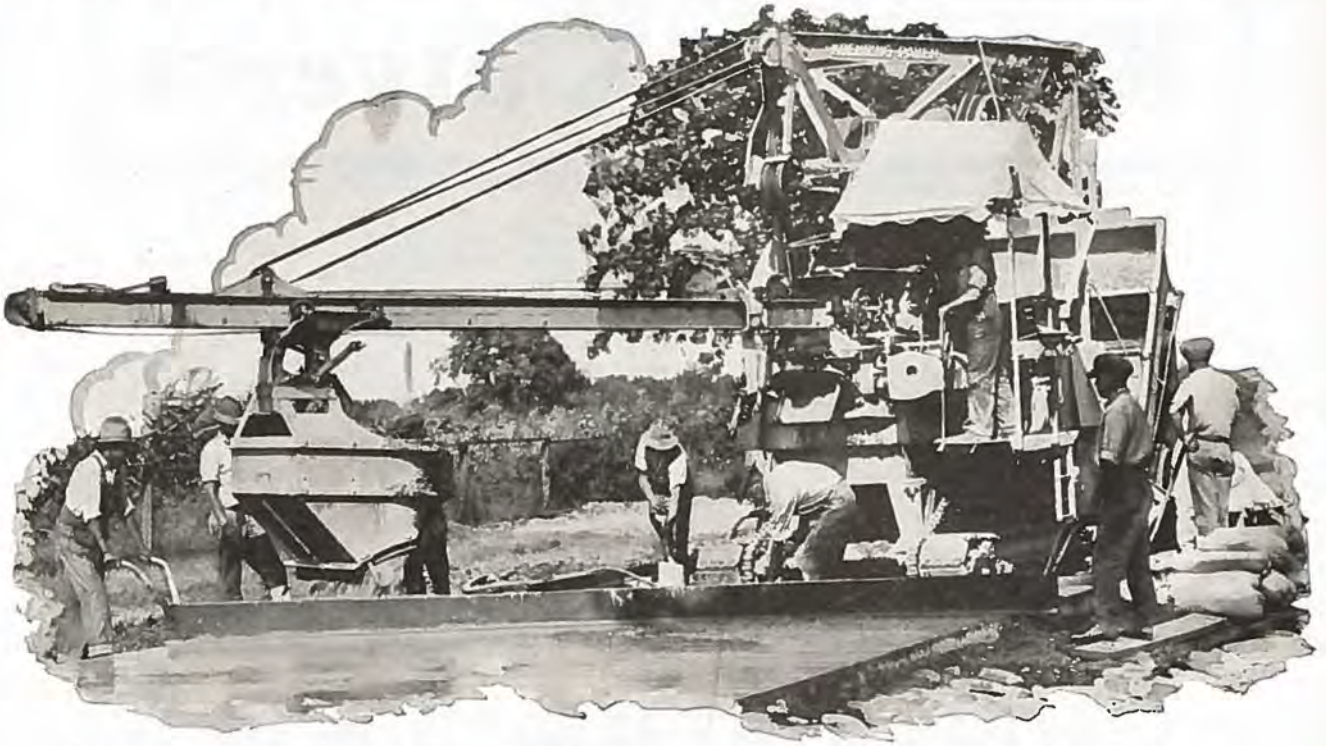

PRICE!

WHEN demand is big, it is easy for any mixer to sell at any price—when demand is slow, it is just as easy to build the mixer down to a low price.

The leadership manufacturer may see poorer mixers selling at prices equal to that of his superior machine—

—or he may see mixers built far less well than he is willing to build mixers, selling at low prices.

But the whole future of the Leader in an industry is committed to maintaining leadership. He can neither trifle with quality, or jockey with price. He dare not overprice, or under-build!

Stability of value and price must go hand in hand.

This is why the Koehring will always represent the highest quality in a mixer. a legitimate profit—and no more!

The Koehring will always be built up to its price.

Paver Capacities

7, 13, 21, 34 cu. ft. of Mixed Concrete

Steam, gasoline or electric power. Steel rim or rubber tired wheels or half or full length multiplanes. Boom-and-bucket or spout distribution.

Single or double adjustable derrick on 21E. Auxiliary water tank optional on 21E and 32E. Batch meter.

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10, 14, 21, 28 cu. ft. Mixed Concrete.

Steam, gasoline or electric power. Mounted on trucks or skids. Rubber tired wheels optional.

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4 and 7 cu. ft. Mixed Concrete.

Gasoline power. Power charging-skip or low charging platform with hopper, light duty hoist automatic water measuring tank. Standard or flanged rim steel wheels, or disc wheels, rubber tired. Mixes mortar as well as concrete.

Write for Paver Catalog P 15

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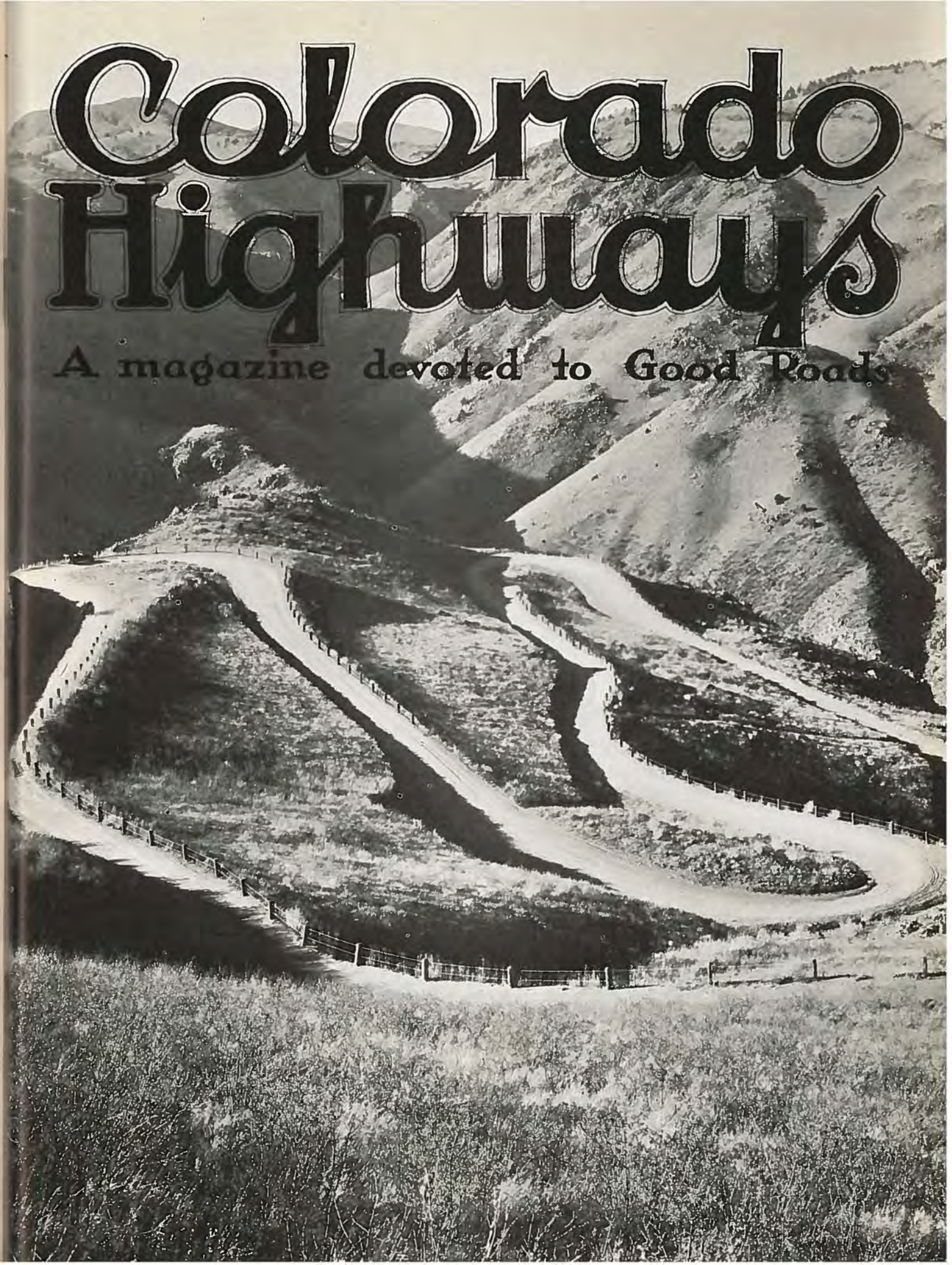
Colorado Highways

A magazine devoted to Good Roads



Colorado Highways

"BETTER ROADS"

Official Publication of the
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado

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10 CENTS A COPY. **$1.00 A YEAR.**

OUR COVER PICTURE

No, dear reader, it's not a cross word puzzle—just a modern mountain highway. This month's cover picture shows a triple "hair pin" stretch of the famous Lookout Mountain road, considered by many leading authorities as one of the most remarkable pieces of road construction in the country. The Lookout Mountain road was constructed several years ago with State and the City of Denver funds. It forms a link in Denver's notable Mountain Park system.

Colorado Highways
"BETTER ROADS"

VOLUME III. DECEMBER, 1924. NUMBER 12

Legislators to Consider Problem of Financing Highway Work After 1926

NO more important session of the General Assembly of Colorado, from the standpoint of legislation covering highway construction and maintenance, has ever been held than the ordinary session of the Twenty-fifth General Assembly which is scheduled to convene on January 7, 1925.

At this session the State's lawmakers representing the people of Colorado, will have to decide whether or not, after 1926, the program of improving state roads followed during the last decade, shall be continued or whether the State Highway Department's activities shall be curtailed to such an extent that they practically amount to maintenance alone.

