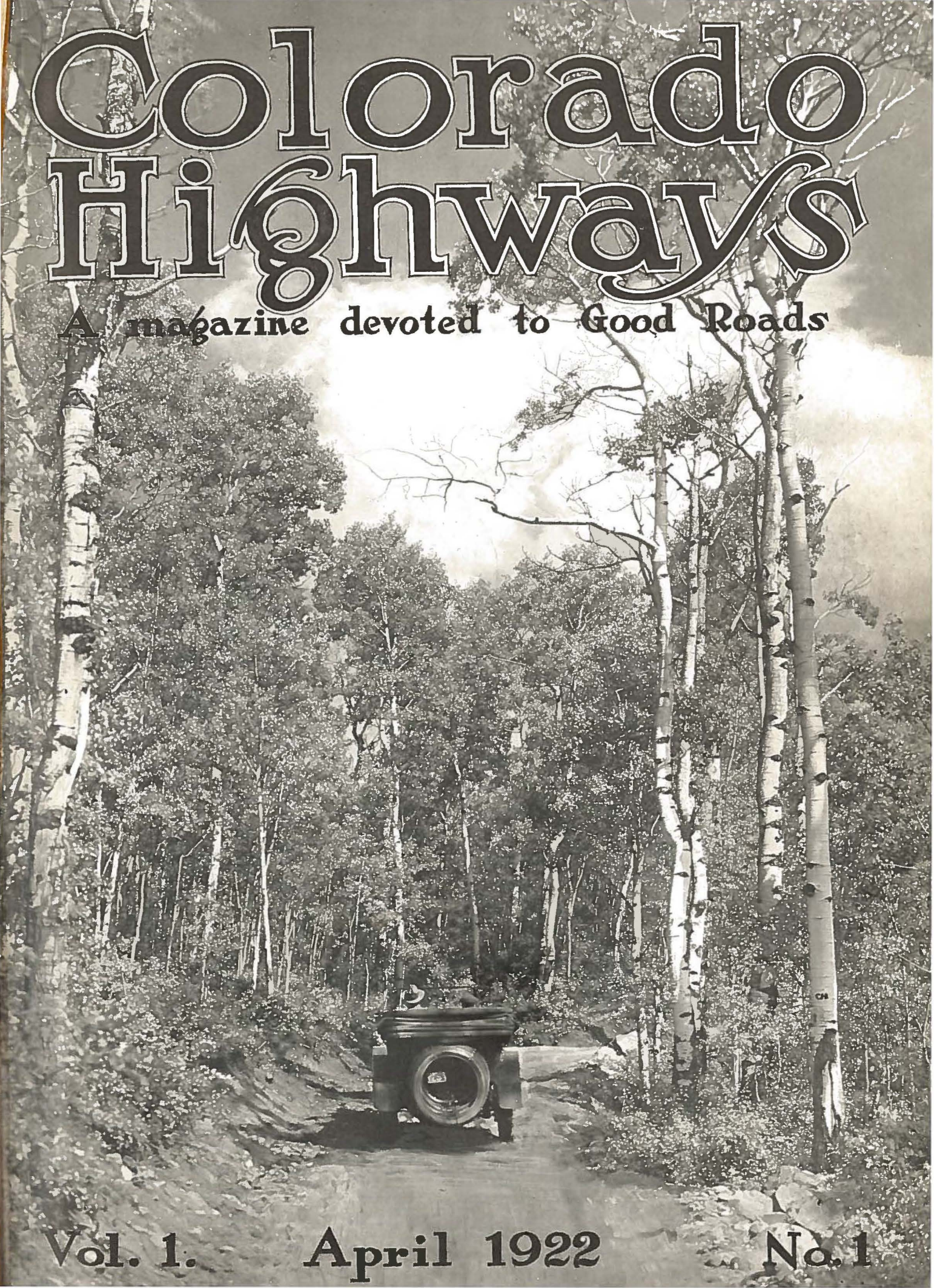
Colorado Highways

A magazine devoted to Good Roads



Vol. 1. April 1922 No. 1

Colorado Highways
"BETTER ROADS"

VOLUME I. APRIL, 1922. NUMBER 1.

MODERN BUSINESS METHODS EMPLOYED

State Road Building Force Operates Like Big Industrial Concern—Efficiency is Watchword—To Spend $11,245,000 on Colorado Highways in 1922.

BY L. D. BLAUVELT, *State Highway Engineer*

The first problem undertaken by the present Highway Department was that of laying the foundation for an organization which should operate intelligently, smoothly and without duplication of work, each individual's duties and responsibilities being clearly defined.

This work of reorganization has been finished. In this connection it should be stated that ability and efficiency are the only qualifications for employment in the department.

The State Highway Department, as at present constituted, is composed of four main Divisions, as follows:

ACCOUNTING DIVISION.
ENGINEERING DIVISION.
MAINTENANCE DIVISION.
PURCHASE AND TRAFFIC DIVISION.

The foregoing designations explain the principal functions of each Division.

At the head of each Division there has been placed in charge a man chosen on account of his knowledge and experience in the particular line of work performed by that Division.

Since the reorganization of the department the administration expense has been reduced to 1.15 per cent of the work accomplished. The average percentage of administrative cost for four western states, the only states from which we have comparable data, for the years of 1919 and 1920, was 2.18 per cent.

The Colorado highway law allows 4 per cent for administrative purposes.

The present State Highway Department, established under the provisions of House Bill No. 106, adopted by the Twenty-third General Assembly, assumed its duties about the middle of May, 1921. Before the organization of the Department was effective, the severe physical conditions caused by the floods

(Continued on next page)

STATE HIGHWAY ENGINEER AND MEMBERS OF THE ADVISORY BOARD OF THE STATE HIGHWAY DEPARTMENT.

Top row—J. A. Clay, Durango; Charles B. Lansing, Colorado Springs, and George L. L. Gann (Vice-Chairman), Pueblo. Bottom row—L. D. Blauvelt, State Highway Engineer, Denver; J. D. Blue, Jr., Sterling; H. A. Edmonds (Chairman), Fort Collins; E. E. Sommers, Denver, and William Weiser, Grand Junction.

throughout the state, were made apparent, and it was not until July that the Department became effective as a working organization.

Under the new law, and in line with other commercial organizations, we might liken the Department to an industrial corporation, on the following lines—it consists of a president—the Governor; its Vice-Presidents, the Advisory Board; its General Manager, the Highway Engineer; and its local Managers, the County Commissioners.

The Divisions of the Department under the General Manager, in its business organization, consists of Engineering Division, in charge of surveys and construction; Maintenance Division, in charge of maintenance of state highways in conjunction with the counties; Accounting Division, and Purchase and Traffic Division.

During the year 1921, the Department has had under construction, work divided among 64 projects. In addition to this, surveys have been made covering prospective projects, and the necessary preliminary engineering, field and office work has been done in preparation for work contemplated under the 1922 budget.

In 1921 there had not yet been awarded for contract certain projects contemplated in the 1919, 1920, and 1921 budgets. This resulted in the department working under three distinct appropriations and budgets.

It was decided by the Highway Advisory Board that all worthy unobligated projects in the back budgets should be brought forward into the 1922 budget.

The budget for this year contains all uncompleted state projects from 1921, totaling about $282,000. It also provides for the completion of contracts awarded last year. These amount to $1,400,000.

There is provided in the budget about $700,000 for maintenance work, about $4,000,000 for new federal aid projects, which includes the federal aid proportion of such projects.

The budget for 1922 totals $11,245,935.

It is true that some important locations have not been taken care of in this budget, but it would be absolutely impossible for us to attempt, in one year, to provide funds and do all the work within the state that is absolutely necessary.

As required by law, there is printed in another section of this bulletin, a statement of the status of the road work now being carried on by the State Highway Department, as well as a financial statement of the Department, ending March first.

ACCOUNTING DIVISION.

This division of the Highway Department is in charge of Mr. Edwin Mitchell, the Auditor. This department is responsible for the correctness of all accounts.

Recently a new system of accounts was installed, and without the use of additional help, allows a close supervision of expenditures and permits an intelligent setting forth, at any period in the year, of the exact status of the Department's relations with the counties and with the Federal government, also the status at the end of any month of each appropriation set forth in the budget.

The Accounting Division has made an extremely creditable record as concerns collection of old outstanding accounts. Through concerted efforts to hold down expenses, the Department's financial condition is showing rapid improvement.

ENGINEERING DIVISION

The Engineering Division, as prescribed by law, is in charge of the Assistant Engineer, Mr. J. E. Maloney. This division is organized along two general lines—Headquarters and Field.

At the Denver headquarters are stationed the Locating Engineers, the Bridge Engineer and Assistants, the Engineer in charge of Federal Aid Projects, Draftsmen, Clerk and Stenographer.

This force is in charge of the Office Engineer and is doing work that is required in connection with all the construction projects in the State. It draws plans, makes estimates, writes specifications, all of which are submitted to the Federal Bureau of Public Roads.

Contracts are advertised for competitive bids and the work is awarded to the lowest responsible bidder. After contracts are awarded, the work is turned over to the second line of the Engineering organization, namely, the Field Engineer.

For supervising work in the field the State is divided in seven divisions, each in charge of a Division Engineer. These engineers are in charge of all construction work. They report direct to the Denver headquarters. Under the Division engineers are Resident Engineers, who have direct supervision over the projects.

The Division Engineers also co-operate with the Maintenance Department heads located in the same division.

When not engaged in construction work, the Field parties are assigned to work of making surveys for new roads.

MAINTENANCE DIVISION.

At the head of this division is Mr Robert H. Higgins, who bears the title of Superintendent of Maintenance.

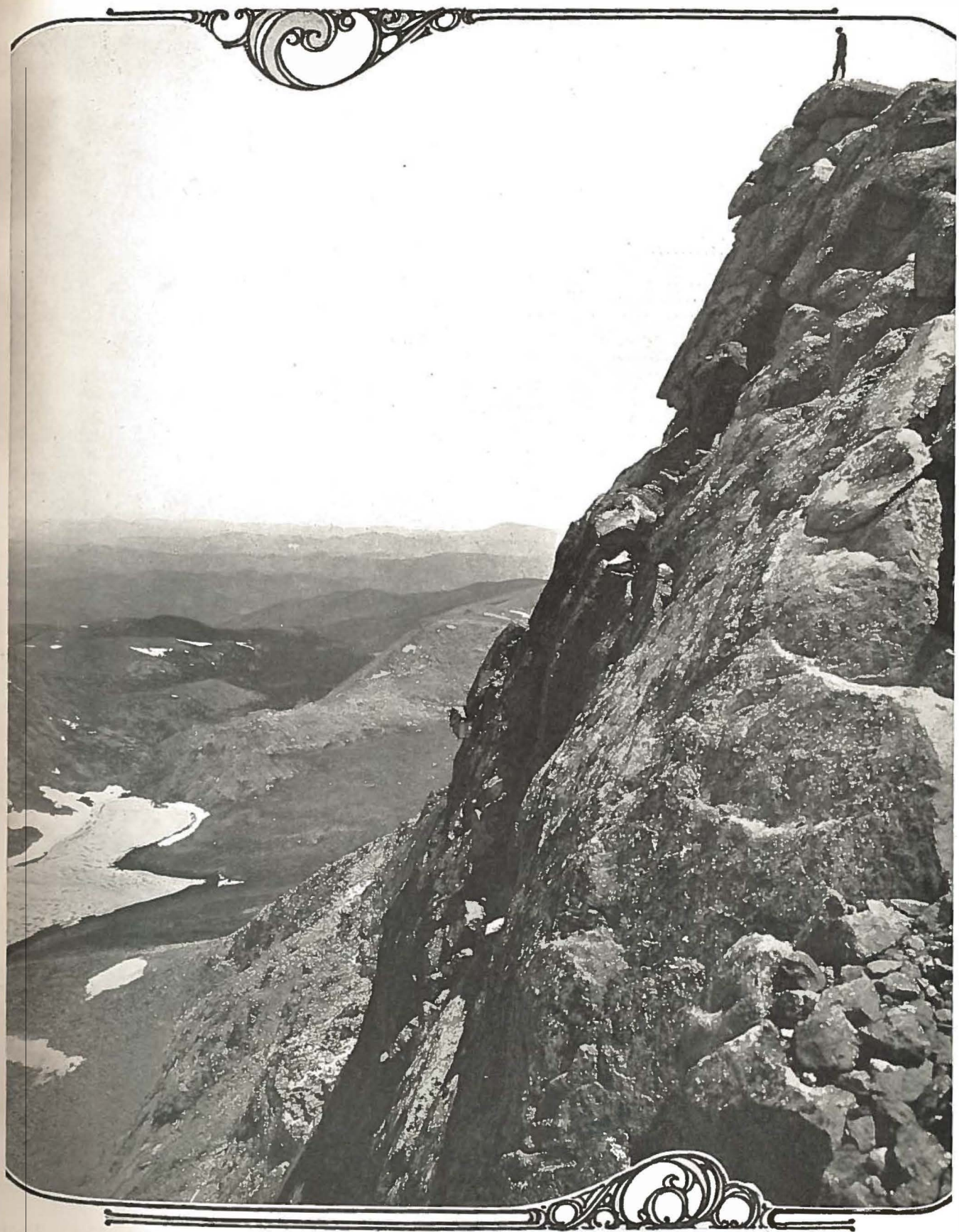
The Division was inaugurated for the purpose of supervising expenditures for maintenance work. Force of circumstances led to its creation. The mileage of newly constructed Federal Aid roads is constantly increasing, and the state is required to maintain them up to the original standards of construction as prescribed by the Federal Bureau of Public Roads.

In working out a plan for proper maintenance of roads, the department has had the hearty co-operation of the Boards of County Commissioners.

The patrol system, patterned after the sections of

(Continued on page 6)

ONE OF COLORADO'S SCENIC WONDERS



One of Nature's masterpieces—Mount Evans. View is looking east, with Summit Lake a mass of solid ice below. The New road will wind around the lake, and hairpinning from that point to the crest of the peak. The peak is 14,260 feet high.

Colorado Highways

"BETTER ROADS"

Published Monthly by
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado.

Address all communications to State Highway Department, attention M. W. Bennett, Editor.

Owing to the necessarily limited edition of this publication, it will be impossible to distribute it free to any persons or institutions other than the state and county officials actually engaged in the planning or construction of highways, instructors in highway engineering, newspapers and periodicals, and civic associations. Others desiring to obtain Colorado Highways can do so by sending 10 cents for each number desired. Associations desiring to distribute the magazine can obtain it at cost in lots of from 500 copies up.

Subscription Price, $1.00 per year.

EDITORIAL COMMENT.

Colorado Highways is off the press—

It is out for good roads—"better roads"—

"Better Roads" is the motto of the State Highway Department.

Colorado Highways is issued monthly by the Highway Department.

Its columns will be devoted to the best roads warranted by the conditions of the traffic and the funds available for construction and maintenance.

This magazine is issued primarily as a means of communication with the County Commissioners and road officials.

It will endeavor to keep them informed as to the accomplishments and the general activities of the State Highway Department.

Colorado has a total of 48,000 miles of roads.

Of this, 8,135 miles have been selected as State Roads. This mileage comes under the supervision of the State Highway Department.

Upon these roads the state spends its money.

Of the State Roads, 1,100 miles have been improved.

Contracts for the improvement of 220 additional miles have been let and are under way.

The budget for 1922 calls for an expenditure of $11,245,935—the largest amount ever authorized for road building purposes in Colorado.