Briefly, the situation which confronts the State of Colorado is this:

By November 30, 1926, all sources of revenue for highway construction and maintenance purposes will have been exhausted with the exception of a half mill levy, one-half of the 2-cent gasoline tax and a few thousand dollars derived from what is known as the Internal Improvement Fund.

No additional money will be available from the proceeds of highway bond issues, and no money will be at the disposition of the Highway Department from its portion of the automobile license fees, because these funds have been pledged to pay the interest and retire the $6,000,000 bond issue voted by the people of the State in November, 1922.

The phase of the situation which makes it so critical is the fact that at the end of the fiscal year 1926, there will be no funds at the disposal of the Highway Department with which to meet the Federal Aid set aside by Congress and allotted to the State of Colorado. Unless the General Assembly makes provision for additional funds, the State will lose approximately $1,350,000 Federal Aid money because of its inability to furnish its share of the allotment as required by the Federal Aid law.

Colorado Highways calls attention to this state of affairs at this time, because the people of the State thru their Representatives, the Twenty-fifth General Assembly must act at the coming session, if there shall be uninterrupted improvement of the State Highway system after December 1, 1926. Under the highway law, the budget for the year 1927 must be made in 1926, and the Twenty-sixth General Assembly does not convene until after the budget has been approved.

Any law passed in 1927 making funds available for the Highway Department would come too late to prevent a suspension of road construction activities. It is up to the Twenty-fifth General Assembly to decide whether or not the State shall continue its program constructing modern and safe highways, or shall hereafter confine its activities practically to maintenance only.

What are we going to do about this matter? It rests with the people of Colorado to decide. Shall we by proper legislation thru our Representatives in the Twenty-fifth General Assembly provide a way whereby Colorado will receive something over a million and a quarter dollars annually from the Federal Aid system fund to assist us in building roads? Or shall we refuse to act and thereby cause this money to be distributed to other states who have the foresight and sound judgment to provide funds for the purpose and who stand ready at any moment to comply with the conditions necessary to receive Colorado's money if Colorado does not want it?

For reasons mentioned above this must be settled now. It is none the less a present crisis because of the shortage not coming till the end of the fiscal year 1926. If we do not act NOW, it will be too late. What are we going to do about it?

Roads rule the world—not kings nor congresses, not courts nor constables, not ships nor soldiers. The road is the only royal line in a democracy, the only legislature that never changes, the only court that never sleeps, the only army that never quits, the first aid to the redemption of any nation, the exodus from stagnation in any society, the call from savagery in any tribe, the high priest of prosperity, after the order of Malchisedec, without beginning of days or end of life. The road is umpire in every war, and when the new map is made, it simply pushes on its great campaign of help, hope, brotherhood, efficiency and peace.—Author unknown.

A stretch of pavement on one of Colorado's heavily travelled trunk line highways—located near Littleton. A daily average of 3,000 passenger cars and trucks pass over this road.

State Breaks Highway Record

DURING 1924 Colorado registered a banner year in road construction. In former years bits of paving were constructed in various parts of the state. These were put in without apparent system or method.

In the past twelve months a score of these short strips have been connected with other pieces of paving, until now the motorist can drive, with the exception of one short stretch, over seventy miles of pavement, running North and South in the state.

One of the Highway Department's most notable achievements during the past year was the formal opening of the pave ment between Denver and Greeley, a distance of 53 miles. This stretch of road is now entirely paved with concrete, with the exception of a short strip thru the town of Platteville, which is now under construction and will be finished for traffic early in the spring.

A few years ago a map of Colorado's hard-surfaced roads looked like a "crazy quilt." Today the motorist looks at a Colorado road map with a great deal of pride and satisfaction. With the close of the construction period in 1924 Colorado now has over 200 miles of paving. A major portion of this paving leads "somewhere," and is not "dabbed" around in short strips.

During the year the Highway Department completed 61 miles of pavement; 52 miles of gravel surfacing and twenty miles of grading. The cost of all these projects was shared by the Federal government on a "fifty-fifty" basis.

Also the department constructed seventeen major bridge structures with Federal Aid funds.

These improvements were made on trunk line roads—the main arteries of travel, included in what is known as the 7 per cent Federal highway system. A total of forty-seven Federal Aid projects were completed during 1924; twenty-eight projects are now under construction, and eight projects of the 1924 budget remain to be placed under contract. These will be carried over into 1925.

The 1924 budget contained 89 State Projects. These included structures involving everything from a small culvert to major bridge and high-type gravel surfacing projects. This construction has continued from early spring, and all but about twelve of these were completed.

On October 4 the highway department opened the Greeley-Denver concrete road to traffic. On this date more than 5,000 motorists drove their cars over this road and enjoyed a barbecue feast in Greeley provided by the Chamber of Commerce of that city.

On July 4, the highway department formally opened the world-famous Ouray-Silverton road which was dedicated with elaborate ceremonies by the Brooklyn Eagle touring party. A month later the department formally accepted the spectacular Sapinero arch bridge, forming an important link in the Rainbow Route leading to the Western Slope, thru the cities of Gunnison and Montrose.

The past year also witnessed the opening of an entirely new highway over Cumbres Pass, and a widening of the muchly-traveled Wolf Creek Pass road.

A total of twenty-two miles of concrete paving was finished on the Denver-Greeley highway. With the completion of this stretch of pavement, Colorado now boasts of one of the longest stretches of concrete paving in the country. At the same time about eight miles of concrete was laid on the road between Broomfield and Fort Collins.

Down in the Arkansas Valley there was completed more than twelve miles of high standard gravel surfacing on the Santa Fe Trail. There was also five miles of paving completed on this important artery of travel east of Pueblo.

During the past year a continuous ribbon of concrete was completed between Fort Morgan and Brush, and the paving southwest of Sterling was extended to Merino. To the north of Colorado Springs the paving program was completed to Husted, while to the south of Littleton, paving was extended to Gann, a short distance north of Sedalia.

During the same period a mile of concrete was laid on the road between Boulder and Lafayette. Paving was extended north from Broomfield to Lafayette. Paving was also completed between Denver and Morrison.

The subway at Wolhurst eliminating two very dangerous railroad crossings was opened to traffic. A 1,200-foot wood-pile bridge at Sedgwick was completed. Two bridges 300 feet in length were constructed at Watkins and Bennett. A new steel span bridge 600 feet long was completed at Delta. An 800-foot wood-pile bridge was constructed at Atwood.

A steel truss bridge, 300 feet long, is now under construction over the Fountain river, south of Colorado Springs, and another 210 feet long is being constructed over the Arkansas river north of Salida.

The following is a list of the Federal Aid projects completed during 1924:

Concrete Paving

Location	Length miles
Breed-Husted	2.339
Colo. Springs-Breed	4.185
Denver-Arvada	1.316
Loveland, north	4.049
Fort Lupton, N. and S.	8.228
Platteville, south	2.868
Platteville, north	4.404
Platteville, north	6.335
Littleton-Sedalia	3.995
Pueblo-Vineland	2.537
Pueblo-Avondale	0.787
Rocky Ford-Swink	1.329
Lafayette-Boulder	1.014
Loveland-Berthoud	2.463
Fort Morgan-Brush	2.702
Brush-Fort Morgan	2.944
Atwood-Merino	1.799
Denver-Morrison	1.472
Berthoud, north	2.530
Total	57.296

Asphalt Paving

Trinidad, north	2.998
Aurora, east	1.003
Total	4.001

Gravel Surfacing

Durango, west	3.609
Saguache-Cochetopa	7.474
Sapinero, west	2.708
Lamar-Las Animas	6.861
Palisades, west	5.773
Durango, east	2.082
Holly, east	5.375
Kremmling-Muddy Pass	2.881
Piedra	1.613
Las Animas, west	4.545
Las Animas, west	2.711
Durango, south	3.030
Lamar, east	4.047
Total	52.709

One of Weld County's modern road building outfits, designed for heavy construction work.

Grading

Morrison-Conifer	1.947
Ouray-Silverton	1.057
Buena Vista, north	4.126
Ouray-Silverton	3.026
Dillon-Kremmling	1.453
Morrison-Conifer	5.127
Total	16.735

Bridges

Breed Subway	0.892
St. Charles River	0.502
Blue River, N. of Dillon	0.360
Beaver Creek	0.585
Six-Mile Creek, W. of Avondale	0.454
Gunnison River, Delta	0.377
Viaduct over Moffat R. R.	0.282
Total	3.452

Federal Aid Projects under construction November 30, 1924:

Concrete Paving

Project	Miles	Per Cent Complete
Breed, north	3.163	83
Denver-Morrison	5.065	87
Broomfield, north	2.875	95
Thru Platteville	1.155	0
Colo. Springs, south	3.838	(started)
Lafayette, south	1.249	83
Longmont, south	3.068	34
Wolhurst, south	0.852	96

Asphalt Paving

Trinidad, north	1.922	(started)

Gravel Surfacing

DeBeque, north	7.507	51
Hesperus, west	3.540	6
Mancos-Hesperus	6.135	95
Gypsum-Dotsero	5.185	83
Grand Junction-Fruita	7.703	61
Salida-Buena Vista	12.046	34
Steamboat Springs, W.	6.508	51
Steamboat Springs, W.	3.063	4
Gunnison, west	3.239	51
Walsenburg, west	2.186	70
LaVeta Pass, west	2.899	9
Hochne, north	2.594	26
Cortez, east	2.172	74
Monte Vista, east	3.429	60
Portland, east	3.064	0
LaJunta, west	12.920	22
Cheyenne Wells, east	8.409	29

One of Yuma County's numerous gravel pits, showing farmers hauling material on "yard-mile" plan.