Of this vast sum, $700,000 will be spent by the state for maintenance work. Almost an equal sum will be expended by the counties on such work.

To complete State Road projects, there will be expended $282,090, and to complete contracts on 1920 and 1921 Federal Aid Projects—49 in number—a total of $1,403,493 is set aside.

There is also included in the budget, $4,000,000 to meet new federal aid projects.

The budget also contains $2,500,000 apportioned among the counties from $5,000,000 in road bonds authorized by the citizens of Colorado at the last general election.

Last November the State Treasurer sold $2,000,000 of the total issue.

On June 1, the balance of the issue, $3,000,000, will be offered for sale.

Advices from the treasurer's office indicate that the bonds are in heavy demand, a number of banks and bond firms already having placed tentative bids for the entire issue.

The bonds are a direct obligation of the State of Colorado, and they bear 5 per cent interest.

Times have changed in methods of transportation.

The world moves on—so does the system of transporting commodities.

Distribution of farm products is one of the big problems of modern business.

High transportation charges affect the high cost of living.

Smooth highways for farm products to move over reduces transport costs.

Colorado is on the threshold of the greatest road building program in its history.

The very latest methods of highway construction are employed.

Today, highways must be constructed to stand the strain of heavy trucks.

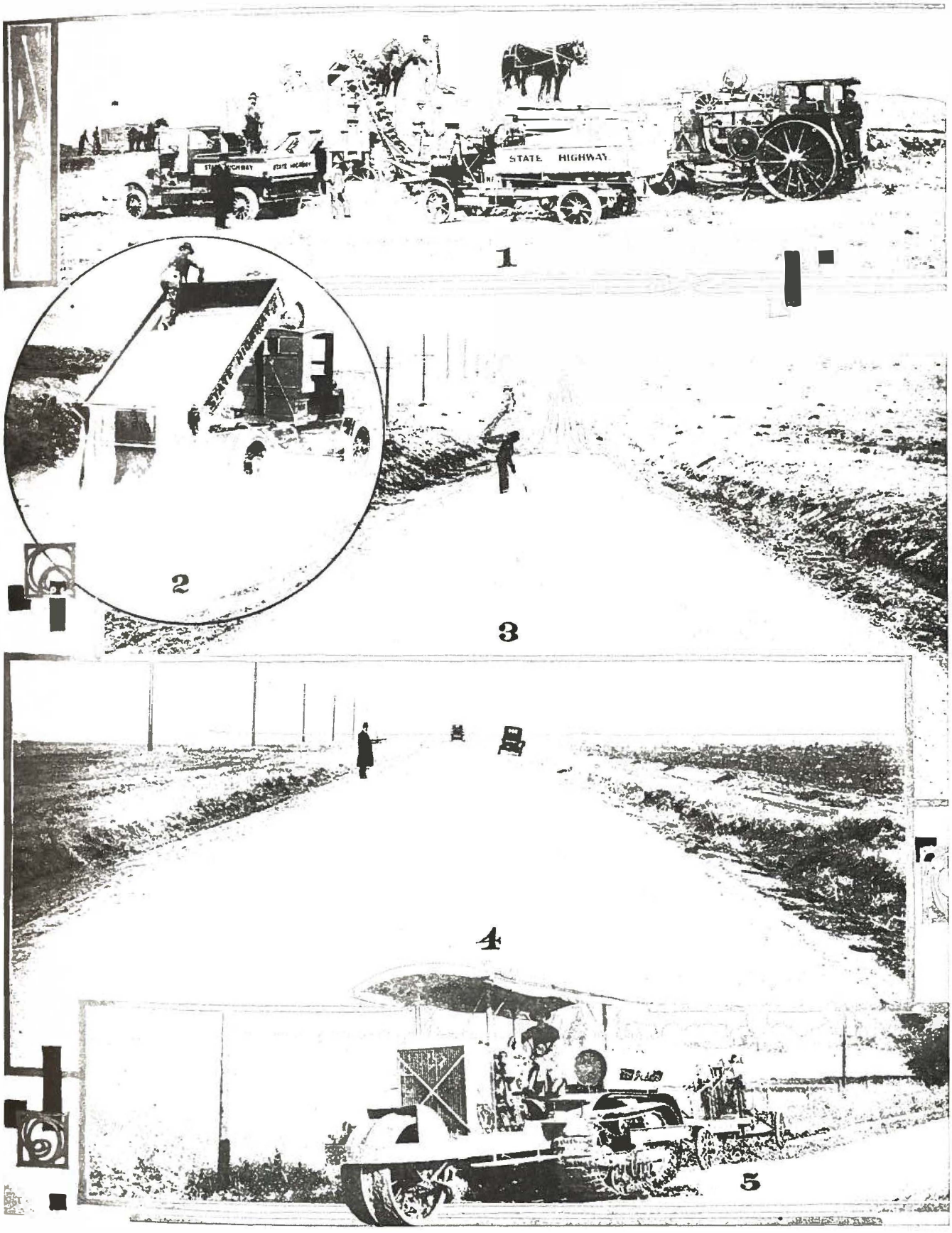
This is no easy task.

In order to meet this demand, the old, haphazard methods have given way to a new era of investigation and scientific highway construction.

Operating costs of various types of road surface are analyzed.

Results of these studies are used as a basis for the building of modern highways.

COLORADO ROAD BUILDERS IN ACTION



TYPICAL ROAD BUILDING SCENES IN COLORADO—

1. Conveyor and motor machinery used for maintenance purposes. 2. A motor truck spreading gravel on Denver-Boulder highway. 3. Before and after graveling. 4. A splendid example of Colorado gravel highways. 5. One of the Highway Department's Maintenance outfits at work.

HISTORIC ROAD GETS FEDERAL AID

State Highway Engineer Orders Recheck and Puts Old Santa Fe Trail in 7 Per Cent System

Trinidad-La Junta link of the old Santa Fe Trail included as part of Colorado's seven per cent federal aid system!

This was the cheerful message that went over the wires recently to the citizens of Las Animas county.

That it was good news, is putting it mildly.

Everybody in that section of the state was disappointed when the first draft of the seven per cent system for Colorado was announced.

This draft did not include the historic old roadway.

However, it had not been forgotten in the shuffle. L. D. Blauvelt, the state highway engineer, all the time had had the road in mind.

He ordered a recheck of the figures before they were finally submitted to the Federal Bureau of Public Roads for approval.

In the recheck it was found that an error had been made in the original figures. This made it possible to include the old Santa Fe Trail in the seven per cent system, which gives this highway the benefit of federal aid funds.

By this inclusion, Las Animas county now has two federal aid highways: The Trinidad-La Junta section which was known as "State Highway No. 29". The other federal aid project is No. 26.

Work of improving the Santa Fe Trail already is under way. During the tourist season, hundreds of autoists pass over this road, and with the improvements contemplated, it will attract still a greater number of visitors each year.

The trail is used particularly by transcontinental auto parties in the early spring and fall and during the winter months, when the more northern routes are made difficult from rain and snow.

A very extensive program of road improvement has been laid out by the Las Animas county commissioners for this year.

They assure the citizens of that section that they will have no cause for complaint when an inventory of road work accomplished during 1922 has been made.

In the execution of this program, the commissioners have the full co-operation of the State Highway Department.

(Continued from page 2)

a railroad right-of-way, with responsible men in charge of each section, has been adopted. The men in charge of the sections are county employes, who work in co-operation with the Assistant Superintendent of Maintenance.

Each patrol is adequately supplied with equipment to make all necessary repairs on its respective section of the highway. Ample appropriations have been made to carry out the work planned by this division in 1922.

PURCHASE AND TRAFFIC DIVISION.

This Division was created to centralize, as far as possible, the purchase of all sorts of supplies and materials used in the construction and maintenance of roads.

Mr. Harry Roe, who has had long experience in this work, is the head of the division.

Through this division also is handled all matters pertaining to freight and passenger transportation in which the Department is interested.

Purchases are made from the lowest and most responsible bidder, giving preference to Colorado products. This Division has been able to obtain some valuable concessions from the railroads. All invoices for goods are checked as to correctness of prices and as to delivery of goods before they are turned over to the Accounting Division for voucher.

"Airline" Route Designated as State Highway

The Kansas City-Denver Airline is now an actuality.

At its last meeting, the State Highway Advisory Board designated the "airline" as a state highway.

This means that the road becomes a federal aid project.

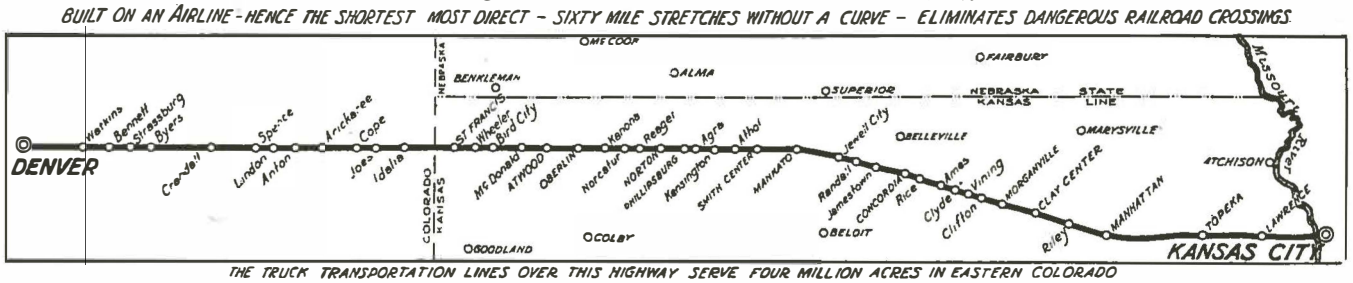
The "airline" is approximately 345 miles long, and cuts 72 miles from the motoring distance between Denver and Kansas City.

The road in Colorado will meet a federal aid highway near St. Francis, Kansas.

At present, the road in Colorado is in fairly good shape except a 25-mile stretch between Crandall and Spence. The road connects with the Victory Highway at Byers, Colorado.

"Action of the Colorado advisory board puts more than 4,000,000 acres in eastern Colorado in a position to develop natural resources," said Joseph H. Young of Oberlin, Kan president of the Kansas City-Denver Highway Association.

"Fifty miles east of Denver, farmers now will be able to haul hogs, sheep and other livestock direct to the Denver market without being forced to detour 75 to 80 miles."



HIGHWAYS BRING TWO-FOLD RETURNS

BY WARREN E. BOYER,
Director of Public Information, Denver Tourist Bureau.

Commercial representatives are not blind to Colorado's scenic splendors, and travelers drawn by the lure of snow-crowned peaks are not too engrossed to revert momentarily to business, and consider industrial or agricultural inducements; so that there are few, if any, highways in Colorado which do not serve the two-fold purpose of an artery of commerce and a recreational avenue to cloud-kissed heights.

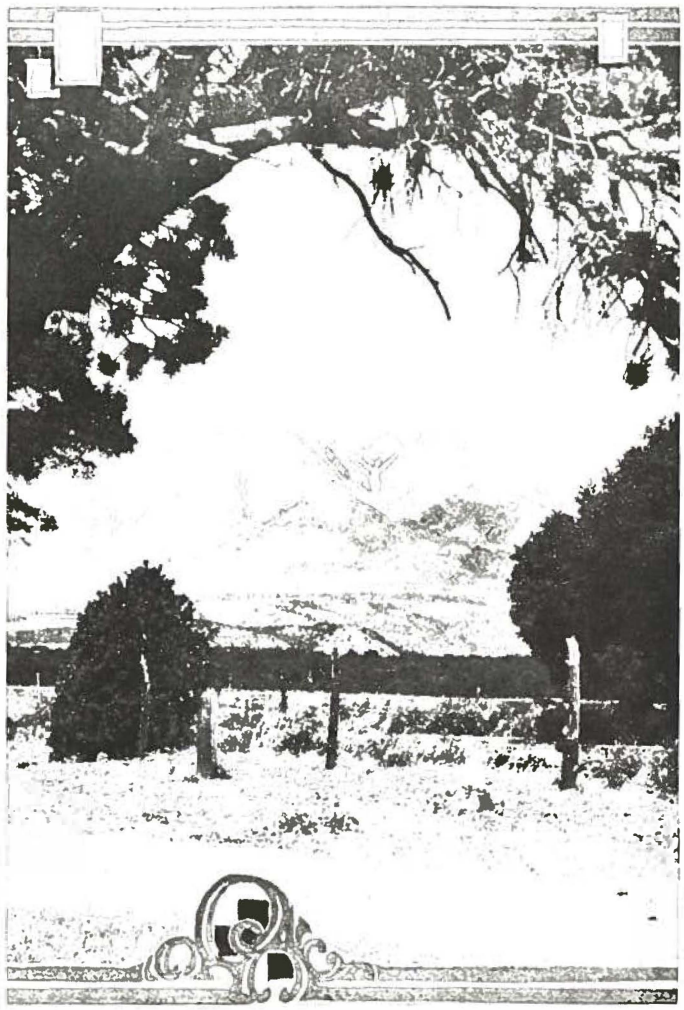
Getting tourists to come by way of transcontinental highways or railroads, is one thing; keeping them in Colorado, once they get here, is another. Whether the travel focus is centered in the point of origin, or the attraction of broad highways to give them direct and safe passage to commercial and travel centers, the highway department of the state of Colorado is chiefly concerned, from the viewpoint of the automobile.

If the commercial phase of travel in Colorado momentarily could be ignored, the $11,000,000 budget of the state road builders for this year would not seem out of proportion, as a rightful investment of the tax payers' money and federal assistance, when one reflects that 31,000 travelers visited Rocky Mountain National Park in 1915, and 273,737 registered there last year—an increase of 900 per cent.

True, the railroads play an important part in bringing travelers into the state, but highways loom on the transportation horizon, for Rocky Mountain and Mesa Verde Parks depend on them to convey travelers from railroad destination points by auto to those areas. The same is true of the Denver Mountain Park system, municipal playgrounds generally, and national and state forests. From this standpoint, the need for more and better highways weighs heavily in favor of road building activities. In 1915, the Estes Park country was visited by 5,000 autos; in 1921, there were 57,438.

Considered from the commercial viewpoint, the scenic attractions of Colorado serve as a magnet to draw upon 30,000,000 people in an area tributary to the Centennial State; or, contrariwise, Denver, and the entire State of Colorado, for that matter, is the scenic gateway to twelve national parks and thirty-two national monuments.

If you think that good roads and tourists are not synonymous, in the broad sense of commercial returns, consider the statements of department stores and mercantile establishments throughout the state. These merchants, who come in direct contact with tourists, say that August, formerly the poorest in their calendar, now is second only to December, the heaviest in point of sales. In Colorado's scenic area, last year, 3,500,000 people were registered, according to a Tourist Bureau survey, and 500,000 of them stayed an average of seven days and left $35,000,000.



Mt. Shavano, Salida, Colo., showing the "Snow Angel" which appears every summer with the melting of the snows. This wonderful scene is between Salida and Maysville. Photograph was taken by H. R. Hay, of Salida.

Selling scenery and climate is not unlike bargaining in other commodities, and one of the best arguments for bringing and holding tourists, once they have decided to travel by automobile, is splendid highways. Colorado has grown from a flag station in travel circles, to a land of many scenic points of destination, and more and better highways mean a greater and more equal distribution of tourist dollars among all communities—the automobile camp, for example, being considered as another clearing house for their local distribution.