Grading Projects

Byers Canon, west	1.057	61

Bridge Projects

Arkansas River, Salida.		66

SURVEY OF A ROAD TO ESTES PARK IS MAKING PROGRESS

Good progress is being made by S. A. Wallace and party of engineers from the United States Bureau of Roads at Denver on their preliminary survey of a new automobile highway from Raymonds to Estes Park.

County commissioners today expressed themselves as hopeful that the survey will result in state and federal appropriations which will give Boulder an improved direct route to the Rocky Mountain National Park. At the present time the road is not classed to receive early consideration, but recommendations by the bureau of roads will do much toward bringing this about.

The survey now in progress started at the foot of Stanley Hill, by which the road leaves the South St. Vrain canon at Raymonds. The present roadway, constructed last year, will be altered only to increase the radius of several sharp curves.

It is understood that the preliminary line run by the party now in the field makes material changes in the old road at several points. Chief among these is the transfer of the line from Bald Pate Inn north to the west side of the gulch. Minor changes are also called for in the vicinity of Will's Hotel and Copeland Lake Lodge.

Construction of the proposed highway would place Boulder in the position of being one of the principal gateways to the Rocky Mountain National Park.

A bit of scenery on the summit of Monarch Pass, well-known to tourists as the Rainbow Route.

PROPOSED TO MAKE SAND DUNES NATIONAL PARK

The initial steps are being taken by national and state associations interested in the development of tourist travel to make the Sand Dunes, located near the foot of Mosca pass, a national park.

The Sand Dunes of the San Luis valley are becoming famous thruout the West, but due to poor road connections, very few people have had an opportunity to see them. According to those in authority, the Dunes, if opened to the traveling public as a national park, would bring thousands to southern Colorado and the San Isabel.

The proposed circle trip to the Sand Dunes would start from Pueblo, extend to Canon City, then south thru the Wet Mountain valley to Gardner and west to Mosca pass and the Sand Dunes, connecting with Fort Garland and La Veta pass, La Veta and Walsenburg and turning north to Pueblo. It would be possible to increase the territory covered by the proposed circle trip to include Trinidad.

The cost of developing such a scheme, including road construction, would be in the neighborhood of $250,000. This would come under the system of federal and state aid, it was said.

Showing method of handling concrete on Denver-Morrison project, completing pavement between these two points for heavy traffic.

Federal Aid Project No. 279-A

By WALTER R. DOUGLASS,
Resident Engineer

ACCEPTANCE of Colorado Federal Aid Project No. 279-A on December 1, 1924, marks a new mile-stone in the record of contractors' progress in Federal Aid Projects in this state, as far as I know.

The project is a concrete pavement approximately 1.5 miles in length, extending southwesterly along State Highway No. 8, from the city limits of Denver to the eastern end of the original Morrison road paving, which was the first concrete paving built in this state.

Bids were received by the State Highway Department for the construction of this project on August 12, 1924, and the contract was awarded on August 14, 1924, to Andrew J. Collins, of Denver, a hustling young contractor, who was without experience in State Highway work. He started grading and building drainage structures on August 18, 1924, and by the 17th of September had completed all culverts crossing the road, and having 3,200 feet of finished subgrade road for concrete ahead of him, started laying paving on that date.

The concrete for the paving was mixed by a central mixing plant at a gravel pit owned by the contractor, and the mixed concrete was hauled an average of 3½ miles to the job. Two 3-sack mixers were used at the central mixing plant, and were placed back to back, so that the hoppers were fed by mine dump cars running from the stock pile along one line of mine track which ran between the hoppers and dumped either way as required. This method of mixing gave an unusually uninterrupted flow of mixed concrete from the mixer to the job, and the result was that there was very rarely any delay, and consequently the pavement was built at an unusually even rate of progress. The mixers were not run to their full capacity, and the contractor made no attempt to break any records for a day's run of either mixer or pavement, but set a rate of output that varied but little from day to day, and it was the maintenance of that steady rate that completed the job in an unusually satisfactory manner. The use of the central mixing plant proved economical to the contractor in several ways, among which can be noted the following:

1st: There was one central location for the assembling of sand, gravel and cement.

2nd: There was a permanent supply of water for the mixing plant at one spot during the entire life of the job.

3rd: The placing of the longitudinal joint and sand cushion was facilitated by the fact that there was no paver blocking up the subgrade between the forms.

4th: The only water supply needed on the road was that required for curing the concrete and wetting the subgrade.

5th: The number of handlings of sand and gravel and cement was cut down considerably. Hauling from the central mixing plant to the subgrade was done by Ford trucks, using various types of dump bodies, all loads being a six-bag batch of the standard 1-2-3 mix of paving concrete. Round trips between the subgrade and the mixing plant were made in an average of from forty to sixty minutes, and there was no trouble in maintaining this average on the haul, which throughout the job varied from 3½ to 4 miles in length each way.

No attempts were made to break any records. The work was carried forward from beginning to end on a definite schedule which actually provided sufficient men, equipment and material to complete the job in an efficient and workmanlike manner within the contract time.

The paving was finished on October 25th, 1924, and the entire job was completed on the 29th of November, 1924, and accepted by engineers for the State Highway Department and the Bureau of Public Roads on December 1, 1924, the date on which they made the acceptance inspection.

No job under my supervision during the past five years with the Colorado State Highway Department has been better planned, organized or executed; and this is my first experience with a contractor for the Colorado State Highway Department who finished a paving job ahead of time. All of this is more remarkable because the contractor had

(Continued on Page 14)

County Officials to Meet in Denver to Discuss Road Program for 1925

THE annual convention of the Colorado County Commissioners' Association will be held in Denver on December 15 and 16. This is the first time that the commissioners have held their annual meeting at this time of the year. In past years the convention has been held either in Denver or in some other city of the state in January.

It was decided by the Board of Directors of the association to hold the meeting in Denver at this time, because of the importance of a number of measures which will be submitted to the Twenty-fifth General Assembly for consideration, which will affect the activities of county officials.

These measures will be discussed by the entire convention and the legislative committee instructed as to what action the commissioners as a body would have them take in their discussions with the various committees of the general assembly.

An invitation has been extended to all new members of the association who were elected at the last general election to attend the meeting.

Among the measures which will likely be discussed by the convention are:

A measure permitting the counties to create a fund whereby they may write their own bonds for county officials. It is claimed that many thousands of dollars can be saved the taxpayers by the enactment of such a measure.

A measure relating to the care for the poor of the state.

A measure relating to the care of the blind, which during the past few years has become quite a problem for some of the counties.

Several measures relating to the financing of state road construction and maintenance.

It is announced that all sessions of the convention will be held at the Shirley-Savoy Hotel.

Among those scheduled to address the convention include officials of the State Highway Department, the Bureau of Public Roads, and state officials.

President J. W. Shy will preside at all sessions.

Officials of the association are: J. W. Shy, Cheyenne Wells, president; J. E. Beckley, Delta, vice-president; and T. W. Monell, Montrose, secretary.

A list of the commissioners who will hold office during 1925-26 follows:

Adams—Geo. K. Kemp, H. L. Prather, S. R. Rigg.

Alamosa—H. Emperius, Roy Campbell, H. F. Stahl.

Arapahoe—Ramon A. Miller, T. A. Race, O. C. Hoffman.

Archuleta—Thos. A. Reavis, Fred Catchpole, J. E. Walker.

Baca—J. C. Lent, W. L. Rockhill, Albert Peterson.

Bent—John C. Peper, Dan Carl, Stanley Lee.

Boulder—E. B. Hill, S. D. Buster, Guy Miller.

Chaffee—Mell DeWitt, J. H. Habenicht, G. F. Snell.

Cheyenne—W. C. Shultz, Chas. J. Heath, W. E. Williams.

Clear Creek—John W. Green, Geo. H. Curnow, Geo. D. Criley.

Conejos—F. A. Espinoza, A. Gonzales, C. P. Jensen.

Costilla—J. H. Wilson, J. L. Morris, S. N. Smith.

Crowley—W. F. Tarbox, S. S. Sipllars, Edd Whitney.

Custer—Clarence Pond, C. W. Vickerman, Chas. J. Donahue.

Delta—J. E. Beckley, W. F. McMurray, Geo. S. Roller.

Dolores—W. E. Quine, S. M. Conn, Edward Baer.

Douglas—J. T. Berry, Andrew Nickson, A E. Tailing.

Eagle—G. D. Roberts, W. P. Mayer, J. H. Heyer.

Elbert—Jack Wood, Perry Davis, Al Carnahan.

El Paso—J. Oscar Cell, W. H. Bartell, J. B. Fowler.

Fremont—C. A. Somerville, Frank Steinmier, S. K. Kelso.

Garfield—John L. Heuschkel, Otto Hahnewald, Lynn Kennedy.

Gilpin—John Hancock, Neil McKay, John L. Robins.

Grand—W. A. Hurd, Glenn Sheriff, Thos. J. Mitchell.

Gunnison—W. U. Mergelman, Frank Comstock, R. A. Little.

Hinsdale—J. H. Hammond, Lee F. Williams, Theo. Watson.

Huerfano—Geo. S. Neibuhr, John Elly, J. G. Archuleta.

Jackson—C. B. Harmon, W. T. Ferrier, Frank R. Fraser.

Jefferson—F. D. Blackmer, O. N. Evans, E. L. West.

Kiowa—J. O. Walker, John Lamberson, P. O. Meyer.

Kit Carson—C. J. Buchanan, I. D. Messinger, Jos. Gray.