The increase in road travel, of which Overland Park Camp grounds in Denver is a good index, is little short of amazing. In 1920, 7,906 autos were registered; in 1921, there were 11,087 cars from every state in the Union, indicating how rapidly this phase of transportation is developing.

MAY BUILD HIGHWAY ALONG NIAGARA GORGE.

Converting the Niagara Falls gorge railroad route of the International Railway Co. into a well-improved state highway, to be known as the Niagara Falls Rapids boulevard, is said to be a project under consideration by the New York State Highway Commission. For scenic beauty, such a boulevard would undoubtedly equal anything in the country and serve as a magnet for every motorist who has occasion to tour in this territory.

MONARCH PASS HIGHWAY COMPLETED.

One of the Finest Mountain Roads in Colorado—Crosses the Continental Divide at 11,400 feet—Mecca for Tourists.

After two years of difficult mountain grading, the famous Monarch Pass road has been completed.

It was officially opened on September 19, 1921.

The road is 27 and one-half miles long. About two-thirds of it runs through Cochetopa National Forest.

Looking south around switchback at station 90 west.

Construction of the road was by the Bureau of Public Roads from funds appropriated by the U. S. Forest Service.

Monarch Pass is beyond doubt the most beautiful piece of highway in the state.

It cost $204,450 to complete.

At present, the Pass is closed to traffic, because of heavy snow. However, it is expected that it will be open for tourists and commercial transport about June 1.

Already hundreds of inquiries are beginning to reach the various tourist bureaus regarding the new road, and it is expected that traffic over Monarch Pass will be the heaviest in history this summer.

Loading surfacing in pit at Station 470 West.

The Monarch Pass highway crosses the Continental Divide at 11,400 feet. It forms a link of the trans-continental route from Denver to the west, being about 12 miles west of Salida and affording a direct route to Gunnison.

The project is located in Chaffee, Gunnison and Saguache counties.

The road as now completed follows the old about one-third of the way, passing over the Continental Divide about one mile south of the old pass road.

Day labor was used in the construction of the new road. Work was started on the road on July 10, 1919. Bids of the contractors for the project were $40,000 above the engineer's estimate, and the Bureau of Public Roads concluded to build the road with its own equipment, using day labor.

Scene showing completed road and ditches.

Representatives of the State Government, State Highway Department, Forest Service, Bureau of Public Roads, Denver, Pueblo, Florence, Canon City, Gunnison and Montrose Commercial Clubs, about 1,000 citizens in all, participated in the dedication program.

Construction of the road was under the supervision of J. W. Johnson, District Engineer, U. S. Bureau of Public Roads, with W. M. Jeffrey in direct charge of the work.

Fifteen-ton Holt tractor and Adams Giant Road King used in grading.

Sign Posts Along the National Highways

The Michigan State Highway Department has made tentative plans to improve nearly 1,000 miles of road during 1922, of which about 300 miles will be paved. The work will cost about $13,137,000. In addition, the Federal Government is expected to allot about $2,250,000 to Michigan as its 1922 share of Federal aid, which will bring the total building program close to $15,000,000.

Fifteen states now impose a tax on gasoline, and six other states are considering gasoline tax bills, according to the National Automobile Chamber of Commerce.

Seven million square yards of canvas duck received by the Bureau of Public Roads, United States Department of Agriculture, as surplus war material, is now being distributed to state highway departments for use in roads construction. A great quantity of the material will be used to protect concrete roads from the sun while they are being cured and to protect from rain, cement piled ready for use on the roads. It will also be used as tents for road construction gangs, roofs for temporary storage houses and garages, and to cover road machinery in bad weather.

The $15,000,000 state road bill has been passed by the Kentucky House by a vote of 63 to 34. It now goes to the Senate. The measure provides for submission to the voters at the November election a proposition to issue $50,000,000 worth of bonds to be used within the next five years for building 4,000 miles of state highway system. It pledges the gasoline tax, the automobile license tax and the 3-cent road tax to pay the issue off in thirty years. A provision allowing a 5-cent property tax, is included, its proponents say, to make the bonds salable.

France has rebuilt or repaired since the armistice, 27,000 miles of the 33,000 miles of highway partially torn up and destroyed by the war. She has constructed 2,845 of the 3,200 bridges that were wrecked. All but 40 of the 3,256 wrecked and partially destroyed villages have been reoccupied.

The Highways Committee of the National Automobile Chamber of Commerce, of which Roy D. Chapin, of Detroit, is chairman, is sending out a communication to the members of the organization urging them to get busy with the members of Congress in their respective districts in support of legislation providing Federal Aid for road building at the maximum rate consistent with efficiency. Following is a copy of the communication, which explains itself:

1. The Senate Committee on Post Offices and Post Roads, of which Senator Charles E. Townsend of Michigan, is chairman, has reported out the Post Office appropriation bill with a rider providing for an appropriation of $50,000,000 for Federal Aid for highway construction in the fiscal year 1923; $65,000,000 for 1924; and $75,000,000 for 1925. The first amount becomes available July 1st of the present year, and is essential to the continuation without interruption of the highways building program. The measure also contains appropriations for forest roads of $7,500,000 for each of the fiscal years of 1924 and 1925.

2. The bill passed the House without a rider and accordingly, if accepted by the Senate, must be referred back to the House for approval.

3. The sums mentioned represent the absolute minimum requirements for the highway program. To lower them would be to decrease efficiency and to lower the standards of road construction in the United States. Speaking without prejudice, Mr. Thomas H. MacDonald, chief of the Bureau of Public Roads, recently stated that if the people of the United States desire to see a completed system of seven per cent. of the highways of the country within the next decade, in his judgment Federal Aid appropriations would have to be continued at the rate of $100,000,000 a year. The program will take fifteen years at the rate of $75,000,000 a year, plus state and county contributions, and twenty years at the rate of $50,000,000 annually. It is evident that losses in transportation cost, due to poor highways, would far exceed the cost of construction, if the longer program is adopted.

4. If you agree with the Highways Committee in its advocacy of continued Federal Aid at the maximum rate consistent with efficiency, write or wire your representatives in Congress, urging them to support this bill.

Advice has been received at the headquarters of the Lincoln Highway Association to the effect that another through connecting highway, leading off from the Lincoln Highway in Granger, Wyo., and reaching the pacific at Florence, Ore., has been laid out and is being actively promoted by an organization known as the Central Oregon Highway Association.

The objects of the Central Oregon Highway Association, according to its announcement, are: "To connect central Oregon and southern Idaho with the Main Street of the Nation —the Lincoln Highway."

Realizing that increasing motor vehicle traffic will make the present right-of-way on important highways entirely inadequate within a few years, the last Pennsylvania legislature passed a law authorizing the State Highway Department to increase the width of the state road right-of-way to 120 feet. While no immediate construction activities will result, the State Department, it is stated, for the last two years has been making a study of main thoroughfare traffic conditions, with a view to having plans completed for the widening of main roads when conditions make it necessary.

Berrien county, Michigan, has bought two loadometers, to be used in weighing overloaded trucks and capable of weight a trusk anywhere on the road. The sheriff of that county has deputized two men with authority to stop and investigate trucks where suspicioned of being overloaded, and with authority to reduce the size of the loads where necessary by dumping the extra merchandise or property by the roadside.

It is claimed that $25,000 worth of damage was done during the past few weeks to that county's highways by heavy trucks. The roads were undermined by water during the February and March thaws and trucks broke through. The deputies are authorized to stop any driver and make arrests if necessary.

What part of the cost of a road goes into grading and structures that are more or less permanent, and what part goes into the paving, which may eventually wear out?

This question is answered fully by statistics compiled by the Bureau of Public Roads of the United States Department of Agriculture, on 1,350 completed Federal-aid roads, involving 7,500 miles of road, at a total cost of $112,000,000. Of the total cost, 21 per cent went into grading, 14 per cent into structure, 62 per cent into paving, and 3 per cent for engineering. These are the average figures for the whole of the United States, but there is considerable variation in different sections.