Lake—Dan Colahan, George Bennett, Chas. Kutzleb.

La Plata—Wm. E. Tyner, J. H. McHolland. J. A. Bell.

Larimer—F. E. Baxter, Harris Akin, J. W. McMullen.

Las Animas—Hal Barnes, J. J. Abercrombie, William H. Green.

Lincoln—E. J. Kidder, Dan Newberry, J. D. Peyton.

Logan—C. M. Morris, S. A. Richerson, J. P. Dillon.

Mesa—Gus J. Johnson, Chas. A. Wallace. Thomas A. McKelvie.

Mineral—L. G. Carpanter, John G. Dabney. Wm. C. Sloan.

Moffat—Frank C. Barnes, D. J. Davis, Thomas S. Iles.

Montezuma—Henry L. Crawford, Fred C. Hallar, E. S. Porter.

Montrose—H. P. Steel, C. C. Sheats, W. G. Haney.

Morgan—O. B. Schooley, I. G. Aker, James Hurley.

Otero—J. C. Vaughn, J. G. Washburn, D. P. McClaren.

Ouray—James H. Doran, C. H. Rowley, E. C. Fisher.

Park—J. T. Witcher, Frank E. Lilley, G. S. Singleton.

Phillips—Roy E. Owens, Roy D. Goddard, Steve Meakins.

Pitkin—J. R. Williams, Chas. Evans, C. M. Reed.

Prowers—Ray McGrath, J. G. Schlager, Henry Massar.

Pueblo—W. L. Rees, O. G. Smith, H. H. Wilson.

Rio Blanco—Fred A. Nichols, Frank M. Green, S. M. Green.

Rio Grande—J. G. Duncan, W. W. Wright, T. J. Hawkins.

Routt—A. H. Poppen, Geo. W. Dunckley, R. I. Gwillim.

Saguache—Ed. F. Clark, W. E. Gardner, Geo. Woodard.

San Juan—Edw. Meyer, H. Clay Johnson, W. L. Gooch.

San Miguel—Walter B. Rogers, A. T. Wood, Howard Davis.

Sedgwick—J. C. Wagner, Oscar Franson, Wm. Peterson.

Summit—D. F. Miner, Andrew Lindstrom, B. F. Rich.

Teller—Matt Edwards, Richard Quinn, J. B. Wild.

Washington—T. McAloon, Vern Beck, J. R. Shirley.

Weld—Chas. Hewitt, Dan Straight, Forrest Powars.

Yuma—H. H. Brand, Byron Taylor, Walter L. Hadlock.

FINANCING HIGHWAYS

Colorado has gone a long way in the development of good roads, but it has a longer way yet to travel to attain that primary network of permanent highways essential to transportation needs.

By comparison, the state occupies an enviable position. In part this is due to an aroused public interest in highway building. Much of the advantage comes by virtue of natural resources. The state has a wealth of road materials easily accessible. In many places first-class gravel highways can be constructed by a process no more difficult or expensive than mere grading. The advantage is the better appreciated by those who have lived in the mud belt.

But whereas the natural roads are admirable within their limits, they will not withstand the pounding of such heavy traffic as moves over the main highway. It is essential that primary highways be hard-surfaced.

Much work has been done along this line; not so much as might be desired, nor yet so much, relatively, as has been accomplished in some other states. Still, the program is well on its way. Colorado has a good reputation for its highways. It is one of the favored states among motorists. The fact is to Colorado's great interest. Travel is one of the state's chief sources of prosperous activity. The purpose is ever to increase travel, and one of the means is to expand the highway system. This is to consider the merely selfish viewpoint, without regard for the benefits derived directly from first-class highways. However, in itself it is sufficient reason for unslacking effort.—Colorado Springs Gazette.

A view of Milner Pass, showing a bit of Colorado's scenic grandeur, which attracts thousands of visitors to the state each summer.

Colorado's Tourist Crop

By WARREN E. BOYER

COLORADO'S attitude toward the Rocky Mountains is one of stewardship rather than ownership. The fact that this mountain range reaches its majestic greatness in Colorado is only another reason why its people call to their less fortunate neighbors of states to the East and the South to "Come Up!" And in helping to convey the idea that the Rocky Mountains, the national parks and the national forests, belong to all of the people in the United States, good roads have played no little part.

In fact, the automobile travel to Colorado this year is responsible for the gain in the general tourist business, representing an increase of money spent, from $45,500,000 to $49,000,000. This gratifying result is realized in the face of a decrease of railroad travel generally regarded as 4 per cent under last year, and more than made up, from the standpoint of financial returns, in the accepted increase of 15 per cent in automobile travel. It is estimated that there were 700,000 rail and auto tourists in Colorado during the 1924 season, and they left $49,000,000.

Not many years ago Iowans and Kansans thought it a tremendous undertaking to make a trip to Colorado by auto in summer. This summer 6,676 Kansans and 2,219 Iowans camped in Overland Park in Denver, where a total of 49,034 motorists were registered from all states. A newspaper clipping picked at random in the files of the Denver Tourist Bureau describes a trip of Dr. W. W. Carlton, a former pastor of the First Methodist Church in Charles City, Iowa, to Trinidad, and contains this further remark: "After completing their visit in Colorado they will continue their journey westward before returning home." That was the middle of November.

Such is the change wrought within a few years through better roads, instilling confidence in travel and substantiating the statement that in summer Colorado's population is almost doubled because of the continuous influx of tourists. The tourists, who left $49,000,000 in Colorado this year, little realized that its total is three times as much as it costs to run the state government. It is a pretty safe guess to assert, in passing, that the surprise is just as great to the average citizen of Colorado.

Commendable strides are being made in the revival of mining, and with each new strike the news is acclaimed to the four corners of the United States. And yet, in 1924, the travel business to Colorado was seven times greater than the gold output. It has elicited this comparison: "If mining brought $49,000,000 in new money to Colorado like the tourist industry did this year, another boom would be heralded throughout the nation." As it is, thousands of business men in Colorado regard the tourist trade as something which in some mysterious manner keeps up its own momentum, without effort or a driving force to increase the numbers of tourists Colorado bound.

The Denver Tourist Bureau, perhaps the largest individual agency in the state other than the railroads, spent $100,000 this year to induce travel to the state. Colorado highways are keeping abreast of the great travel movement, all things considered, but it is well to remember that competition has entered into the business, and good roads in other states are beginning to lure the man and his family to other regions, sometimes close at hand, again hundreds of miles away.

Just how this competition is developing, almost at Colorado's door, is aptly illustrated in the quoted remarks of Governor-elect McMullen of Nebraska in an Omaha paper: "Why, out around Chadron we have scenic places that are the equal of anything in Colorado. Perhaps the hills are higher in Colorado and rockier, but in proportionate scale there is nothing more beautiful. Some day main highways which are so badly needed will traverse this wonderful country."

But Colorado is pushing ahead. Last year its 247 automobile camps had a total registration of 643,015 motorists, while this year there were 276 camps with a total of 693,127 nomads of the gasoline trail. What did they mean to the State? They are represented in large measure in the $49,000,000 received by Colorado for

(Continued on Page 14)

REPORTS FROM THE DIVISIONS

STATE HIGHWAY OFFICIALS START SURVEYS FOR 1925 PROJECTS

No effort will be spared by the heads of the State Highway Department to get the entire 1925 highway budget under contract at the earliest possible moment. Major Blauvelt and his assistants are anxious to have as many projects under contract by the time that the snow is off the ground as the department's engineering facilities will be able to get ready.

If present plans of the department are carried out January, February and March will witness the letting of contracts for a larger number of contracts than during the same months in any preceding year.

As a matter of fact, even now, with the budget not even definitely adopted, already several surveying crews are in the field and getting the engineering data ready for a number of projects which, no doubt will be contained in the budget, as for instance two big Federal Aid projects on the main North and South highway between Husted and a point north of Castle Rock.

Ever since the department was re-organized in 1921 it has been the aim of its heads to do as much of the necessary preliminary engineering as possible during the late fall and winter, and thus have projects ready early in the new year, instead of waiting until spring for the surveys.

Gradually the engineering department is getting ahead of construction far enough to permit utilization of the good weather in the spring for construction.

In this connection it is interesting to note that the department in 1924 succeeded in catching up with all projects for which appropriations were made in former years. The 1924 budget, of course, was not completed, but the 1923 and 1922 budgets have finally been finished.

In the 1924 budget there were carried over quite a few projects from the two preceding years. In the 1925 budget only the new appropriations for 1925 and a few carry-overs from 1924 will appear.

TRAFFIC MOVES THRU NEW SUBWAY SOUTH OF WOLHURST

The last week in November witnessed the completion of the double under-pass under the Denver & Rio Grande Western and Santa Fe railroad tracks, a short distance south of Wolhurst in Douglas county. Traffic may now pass under the tracks and utilize the concrete pavement laid last summer as far south as Gann. A distance of about 900 feet remains to be paved. Contractor M. J. Kinney could not pave under the tracks because of the work on the under-pass.

This short stretch of paving will be laid early in the spring.

Completion of the double under-pass eliminates one of the most dangerous grade crossings on one of the most heavily traveled roads in the state. It was paid for by the United States government, the state and the two railroads affected. The railroads, with their own bridge crews, constructed the crossings.

The work took a little longer than was estimated, because of the unwillingness of the Santa Fe railroad management to permit tunnelling under its tracks until completion of the Denver & Rio Grande Western under-pass. The Santa Fe officials "played safe." They did not wish to run the chance of having both its own and the D. & R. G. W. main line tied up in case of some accident.

A stretch of high standard pavement near Grand Junction.