In the Middle Atlantic States, where grading is not heavy and paving must be built for heavy traffic, the cost of the paving rises to 75 per cent and the grading and structures fall to 15 per cent, and 9 per cent, respectively.

In the Mountain States the problem is very different, much of the work being new construction with heavy grading, and the highest type of surface is not necessary. In this group of states the cost of grading amounted to 33 per cent, structures 20 per cent, and paving 42 per cent.

The people of Hartley, Iowa, believe that a man's last ride at least should be over a good road. Citizens of the town—103 of them—recently donated time, service and teams, to hauling gravel for the road leading from the town to the cemetery.

Road Work and Builders the State Over

The patrol system of maintenance has been instituted on all Moffat county roads. And road maintenance such as this county has never seen before, is promised by the county commissioners. Eight patrol crews are to be employed in the work.

Plans have been completed for the construction of a new road from Antonito to Tres Piedras, N. M. From the latter point the road will run through to the New Mexico state highway at Rio Grande, crossing between Taos Junction and Taos, N. M. The highway will provide a practical route from the San Luis valley into central northern New Mexico and through to Santa Fe.

A. B. Collins, district engineer for the seventh road district, W. L. Lewis, and John Stamm, assistant superintendent of maintenance, have completed plans for the season's work on the Lone Star Highway south of Yuma and the Golden Rod Highway between Yuma and Eckley.

Work is in progress on a splendid new road from Buena Vista to Mount Princeton hot springs. This will be one of the prettiest auto drives in that section.

Pitkin county is to have another highway to the outside world, if plans now under consideration are ratified by the U. S. Forest Service. It includes the building of a 15-mile stretch of road in Gunnison county, known as the Taylor Park road over Taylor Pass through the national forest.

Date of the annual convention of the Colorado to Gulf Highway association, to be held in Amarillo, Texas, has been set for May 23rd and 24th.

Originally the convention was scheduled for April 4th, but due to the fact that the Transcontinental Shrine Motor Caravan will reach Amarillo in May, the association executives decided to set the convention over two months.

The Governors and Highway Commissioners of the states of Colorado, New Mexico and Texas have been invited to attend the convention.

Agreements have been reached whereby the U. S. Forestry Service will spend $140,000 on the Berthoud Pass road this summer. This will complete the work already started on the west side of the Divide to Spruce Lodge, and will bring the eastern end of the present work into Empire. Work will be started as soon as weather will permit.

Citizens of Eagle county recently contributed $3,804.15 for the building of the Woods Lake road from Brush creek to Thomasville. A like sum was appropriated by the Eagle county commissioners. The balance of $11,000, which it is estimated will be required to construct the road, is contributed by the U. S. Forest Service.

Work of paving four miles of the Ft. Collins-Loveland road has been started. It connects with the present paving leading south from Ft. Collins. Contracts for the remaining four miles of paving to Loveland from Ft. Collins will be let in a short time.

A steel bridge is being constructed on the Midland trail one mile east of Grand Junction. The floor of the bridge, which will be about 300 feet in length, will be laid of concrete. A wooden bridge has been in place there about a year.

County Commissioner W. H. Bartell has announced that work of improving and repairing the Canon City road for a distance of 25 miles from Colorado Springs, will be carried along to completion. The old Lytle road for a distance of eight miles in El Paso county, also is to be improved.

Ben Johnson will be in charge of the work of reducing grades and changing the alignment of the Poudre Canon road in Larimer county. This work, with ten men on the job, is now under way.

H. L. Scott, contractor for paving on the Lincoln High south of Sterling, is now placing culverts preparatory t resumption of construction work on the paving. Three-q ters of a mile of the paving was finished last year.

Messrs, C. M. Garrett, Harris Akin and J. W. McMul Larimer county commissioners, were callers at the St Highway Department on March 23, for a conference rela to road work to be done in Larimer county this year.

The $75,000,000 road appropriation passed by Congr on a fifty-fifty basis, means one hundred and fifty millions be spent upon public roads this year, giving work to an a of a hundred thousand men.

Bids are being advertised for the paving of a sh stretch of paving connecting Manitou with the city limit Colorado Springs. The sum of $10,000 has been appropria for the work.

With the building of countless miles of new roads pavements, the problem of road maintenance increases importance. Every added mile of modern roadway, ev pound of freight, and every passenger traveling over th new roadways, increases the necessity for constant and a quate road maintenance.

All types of roads or pavements are subject to wear tear. Effective and economical road maintenance requ that repairs be made promptly as needed. Otherwise, cipient injury to a road becomes irreparable damage, and loss resulting to the community owning the road, and to traffic using it, becomes great indeed.

The need for proper road maintenance has led to the velopment of the patrol or gang system of maintena: Under this method maintenance is continuous and the pro repair of holes and ruts as soon as they appear, is the p ciple upon which the system is based. The ancient adag "a stitch in time" thus becomes the modern axiom of r maintenance.

Contracts on three new projects were awarded by the S Highway Department on March 27th. They covered two ber bridges, and one and one-third miles of concrete pav located two miles east of Grand Junction, Colo. One of bridges will span Kiowa creek near Bennet, while the o is to be constructed over the South Platte river near Orch Total cost of the three projects is $79,245.86.

The State of Colorado has a total of 48,000 miles of r ways. Of this, 8,135 miles are designated as State Highw with 1,100 miles now improved. It is proposed to improve miles of State roads in 1922. There were 319 miles impr in 1921.

Under the new system of patrols adopted by the S Highway Department, 4,224 miles of state highways wil maintained in 1922. Each patrol crew, consisting of tw three men, will be held responsible for the maintenanc five to ten miles of highways.

Over $1,000,000 will be expended on the constructio new highway bridges by the State Highway Department year. This is the greatest amount of money ever expe for this purpose by the state in one year. Letting of contr for this work is now under way.

The movement in several states to restrict motor tr is by no means original with this age. Two hundred y ago the town authorities of Boston were compelled to a an order to restrict the "cussedness" of the famous Bo teamsters, as follows: "Trucks shall not be more tha feet long, may employ not more than two horses in one t carry no more than one ton, have tires four inches wide, driver to go at the head of the thill horse, which he r govern by a halter to be held in the hand." The law efficacious, and this was the "Truck Law of 1720."

QUARTERLY REPORT OF THE STATE HIGHWAY ENGINEER

FINANCIAL STATEMENT

of the

STATE HIGHWAY DEPARTMENT

For the First Quarter of the Fiscal Year 1922, Ending March 1.

RECEIPTS

	December	January	February	Total	
U. S. Government	$217,157.52	$112,107.18	$41,729.42	$370,994.12	
One Mill Levy Tax	62,358.69	57,413.33	44,436.19	164,208.21	
Motor Vehicle Tax	16,443.93	70,000.00	65,000.00	151,443.93	
Internal Improvement		26,000.00	13,000.00	39,000.00	
Gasoline Tax	29,736.11	15,000.00	10,000.00	54,736.11	
Counties—Federal Aid	53,426.02	99,258.44	77,247.21	229,931.57	
Counties—Merchandise	14,109.05	23,370.00	10,834.20	48,313.25	
Cement Sacks	1,894.44	5,170.82		7,065.26	
Miscellaneous	1,501.98	36.00	90.00	1,627.98	
Cancelled Vouchers			1.40	1.40	$1,067,321.93

DISBURSEMENTS

Overdrafts November 30, 1921				$438,209.57	

VOUCHERS ISSUED

Administration	$ 4,210.67	$ 5,703.48	$ 5,020.60	$ 14,934.75	
Adminstration Roads	11,078.70	12,181.11	15,666.25	38,926.06	
Construction	198,265.94	72,870.47	137,218.95	408,355.36	
Maintenance	8,354.06	26,280.37	25,596.04	60,230.47	
Property and Equipment	6,861.30	14,923.26	10,500.75	32,285.31	
Balance				74,380.41	$1,067,321.93