NEW STATE ROADS OPEN BEAUTIFUL MOTORIST ROUTES

New forest roads completed in Colorado during the 1924 season by the federal bureau of roads open to motorists new districts of incomparable beauty, according to A. E. Palen, assistant district engineer of the bureau of roads.

Work was completed, or virtually finished, on four forest highway projects last season at a cost of approximately one-half million dollars, according to Palen, and the mild weather permitted road building at elevations until late in November. In other years the season's work has been brought to a close October 15.

The most important project finished by the bureau of roads in Colorado in 1924 was twelve miles of the Ouray-Silverton highway, known as the "million-dollar" drive, according to Palen. That project was on the Uncompaghre National Forest and opened a district of unsurpassed scenic beauty.

Second in importance was the completion of a fifteen-mile stretch of roadway through Cumbres Pass on the Rio Grande National Forest. This highway, besides opening up to motorists one of the most beautiful scenic districts of the state, shortened the route into the San Juan Basin. The new road is lower than the old Wolf Creek Pass highway, and on that account will be open for travel early in the spring and late in the fall.

A shorter route to Twin Lakes and Glenwood Springs was opened with the completion of six miles of highway through Independence Pass on the Holy Cross Forest, Palen said. This route also is more attracive from a scenic standpoint than the old highway through Tennessee Pass.

COUNTY OFFICIALS DISCUSS ROAD LEGISLATION AT DISTRICT MEET

Highway matters formed the principal topic of discussion at the regular meeting of the Arkansas Valley Association of County Commissioners held at Canon City on December 3. The meeting was largely attended. Among those in attendance were the new commissioners and county clerks elected on November 4. Their introduction to the old members of the association formed one of the interesting features of the meeting.

The principal business before the meeting was the outlining of a program by the legislative committee and a discussion of the future activities of the association. Several highway officials were present and made short addresses on highway topics.

CONIFER-BAILEYS GRADING PROJECT STARTED ON STATE HIGHWAY CONTRACT

A solution agreeable to all interests has been found of the problem of continuing the work on the Denver-Baileys highway thru Morrison, Conifer, Shafer's Crossing, etc. After residents of Conifer had protested against the relocation of the highway in the manner originally proposed by the highway department, a new survey was made, with the result that a route was selected that pleases all parties concerned.

The new route does not give quite as good a grade as the one first selected, and it is perhaps a little longer, but it overcomes the objections raised by owners of property in the vicinity of Conifer. Furthermore, it offers an excellent connection with the road connecting Conifer with Evergreen.

Bids for the completion of the road were opened early in December. Harry H. Brown of Salt Creek, Wyo., was the low bidder, his bid just "nosing out" several other bidders. The project extends from a point just north of Conifer to a point a short distance south of Shafer's Crossing.

Road News, Views and Gossip

LOVELAND-FORT COLLINS PAVED ROAD IS PAYING OWN WAY, FIGURES SHOW

Does a paved highway pay in dollars and cents?

Has the paved highway between Loveland and Fort Collins paid out or will it pay a fair dividend on the investment?

Now that we are about to spend $315,000 more for connecting up the paving south of Berthoud and Longmont with the capital city, it is well to do a little figuring.

Taking for example the 12 miles of paved highway between Loveland and Fort Collins which has been completed for a year let us do a little figuring.

The United States government has been doing some investigating and in a bulletin issued over the signature of an engineer we find this statement:

"Unless every mile of paved road pays $5,000 a year we have no right to build it."

In another place in the bulletin we find a statement that the engineer has observed a certain stretch of road in Iowa, in the rural districts, not leading into a large city, that has been paved. This, we are taking for granted, compares favorably with the Loveland-Fort Collins stretch of paved highway in the matter of the number of cars and trucks that pass over daily. The engineer claims that for the number of trucks and autos that pass over each mile of the Iowa paving daily the gas bill is $11.70 per mile and also states that had it been a dirt road the gas bill per mile daily would be $24.44, or a saving in favor of the paving of $14.74 per mile daily in gasoline alone. This does not include tires or wear and tear on cars which are greatly lessened on paved roads.

Taking for a basis on the Loveland-Collins road a saving of $15 per mile daily on gas ($15.00 is quicker figuring for a novice than $14.74) it means that during the year, 365 days, the paving has saved the autoists $5,475 on each mile. The engineer stated that "Unless every mile of paved road pays $5,000 a year we have no right to build it."

The Loveland-Collins road has beat that figure by $475.

The twelve mile paved strip between the two cities has earned $65,700 a year in gas savings or $5,700 a year more than the government experts says a road must earn per mile in order to pay for its building.

We are not vouching that these figures on the Loveland-Fort Collins road are correct. We are merely drawing a parallel with a similar road in Iowa, but we do believe that there is more traffic on the Colorado road, especially when we take into consideration the drawing power of Estes Park, than there is on the Iowa road, and if this is true, the Loveland-Fort Collins road is paying its way.

We have no reason to doubt the figures of the government engineer. The government does not put out a bulletin unless it is reasonably sure the statements made therein are correct.—Loveland Herald.

REDSTONE AND HIGHWAY WILL BE IMPROVED BY OSGOOD

Redstone and also the Carbondale-Redstone highway is to be completely rebuilt, improved and made one of the most desirable places of residence in Western Colorado, according to J. C. Osgood, owner and builder of the town.

Several years have passed since Mr. Osgood made his home at Redstone. On November 6th he arrived in the city with Mrs. Osgood and after visiting Redstone he accompanied her back to New York and has returned with plans for his town and the region which are most extensive. With him came an engineer from New York City, who with Frank DeWitt, local contractor, will aid Mr. Osgood in carrying out plans for the rebuilding and improving of Redstone.

The eighteen-mile highway which he had built from Carbondale to Redstone at a cost of thousands, will be completely rebuilt and put in a condition which will encourage tourists and home seekers to visit Redstone. His palatial residence, which has been in the hands of caretakers during his absence, will be made even more beautiful and luxurious, it is believed.

The cottages in Redstone, numbering more than twenty-five and which have fallen into disuse, will be gone over and put in good condition and additions to the village will probably be made. Streets, the water system and other municipal utilities will also receive attention and the entire town arranged to afford a suitable place of residence for anyone so fortunate as to make their home there.

Mr. Osgood has done much for this region in the past and his endeavor to reopen and improve the Redstone territory will be watched with considerable interest by this section as well as greater Colorado.—Glenwood Springs Avalanche.

WORK STARTED ON GOLDEN GATE HIGHWAY

Actual work has been started on the new Golden Gate road, and there is every indication that the work will be continued through next year, according to a report made by W. G. Duvall to the Chamber of Commerce.

Mr. Duvall, who is chairman of the Chamber of Commerce highway committee, has been working many months for this road. This year the co-operation of the Jefferson county commissioners was secured, on promise of the highway department to include the new project in its next year's program, and the work was started.

SAVE HAUL OF THIRTY MILES TO RANGELY OIL FIELD

The Douglas creek road to the north from Loma will be a busy highway if oil is brought in by the Midwest company in a deep test well they are now sinking. Rangely is far isolated from rail connection, and the drilling machinery now in use there by the Midwest company was hauled in by auto truck from Craig.

From Craig, the distance into Rangely is 116 miles, while from Loma it is only eighty-six miles, or a saving of thirty miles. On the Douglas pass road, there is the one pass to go over, the road reaching to an altitude of slightly over eight thousand feet. Ten miles will cover the distance from the foot of the pass on one side to the foot on the other, and if traffic warrants, it is known this road can be kept open. Recently it has been in a very bad condition, but this has been due to the mud more than to the snow. With the proper equipment to remove the snow from the road after each fresh fall, the pass can be kept open throughout the year.

STAY OFF PASSES UNTIL NEXT SPRING

Following the tragic death of the late George Becker on Cumbres Pass, the narrow escape from death of the Stites family of Oklahoma on Wolf Creek Pass, and the narrow escape of a Ouray man from freezing on the highway between Ouray and Silverton, it behooves every motorist to stay off the passes until next spring.

Maintenance Supt. Dunham, of the State Highway Department, has made careful inquiries as to the condition of all the passes, and he issues a warning that they are in no condition for travel and will not be until spring.

There is two feet and a half of snow on the highway between Ouray and Silverton. There is eight inches of snow on Wolf Creek Pass and an equal amount on Cumbres. Both passes are blocked for the winter and motorists attempting the passes must do so at their own risk. —Durango Herald.

MODERN ROAD BUILDING

Almost over night road builders are awakening to the fact that one of the surest ways to prevent highway accidents is to widen the road grades from fence to fence more like a street instead of digging great ditches at the side of the road and banking up the center like a railroad grade. The amount of dirt moved is practically the same so no additional expense is involved.

The new type of road is much safer, as a motorist feels more at ease on it than he does on the old turnpike style of construction. The mere fact that he does not feel as nervous about running off the grade reduces the danger of accidents, for he is inclined to drive straighter and not "wobble" in passing another car.

It's the same proposition as when you walk a narrow plank across a creek, you are inclined to think you are going to fall off. Put an additional plank on each side of the one you are walking, and you can walk the single plank between the other two without any hesitancy. A wider road grade gives the same feeling to an automobile driver.—Fort Collins Courier.

Colorado's Tourist Crop

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scenery, climate, hospitality, necessities, investments and amusements.

The first direct returns may be seen in the treasuries of municipalities that adopted the pay camp idea this year for the first time: Denver, $14,702 for camping fees and an additional $6,202,92 for concessions, or approximately $21,000. Excluding about $6,000 for capital investments in Overland Park, the camp received sufficient revenues for the first time to meet maintenance charges, including water, light, police, clean up.

Harry E. Niven, custodian of Sunset Park, Longmont, reports that 2,546 motorists were registered in the camp grounds and paid $477.75, while the total number of automobilists visiting the park is 4,146. Grand Junction had 7,044 campers in Lincoln Park, who paid a total of $758.25 for the camping privileges. The increase in campers was nearly 4,000 over 1923. Many other cities and towns give remarkable increases in travel, due to scenic attractions and accessibility through good roads.

There were 224,211 visitors in Rocky Mountain National Park this year, by rail and auto, of which amount 125,000 people came in their own automobiles. Mesa Verde National Park had 7,109 visitors this year as against 5,236 last year, while the national forests in the state reported a total of 1,680,000 visitors, in comparison with 1,600,000 last year. The Denver Mountain Parks attracted 850,000 visitors, many of whom paused at the grave of Col. William F. Cody, better known as "Buffalo Bill," or visited the rustic museum erected to his memory by the City of Denver and conducted by Johnny Baker, foster-son of the celebrated plainsman.

As to the communities sharing in the tourist dollars that go to make the huge total of $49,000,000, and the extent of their prosperity from an investment considered largely in the cost and maintenance of highways, the following are given from among the Tourist Bureau's compilation of reports received from the communities: Gunnison, total expended by rail and auto travelers, $70,000, of which $60,000 was realized from motorists; Salida, a total of $50,000, of which $30,000 was left by auto travelers; Hugo, $26,000, of which $6,000 was spent by campers; Glenwood Springs, $158,000, of which $8,000 is credited to motorists; Durango, $60,000, of which $10,000 was left by autoists; and Sterling, $80,000, of which $75,000 was spent by motorists.

So the stewardship of the Rocky Mountains is one in which scenery and climate primarily are "sold" over and over again, and Colorado, in the meantime, is pushing ahead!

Federal Aid Project No. 279-A

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never before had experience in state highway paving, or in any Federal Aid work. Progress of the work from beginning to end was continuous and at a uniform rate of speed. The fact that the contractor started paving within thirty days of the date of being awarded the contract is in itself remarkable, and it is a great pleasure to me to be able to say that the credit for this unusual workmanlike and satisfactory piece of paving belongs to the contractor, Andrew J. Collins.

HALF-WAY HOUSE IN BLUE CANON RAINBOW ROUTE

We do not know whether being adopted into the "Pikes Peak Ocean-to-Ocean Highway" eliminates the name of the famous old "Rainbow Route" or not, but it should not. This picturesque name has had much to do with featuring the auto highway through Gunnison, and might well be retained. This "Half-Way House" is approximately half way between Gunnison and Montrose, and also half way across Blue Mesa, between Sapinero and Cimarron. It was built by Gunnison county in 1916 and is used to house the road workers, and also take care of belated travelers in desperate need. Located at a most scenic spot—the junction of the Big and Little Blue rivers—the surroundings are ideal for an outing place. One hundred and twenty acres of government land there have been purchased by Montrose and Gunnison counties for use as a public park, so that in future years no land-owner can compel the tourist to "keep off the grass." Down the river a few rods are fine camping places, which in time will undoubtedly be made more presentable and be better equipped for auto tourists than they are today.

MOTOR TAX AN INVESTMENT

A Missouri highway commission has good words to say for the motor license tax and the highway program in his state. The former, he says, is an investment rather than a tax. Goods roads are the wealth purchased by that tax.

The Missouri highway program takes 80 per cent of the license money and puts it into hard-surfaced roads. Better roads enable the motorist to go farther, more safely and comfortably than before. They also save gasoline and wear and tear on the car.

Paying a motor license tax for such a purpose is almost a case of having one's cake and eating it, too. One buys the car and pays the license fee and spends a considerable sum of money. But the license fee goes to work for the car-owner, and saves him money in other ways.—Cisco News.

CEMENT CENTENNIAL OBSERVED BY PORTLAND CEMENT ASSOCIATION ANNUAL MEETING

The Portland Cement Association concluded with a banquet Wednesday evening, November 19, its usual annual meeting. Three days were devoted to the various sessions. On Monday, November 17, reports of standing committees were prepared. On Tuesday, November 18, the morning and afternoon sessions were given over to the usual program of reading and discussing specially prepared papers on cement mill practice. The subjects presented and discussed were the following: "Fire Prevention and Cement," by R. S. Moulton, assistant secretary, National Fire Protection Association; "The Economic Limit and Operating Flexibility of Waste Heat Boiler Installations," by Helmuth Krarup, superintendent, Hawkeye Portland Cement Company; "High Early Strength Cements," by Dr. Gustav Haegermann, director, German Portland Cement Association laboratory; "European Cement Plant Practice," by H. A. Schaffer, conservation engineer, Portland Cement Association.

On Wednesday, November 19, the morning session was devoted to the usual business session, at which committee reports were presented to the members, the annual election of officers concluding the session.

F. W. Kelley, of Albany, New York, president of The Helderberg Cement Co., who has served as president of the Portland Cement Association for the past two years, was presented on retiring from office an engrossed testimonial signed by practically the entire membership of the association, and recording appreciation of the membership for his contribution to the advance of association work during his administration.

The officers elected for the ensuing year were the following: Blaine S. Smith, Chicago, general sales manager, Universal Portland Cement Co., was elected president; Lowell R. Burch, New York, vice-president, Atlas Portland Cement Co., was elected first vice-president of the association; and C. A. Irvin, Chicago, vice-president, Alpha Portland Cement Co., was elected second vice-president. John W. Boardman, Detroit, vice-president of the Huron and Wyandotte Portland Cement companies, was re-elected treasurer.

In September a number of representatives of Portland Cement Association members journeyed to England to present to the City of Leeds, England, a bronze tablet as a tribute to Joseph Aspdin in commemoration of the patenting of portland cement by him in 1824. While abroad many of these American manufacturers visited various cement plants in Great Britain and on the Continent, and it was natural therefore that as a mark of courtesy, not to mention an equal interest in the cement centennial year, that a number of European cement manufacturers should visit this country to assist the Portland Cement Association in its centennial observance.

The afternoon session of Wednesday, November 19, was given over entirely to a special program in commemoration of the cement anniversary. Representatives of various professions related to or associated with the several branches of the construction industry presented short talks relating to the effect concrete has had in the advance of engineering, architecture and associated construction lines as coming under their particular observation and practice.

UP TO THE DRIVER

The unusual number of automobile accidents of late should warn the motorist of the potentially dangerous character of the iron steed on which he holds the reins. And remind him that with cars, as with horses, a rein is absolutely necessary. Whether that is to be in the exercise of the driver's better judgment, or in a stricter enforcement of speed and traffic laws, is largely up to the man who drives the car.

A continued epidemic of accidents can lead to but one end—the clamping down of more rigid motor regulations. Let every driver resolve to use better judgment in driving, pay more attention to stop lines and parking regulations; let him watch carefully at intersections carrying no stop-line markings; let him use greater care when passing other motorists and when turning corners and save his speeding for the less crowded thoroughfares and the countryside, and the number of accidents can be cut down without the putting into effect of drastic and onerous regulations.

It is up to the man who drives.—Gilbert Herald.

A GASOLINE TAX IS FAIR

Roads must be built and maintained. That costs money. The money must be raised by some form of public license or taxation.

Years ago it was just and proper to raise all road funds by a general property tax—a tax on the farms and homes. In the days of horse-drawn vehicles the road was a neighborhood road, used almost solely by the neighbors and paid for by the neighbors by a general property tax.

Today, with the automobile, the motor truck and bus, the road is not a neighborhood, or a town road, but a county, a city, a state, a national highway, used by everybody, from everywhere.

Under these changed conditions, with the general property tax at a prohibitive point, it is simply common sense and common fairness to say that the people who use the roads and get the most benefit from them, the motor vehicle owners, should pay a fair share of the cost.

You Pay As You Ride

If you could put a meter on every motor vehicle which would show the mileage run, the ton mileage run, and the average speed, it would be an ideal plan to determine road use or benefits. You can't. The gasoline tax is the nearest approach to it; the use of gasoline is the meter or measure of road use and road wearage—a car traveling a large mileage uses more gasoline than one traveling a small mileage; a big car more than a small one; high speed uses more than low speed. The public utility companies meter their service, gas and electricity; railroad companies charge so much per mile—the gasoline tax promises to meter road use.

The gasoline tax is not a burdensome one. It is paid in small amounts, twenty or thirty cents, when the gasoline tank is filled. The price of gasoline rises and falls every few days, and we pay no attention to it.

No tax would be so easily and cheaply collected. All gasoline arriving in the state is inspected by a deputy state oil inspector. A duplicate of the inspection slip would be sent to the Secretary of State and within two weeks the wholesaler would be required to remit his tax. It would not need a force of auditors or assessors—at most four clerks, to handle the collection of over $4,000,000 which a two-cents a-gallon tax would yield.

No Gas Tax Dodgers

The gasoline tax does not offer the opportunity for or invite evasion, to the same degree as the income, personal or real property tax. So far as the individual owner of the motor vehicle is concerned, the saving involved, twenty or thirty cents to fill his gasoline tank, is too small to invite such evasion. All taxes are evaded to an extent. Gasoline tax evasions in money loss could not in the remotest way be compared to losses involved in collecting real and personal property and income taxes.

Different aspects of the gasoline tax law have been attacked in the courts of several states. The supreme courts of three states and of the United States have upheld gasoline tax laws, when their constitutionality was attacked.

Tourists from other states enjoy good roads and do not help to pay for them. The gasoline tax is the only feasible way to collect the tourists' share.—Alexandria Citizen News.