BOND FUND

RECEIPTS	$100,000.00	$100,000.00	$100,000.00		$ 300,000.00

DISBURSEMENTS

Overdrafts November 30, 1921				$ 29,615.94	
Vouchers Issued	$ 59,287.87	$53,881.34	$31,919.65	145,088.86	
Balance				125,295.20	$ 300,000.00

UNCOMPLETED FEDERAL AID PROJECTS UNDER CONTRACT

(As of March 31, 1922)

No.	NAME OF ROAD	COUNTY	LENGTH IN MI.	TYPE	APPROXIMATE PERCENTAGE COMPLETE	
2	Pueblo-Walsenburg-Trinidad	Huerfano, Las Animas	64.12	Crushed Rock Surface	98%	
7B	Naturita, East & West	Montrose	4.027	Mountain Graded	41%	
18	Re-Op. Pueblo, East	Pueblo	0.175	Bridge with paved approaches	50%	
28	Dillon, North	Summit	2.093	Graded	70%	Shut down for winter
29	Morrison-Bailey	Jefferson	1.946	Graded	98%	Complete except guard rail
51	Cheyenne Wells, North	Cheyenne	8.788	Sand Clay Surface	87%	Complete except one bridge
54	Buena Vista-Divide	Chaffee	5.097	Graded	46%	Shut down for winter
55	Peyton toward Rumah	El Paso	5.36	Sand Clay Surface	96%	Complete except surfacing
56	Las Animas, East	Bent	9.921	Gravel Surface	94%	Bridge completed
65	Silverton-Ouray	Ouray	1.155	Graded	88%	Shut down caused by bad weather
70	Durango to Mancos	La Plata	4.962	Gravel Surface	77%	Shut down for winter
75	Kremmling, North	Grand	6.847	Mountain Graded	82%	
80	Steamboat Spgs., North	Routt	6.647	Mountain Graded	80%	Shut down for winter
81B	Mt. Vernon Canon	Jefferson	1.714	Graded		Not begun
94	Canon City, East	Fremont	3.296	Gravel Surface	75%	Shut down caused by cold weather
96	La Junta, West	Otero	1.377	Concrete Pavement	41%	Shut down caused by frozen gravel pits
97	Lamar, East	Prowers	6.699	Gravel Surface	80%	
100	Del Norte-Saguache	Rio Grande	3.087	Gravel Surface	85%	Complete except gravel surfacing
101	Bayfield, East	La Plata	4.091	Gravel Surface	92%	Shut down for winter
102	Silverton-Ouray	Ouray	1.051	Graded	35%	Shut down caused by bad weather
103	Placerville-Dry Creek	Montrose, San Miguel	5.681	Graded	89%	
104	Montrose-Delta	Montrose	0.208	Gravel Surface	79%	Bridge work completed
106	Steamboat Spgs., East	Routt	1.337	Gravel Surface	84%	Shut down for winter
107	Maybell to State Line	Moffat	3.97	Gravel Surface	64%	Shut down for winter
111	Limon, East	Lincoln	9.875	Sand-Clay Surface	68%	
126	Dolores-Cortez	Montezuma	3.141	Gravel Surface	95%	
127	Limon, South	Lincoln	2.727	Sand-Clay Surface	77%	Complete except one bridge
129	Federal Blvd. toward Broomfield	Adams	4.424	Concrete Pavement	26%	Shut down till warm weather
131	Denver, East	Adams, Arapahoe	0.833	Concrete Pavement		Not begun
133	Federal Blvd., Denver-Broomfield	Boulder	4.223	Concrete Pavement	2%	
136	Morrison-Bailey	Jefferson	5.522	Mountain Graded	39%	
137	Denver-Arvada	Jefferson	0.596	Concrete Pavement	2%	
139	Ft. Collins-Loveland	Larimer	4.024	Concrete Pavement	2%	
142	Sterling-Merino	Logan	2.5	Concrete Pavement	28%	
146	Greeley-LaSalle	Weld	2.078	Concrete Pavement	64%	
148	Brighton, North & S.	Adams, Weld	4.897	Concrete Pavement	32%	
161	Buttes Bridge	El Paso	0.275	Steel Truss Bridge	17%	
169	Las Animas Bridge	Bent	0.511	Steel Truss Bridge	6%	
172	Sapinero-Gunnison	Gunnison	5.2	Graded	47%	
174	Red Mountain, North	San Juan	3.124	Rock Grading	16%	Shut down till about June, 1922, caused by heavy snowfall
178	Bridge near Monte Vista	Saguache	0.29	Steel Truss Bridge	79%	
180	Ft. Garland, South	Costilla	2.135	Graded & Bridge	83%	Complete except handrails
182	Red Cliff-Gilman	Eagle	3.305	Graded	42%	
183	Grand Jct.-Palisade	Mesa	1.363	Concrete Pavement		Not begun
188	Craig, East	Moffat	3.158	Graded		Not begun

COMPLETED FEDERAL AID PROJECTS
(As of March 31, 1922)

No.	NAME OF ROAD	COUNTY	LENGTH IN MI.	TYPE
1	Denver-Littleton	Arapahoe	3.95	Concrete Pavement
3	Granite-Twin Lakes	Chaffee-Lake	8.94	Graded
4	Rifle-Meeker	Garfield-Rio Blanco	21.0	Shale Surface
6	Lamar-Springfield	Prowers	3.13	Shale Surface
7	Norwood-Naturita	Montrose	2.102	Graded
9	Loveland-Estes Park Big Thompson Canon	Larimer	19.014	Graded
10	Denver-Brighton	Adams	1.786	Concrete Pavement
11	Wray-Idalia	Yuma	7.497	Graded
12	Greeley-Evans	Weld	0.89	Concrete Pavement
13	Boulder, East	Boulder	0.417	Concrete Pavement
14	Longmont, South	Boulder	0.504	Concrete Pavement
15	Sterling, East	Logan	0.651	Concrete Pavement
16	Ft. Morgan-Brush	Morgan	0.45	Concrete Pavement
17	Colorado Springs, North	El Paso	2.339	Graded
18	Pueblo E. & Salt Cr. Br.	Pueblo	1.705	Concrete Pavement
21	Rocky Ford, East	Otero	0.407	Concrete Pavement
22	La Junta, West	Otero	0.407	Concrete Pavement
23	Delta, South	Delta	5.86	Gravel Surface
24	Ft. Garland-San Luis	Costilla	5.844	Gravel Surface
27	Grand Junction, East	Mesa	0.265	Concrete Pavement
31	Denver E. to U. S. Hospital No. 21	Adams	1.161	Concrete Pavement
32	Denver toward Brighton	Adams	5.737	Concrete Pavement
33	Ft. Collins, South	Larimer	1.962	Concrete Pavement
34	Greeley, South	Weld	1.568	Concrete Pavement
43	Burlington, North	Kit Carson-Yuma	18.061	Graded
47	Colo. Springs toward Canon City	El Paso	1.748	Gravel Surface
52	Woodland Park-Cripple Creek	Teller	4.884	Graded
55	Peyton toward Ramah	El Paso	5.36	Sand-Clay Surface
57	Prowers-Baca	Prowers	1.409	Concrete Pavement
58	Granada, East and West	Prowers	3.129	Gravel Surface
60	La Junta, West	Otero	0.413	Concrete Pavement
61	Rocky Ford, West	Otero	0.407	Concrete Pavement
62	Manzanola, West	Otero	0.833	Concrete Pavement
63	Fowler, East	Otero	0.843	Concrete Pavement
64	Ft. Garland-San Luis	Costilla	7.831	Graded
68	Monte Vista-Saguache	Rio Grande	11.358	Gravel Surface
74	Craig toward Maybell	Moffat	6.493	Gravel Surface
77	Grand Junction-Palisade	Mesa	2.496	Concrete Pavement
78	Red Cliff-Minturn	Eagle	2.759	Mountain Graded
82	Denver-Morrison	Jefferson	2.017	Concrete Pavement
83	Littleton, South	Arapahoe	2.699	Concrete Pavement
85	Ft. Collins-Loveland	Larimer	1.333	Concrete Pavement
86	Loveland-Berthoud	Larimer	1.347	Concrete Pavement
87	Boulder, East	Boulder	1.334	Concrete Pavement
88	Longmont, South	Boulder	1.117	Concrete Pavement
89	Brighton-Ft. Lupton	Adams	4.413	Concrete Pavement
109	Grand Junction-Fruita	Mesa	0.957	Concrete Pavement
112	Divide-Lake George	Park	0.758	Gravel Surface
113	Salida, North and South	Chaffee	4.50	Graded
117	Colorado Springs-Manitou	El Paso	0.929	Concrete Pavement
118	Colorado Spgs.-Broadmoor	El Paso	2.761	Concrete Pavement
119	Saguache-Cochetopa	El Paso	7.482	Graded
120	Berkeley-Arvada	Jefferson	1.273	Concrete Pavement
122	Julesburg, West	Sedgwick	8.401	Gravel Surface
123	Grand Canon Road	Eagle-Garfield	6.941	Mountain Graded
124	Alamosa River Bridge	Conejos	0.17	Concrete Timber Bridge
128	Meeker, South	Rio Blanco	1.799	Gravel Surface
184	Grand Junction-Fruita	Mesa	0.806	Concrete Pavement
185	Grand Canon Road	Garfield	1.27	Graded
187	Meeker, South	Rio Blanco	2.698	Shale Surface