The road is the physical sign or symbol by which you will best understand any age or people. If they have no roads, they are savages; for the road is a creation of man and type of civilized society. If you wish to know whether society is stagnant, learning scholastic, religion a dead formality, you may learn something by going into universities and libraries, something also that is being done on cathedrals or churches or in them, but quite as much by looking at the roads, for if there is any motion in society, the road, which is the symbol of motion, will indicate the fact.—Bushnell.

Heroditus tells of a road built 4000 B. C. It was in Egypt and reached halfway across the African continent. It required 10,000 men working ten years to build a single half mile of it. The stone for the Pyramids was hauled over this road.

Let us travel over all the countries of the earth and whenever we shall find no facility of traveling from a city to a town, or from a village to a hamlet, we may pronounce the people to be barbarians.—Abbé Reynal.

Remains of the first recorded roads are still in existence. They were built by the Assyrian Empire about 1900 B. C., and like the spokes in a wheel, radiated from Babylon to the corners of the empire.

NEW TYPE OF ROAD SOUGHT

The Highway Research Board of the National Research Council is emphasizing the need of a new type of road that will provide a good surface for secondary traffic, yet low in first cost and maintenance.

The secondary and local roads of this country have a far greater mileage than the main traffic lines, yet relative to very large mileage little progress has been made along the lines of improving this type of construction. Because of the small amount of traffic on the local roads, surfaces such as concrete, asphalt and brick are not possible because of the great cost of building the hard-surfaced types.

Many communities do not have available deposits of natural road building materials and consequently the construction of secondary roads have not kept pace with the demand for a serviceable road that will provide a good surface to traffic every day in the year. A large number of states have constructed these local roads of broken stone, gravel, or of selected soil such as sand-clay or top-soil. It has been definitely proven that when a gravel or selected soil road carries more than 500 vehicles a day, this type of road surfacing is unsatisfactory. The surface becomes rough and corrugated and it requires much work on the part of the maintenance forces to put it in good shape.

Several state highway commissions have been experimenting with various materials to determine a method of constructing a road that will cost even less than for a gravel road, yet more satisfactory. In one state the so-called "veneer" type of road has been built and it shows great promise. This type is built by placing three inches of 2 to 2½-inch stone directly upon the shaped road surface and rolling it into the soil so that the stone is properly keyed to the subgrade. Then a light coating of asphaltic road oil is poured on to the stone and this is then followed by placing smaller stone on the surface to prevent the passing cars from "picking up" the asphalt. These smaller stones also wedge into the larger ones underneath, thus forming a hard, dense layer. Other types of construction, such as the sand-asphalt and marl-asphalt are being tried, both of these types utilizing local material incorporated with small amounts of asphalt to serve as a binding material.

The Highway Research Board is calling attention to the fact that while all present research work should continue, the need of a low cost, serviceable road is needed so that the local farm roads may be brought into conformity with the increasing demand of traffic. Some method of stabilizing ordinary earth, particularly in wet weather, is needed to answer this problem. Low cost of construction is demanded together with a low maintenance cost. Hard-surfaced roads have a high first cost with a low maintenance charge; gravel and selected soil roads have a low construction cost, but a high maintenance cost. What road surface has a low first cost, low maintenance cost and will carry fairly heavy traffic?

ROAD WEAR AND TEAR RUNS UP ENORMOUSLY

Minnesota now has probably more than 500,000 motor vehicles—492,528 were registered and tax paid several days ago.

The machines would carry at one time all the men, women and children in the state.

End to end, they would extend over 1,300 miles—make a continuous line from here to New York City.

But they would have to be spaced 60 feet apart in order to cover Minnesota's big 7,000-mile trunk highway system.

Foregoing facts and figures were quoted this week by Nickles N. Dimes. "It's time people began to realize the enormouse increase of the last ten years in the demands made on the public roads in this state," said the gas tax man.

"Automobiles, trucks, wagons, carriages, sleighs and other vehicles in Minnesota today are taxed on a full value basis of more than $310,000,000. compared with a like total of $37,500,000—a little more than a tenth as much — only ten years ago. Seven or eight times, and, tourists' cars included, nearly ten times as many vehicles are using the roads as there were ten years ago; the average vehicle now is probably ten times heavier and is driven probably ten times farther now than was that of ten years ago.

"All that indicates that road use in this state has increased a thousand times over during the last decade," continued the gas tax man. "It means that inasmuch as we are not spending a thousand times as much on our roads now as we were in 1914, that either we are not carrying on now or were extravagant then.

The Bulletin Board

WILSON OPENS NEW DISPLAY ROOM AND WAREHOUSE IN DENVER

On December 15, H. P. Wilson & Co., Denver dealers in construction machinery, will open their new display room and warehouse located in a new building recently completed at 1936-38 Market street. The general offices of the firm will remain at 1500 Seventeenth street.

The new building consists of two stories and a full basement. The first and second floors have been arranged with a large and elaborate display, where a sample of every piece of equipment carried by the concern will be exhibited. A lighting system has been arranged whereby the machinery can be shown at night on special occasions.

The new building has railroad track frontage, is of the latest construction in brick and concrete and is fireproof. It has 20,000 feet of floor space.

A complete exhibit of road building equipment such as might be required in county work, including several pieces of machinery of new design, has been arranged in the new building for the convention of the county commissioners of Colorado to be held in Denver on December 15 and 16.

Special features of the display include the new Austin Standard Leaning Wheel Grader; latest design Barber-Greene loader, and the Austin "Pup" roller complete.

A full list of the equipment to be displayed follows:

Austin and Western Graders—Western Midget, Western Patrol, Little Western, Western No. 10, Aurora Standard, Aurora Special, Austin Rip Snorter, Austin Mammoth, Western Elevating Grader and Austin Standard Leaning Wheel Grader.

Monroe Jumbo Road Planers.

Barber-Greene latest model loader, and new type conveyor complete.

Aurora Jaw Crushers, three types.

Koehring Mixers—both Heavy Duty and Dandie types.

Wonder Mixers—four sizes and several types.

Schramm Portable Compressor Units, two types.

Austin 12-ton Steam Roller.

C. H. & E.—Hoists with and without power, mortar mixers, "mud" pumps, saw rigs, material elevator.

Wonder No. 4 Diaphragm pump and single drum hoist.

Mundy double drum hoist.

Western Plows—eight sizes and two sizes of rooter plows.

Western Double Bottom Drag Scrapers three sizes.

Western Illinois Scrapers (with runners), three sizes.

Western fresnos—five sizes.

Clark Road Drag—new model, 14 ft.

Western 1½-yard dump wagons and dump carts.

Tiger Boltless Steel Bunks, two types and sizes.

Williams Clam Shell buckets.

"Red Star" Cleveland wheelbarrows.

K. & J. Concrete carts.

Fordson One-Man Maintainer hits heavy going on Colorado road.

HARDESTY BANQUET TO BE BIG FEATURE OF CONVENTION

As usual the Hardesty Manufacturing Company will give a banquet in connection with the annual convention of the Colorado County Commissioners Association. The banquet this year will be held at the Albany hotel, on December 16th. This annual event is given complimentary to the County commissioners and highway officials of the state, and is always an outstanding feature of the two-day annual meeting. An elaborate entertainment is being arranged. Last year over 500 persons from all over the state attended. "Bring the ladies" reads the invitation this year.

BUCYRUS GETS OUT GENERAL CATALOGUE OF ITS PRODUCTS

The Bucyrus Company, manufacturers of high-grade, heavy earth moving equipment, is now distributing an elaborate general catalogue to contractors and engineers in this territory. The literature is being sent out thru H. N. Steinbarger Co., the Rocky Mountain distributors of Bucyrus products.

This catalog presents in concise, convenient form a brief description of the products of the Bucyrus Company. Separate bulletins giving more detailed description of each type mentioned in the booklet are available upon request.

Included in the products manufactured by the Bucyrus Company, according to the catalog, are small and large revolving shovels, in both steam, Diesel, electric and gasoline; dragline excavators, railroad-type shovels, caterpillar mounting for railroad type shovels, clamshell excavators and cranes, sewer excavators, tower excavators, dipper dredges, hydraulic or suction dredges, elevator dredges, alluvial mining dredges, spreader plows, unloading and ballast plows, railway cranes, supplies and special equipment.

These are all briefly described in their latest booklet, with tables giving the general dimensions and specifications.

Bucyrus shovels and dredges have been used on the most important and the most historical excavation projects during the last 40 years. It is claimed that the first successful bucket elevator gold dredge to be built in the United States was of Bucyrus manufacture. On the Chicago Drainage Canal in 1892, 27 Bucyrus shovels were employed, when it was first demonstrated to the world the effectiveness of this type of machine for rock excavation.

MOORE TO EXHIBIT FORDSON EQUIPMENT FOR ROAD WORK

A general display of attachments for the Fordson tractor to be used in road construction and maintenance will be made by H. W. Moore & Co. during the convention of the County Commissioners Association to be held in Denver on December 15-16.

Included in this exhibit will be more than 20 distinct pieces of equipment designed for use with Fordson power units. A special feature of the display will be the latest model Anthony One-Lever Shovel Crane, equipped with a ⅓-yard bucket. While this machine is not designed for digging, it is said to be most effective in the handling of gravel and other materials of light density.

The Moore concern also will show the latest model Fordson one-man maintainer, of which there are a number now in use in the counties of Colorado and adjoining states. These include both the tracklayer and wheel types, equipped with graders, new type maintainers and hauling attachments. One of these machines can be equipped with a snow removal attachment.

Also there will be a showing of various hauling bodies for the Ford one-ton truck, designed for contractors and county road work.

BIDS OPENED

Proj. No.	Length	Type	Location	Low Bidder	Bid Price
262-B	490 ft.	Steel bridge, appr'ch's.	Rio Grande Del Norte, Alamosa	Levy Construction Co., Denver	$82,123.58
279-B	5.295 mi.	Graded	Morrison-Bailey, Turkey Creek	Harry H. Brown, Salt Creek, Wyo.	85,980.40

PLANS SUBMITTED TO THE U. S. BUREAU OF PUBLIC ROADS FOR APPROVAL

Proj. No.	Length	Type	Location
243-B	2.973 mi.	Grav. surf. and bridge	Piedra-Pagosa Springs
261-A	16.045 mi.	Gravel surfaced	Rifle-Grand Valley
272-A	325' & 30' spans	Bridges and approaches	Apishapa River, east of Fowler
289-A	2 150' spans	Bridges and approaches	Kremmling

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

Proj. No.	Length	Type	Location
2-R Div. 3	0.55 mi.	R.R. Grade Separation	North of Trinidad
265-A	3. mi.	Gravel Surfaced	West of Bayfield
276	.2 mi.	Overhead R. R. Crossing	North of Colorado Springs
286-A	.2 mi.	R. R. Grade Separation	Between Nunn and Dover
288-A	16. mi.	Gravel Surfaced	Between Brush and Merino

STATUS OF FEDERAL AID PROJECTS UNDER CONTRACT, 1924

Proj. No.	Location	Length	Type	Contractor	Approx. Cost	Per cent Complete	Proj. No.
2-R Div. 2	North of Trinidad	1.922 mi.	asphalt paving	Stamey-Mackey Const. Co.	$72,956	0	2-R Div. 2
17-R	Breed-Husted	2.339 mi.	Conc. Paving	LaNier, Selander & White	81,399	100	17-R
116-B	Breed-Husted	0.892 mi.	Conc. Paving	J. L. Busselle & Co.	51,001	100	116-B
116-C	North of Breed	3.163 mi.	Paving and Bridge	LaNier, Selander & White	139,038.45	83	116-C
125	Sapinero-Cimarron	11.3 mi.	Grav. Surf.	Dale Hinman	36,797	100	125
135	Denver-Morrison	5.3 mi.	Conc. Pavement	Colo. Bridge & Constr. Co.	178,158	87	135
210-B	Grand Valley-Debeque	7.507 mi.	Grading	Winterburn & Lumsden	94,267	27	210-B
213-A	Hesperus-Mancos	3.538 mi.	gravel surf.	Hooker & Hanson	40,422	6	213-A
213-B	Durango-Hesperus	5.26 mi.	Grav. Surf.	J. Edd. Hansen	72,960	95	213-B
214	Durango-Bayfield	3 mi.	Gravel Surf.	Dale Hinman	53,411.05	100	214
222-C	Broomfield-Lafayette	2.82 mi.	Conc. Pavement	R. M. Larsen	134,933	91	222-C
230-A	Wolhurst, south	0.852 mi.	Conc. Pavmt.	M. J. Kenney Const. Co.	82,710	95	230-A
240	Gypsum-Dotsero	5.185 mi.	Gravel Surf.	O. L. Hackett	66,178	76	240
242-A	Grand Junction-Fruita	7.703 mi.	Gravel Surf.	Dale Hinman	81,255	43	242-A
243-A	Bayfield-Pagosa Springs	1.6- mi.	Gravel Surf.	Shields & Kyle	48,311	100	243-A
245-B	Hadley, East	2.711 mi.	Grading	W. A. Colt & Son	21,680	100	245-B
246-A	East of Pueblo	2.537 mi.	Conc. Paving	R. A. White	78,431	100	246-A
248-A	Buena Vista-Salida	12. mi.	Grading & Surf.	Western Const. Corp.	93,533	66	248-A
252	Loveland-Berthoud	3.2 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,676	100	252
253-A	Steamboat Springs, west	6.50 mi.	Gravel Surf.	Northwestern Cons. Co.	126,374	46	253-A
253-B	Brookston-Milner	3.064 mi.	gravel surf.	Hinman Bros.	66,583	1	253-B
254-A	Byers Canon	1.057 mi.	Grading	Pioneer Const. & Engr. Co.	72,408	61	254-A
258-A	Gunnison-Sapinero	3.239 mi.	Gravel Surf.	R. P. Morrison	34,900	38	258-A
262-A	West of Walsenburg	2.186 mi.	Gravel Surf.	Central Const. Co.	19,367	70	262-A
262-C	LaVeta Pass, west	2.897 mi.	crushed rock surf.	C. M. Emerson & Sons	23,218	7	262-C
267-A	Model-Trinidad	2.954 mi.	Gravel Surf.	Pople Bros. Const Co.	25,583	17	267-A
269-A	Cortez-Dolores	2.172 mi.	Gravel Surf.	Engler & Teyssier	21,215	74	269-A
270-A	East of Monte Vista	3.429 mi.	Gravel Surf.	Stamey-Mackey Const. Co.	17,667	27	270-A
272-B	Pueblo-Fowler	13 mi.	Gravel Surf.	Shields & Kyle	103,768	25	272-B
273	East of Lamar	4.047 mi.	Grav. Surface	W. A. Colt & Son	42,305.30	100	273
278-A	Cheyenne Wells, west	8.4 mi.	Sand Clay Surf.	Holly, Burshears & Dobbins	16,016	29	278-A
279-A	Denver-Morrison	1.439 mi.	Concrete Paving	A. J. Collins	42,155	82	279-A
281-A	Lafayette, South	1.249 mi.	Paving	Sims & Boston	55,373	71	281-A
281-B	South of Longmont	3.068 mi.	Paving	J. Finger & Son	102,502.40	34	281-B
283-A	Loveland-Berthoud	2.530 mi.	Conc. Paving	F. C. Dreher Const. Co.	84,829	100	283-A

DEFAULTED HIGHWAY CONTRACTS

Many highway executives have recently shown considerable anxiety because of the number of highway contractors who have defaulted their contracts. Unless something is done to prevent the increasing number of defaulted contracts, the state, contractor, bonding company and material men are all bound to be losers.

There are always present those who try to do more than they are capable of, and this statement holds true for highway contractors as well as in other callings. While many times unforeseen elements creep into the job and force the contractor to abandon the work, it has been pointed out that much time and money could be saved if the contractor were fully aware of the hidden dangers that confront him, and also that he would be held to a strict performance of the work. Lack of finances, equipment and knowledge of the class of work undertaken are main reasons for many of their defaults.

There is, however, another phase of the problem, and that is the relation of the bonding companies to the contractor.

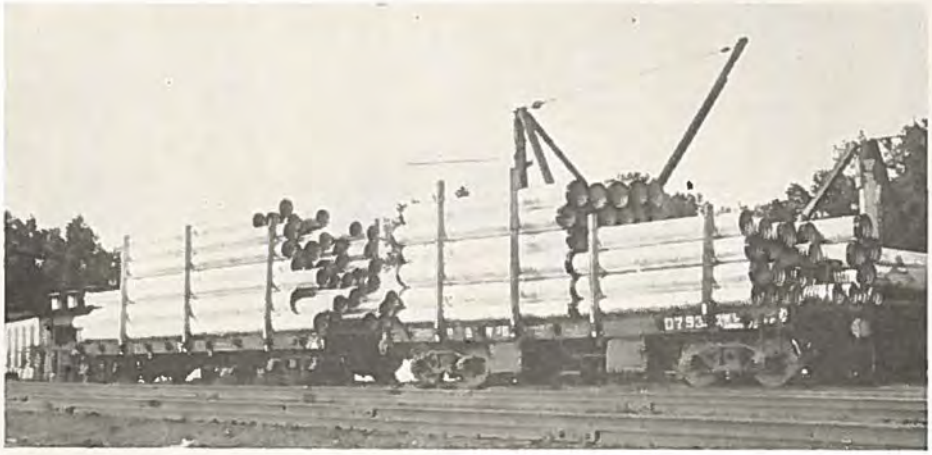
Thomas H. MacDonald, Chief of the Bureau of Public Roads, holds to the belief that the bonding companies should make a more careful study of their risks before issuing contract bonds. Many contractors take a job and expect that they can pay for their equipment, carry their payroll, and at the same time make a profit. Very often the contractor who does not have a cash reserve is forced to abandon the work because of his inability to meet his current expenses. Mr. MacDonald's suggestion is that the best remedy so far developed is the practice of several states in requiring the contractor to have a certain balance, or some other definite financial arrangement, before the contract is awarded. This is sound business and would minimize the number of contracts defaulted. Of course, this does not mean that there should be a fixed amount of money available, but rather that the amount should vary with the size and class of the contract to be undertaken.

In the ancient civilization of Peru streams were bridged and strong stone roads were built. Shade trees and sweet-scented herbs were set along the borders of the road, and at intervals, signs were erected for the direction of the traveler. Inns were built every twelve miles—a day's journey.

Keystone Culverts

Christmas Greetings

KEYSTONE
COPPER STEEL



The Colorado Culvert & Flume Co. — PUEBLO

Extending Season's Greetings

To Our Many Friends and Customers
Wishing Each

A Merry Christmas
and
A Prosperous New Year

H. P. WILSON & COMPANY

Construction Equipment

1500 17th STREET *DENVER, COLORADO*

"A Sample of Every Machine Set Up" At Our New Warehouse and Display Rooms,
1936-38 MARKET STREET

THE BRADFORD-ROBINSON PTG. CO., DENVER