FEDERAL AID PROJECTS NOT YET CONTRACTED
(As of March 31, 1922)

No.	NAME OF ROAD	COUNTY	LENGTH IN MI.	TYPE	REMARKS
7C	Naturita-East	Montrose	11.0	Graded	Location being surveyed
30	Denver-Morrison	Jefferson	1.161	Concrete Pavement	Project Statement approved
71B	Durango-Mancos	La Plata	3.635	Gravel Surface	Drafting complete, and checked
81A	Vernon Canon	Jefferson	3.75	Graded	Project Statement approved
116	Colo. Springs., North	El Paso	4.346	Gravel Surface	Project Agreement executed
119B	Cochetopa-Saguache	Costilla	7.476	Graded	Plans being drafted
125	Sapinero-Cimmaron	Gunnison	3.062	Graded	Plans, specifications and estimate submitt
130	Wolhurst toward Sedalia	Arapahoe	1.004	Concrete Pavement	Plans, specifications and estimate submitt
135	Denver-Morrison	Jefferson	5.370	Concrete Pavement	Project Statement approved
157	Buena Vista, North	Chaffee	14.1	Graded	Project Statement approved
158	Lake George-Divide	Park-Teller	11.75	Crushed Rock Surfacing	Project Statement approved
159	Ramah-Mattison	El Paso	10.5	Sand-Clay Surfacing	Plans being drafted
162	Colo. Springs., Manitou	El Paso	1.374	Concrete Pavement	Project Statement submitted
165	Canon City, East	Fremont	10.928	Gravel Surface	Project Statement submitted
166	La Junta, West	Otero	2.410	Concrete Pavement	Project Statement approved
168	Lamar, East and West	Prowers	2.012	Gravel Surface	Project Statement approved
171	Delta, North	Delta	6.620	Gravel Surface	Plans, specifications and estimate submitt
189	Steamboat-Hayden	Routt	5.217	Gravel Surface	Plans, specifications and estimate submitt
190	Dillon-Kremmling	Summit	1.017	Graded and Bridge	Project Statement approved
208	Grand Junction-Palisade	Mesa	4.0	Gravel Surface	Project Statement submitted
209	Grand Junction-Fruita	Mesa	4.0	Gravel Surface	Project Statement submitted
210	DeBeque-Grand Valley	Mesa and Garfield	13.0	Gravel Surface	Project Statement submitted
211	Meeker, North to County Line	Rio Blanco	3.5	Shale Surface	Project Statement submitted
213	Durango-Mancos	La Plata	18.5	Gravel Surface	Plans being drafted
214	Durango, East	La Plata	3.0	Gravel Surface	Location being surveyed
215	Bridge at Pagosa Springs	Archuleta	0.10	Steel Truss	Project Statement submitted
216	Granada to Colo.-Kansas State Line	Prowers	18.0	Gravel Surface	Project Statement submitted
217	Pueblo, East	Pueblo	2.273	Concrete Pavement	Plans being drafted
218	Hasty toward Lamar	Bent	11.82	Gravel Surface	Location being surveyed
221	Ft. Collins, South	Larimer	3.8	Concrete Pavement	Project Statement submitted
222	Denver-Lafayette	Adams, Boulder, Jefferson	5.0	Concrete Pavement	Project Statement submitted
223	Rabbit Ear Pass	Grand	3.5	Gravel Surface	Project Statement submitted
224	Turkey Creek Road	Park	5.621	Graded	Project Statement submitted
225	Denver-Bennett	Adams	1.0	Concrete Pavement	Project Statement submitted
226	Brighton-Greeley	Weld	24.5	Concrete Pavement	Project Statement submitted
228	Sterling, South	Logan	5.0	Concrete Pavement	Project Statement submitted
229	Beaver Creek Bridge	Pueblo			Nothing done
230	Wolhurst toward Sedalia	Arapahoe	3.5	Concrete Pavement	Location not decided upon

REINFORCED CONCRETE BRIDGE AT CANYON STATION, YELLOWSTONE PARK, WYO.
ARCH SPAN 150 FEET. ONE OF THE FINEST EXAMPLES OF CONCRETE CONSTRUCTION IN THE WEST.

INGENIOUS METHOD USED TO CONVERT SURPLUS WAR MATERIALS

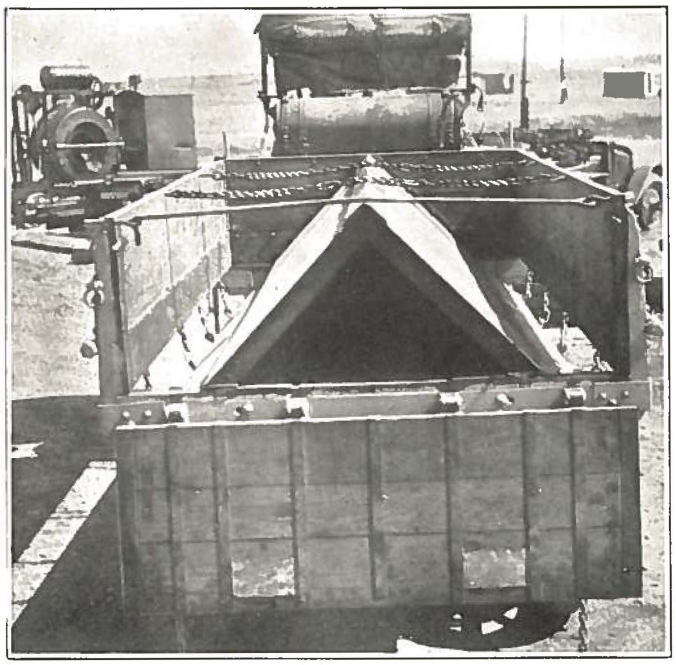
All sorts of ingenious methods have been evolved to convert surplus war materials into useful road-building machinery.

Among the trucks which the state received from the war department were a large number which were used in the ordnance service.

As these trucks came to the State Highway Department, they were not generally suitable for road construction purposes. This was because of the shape and size of their bodies.

During the past few months a score of these trucks have been equipped with special bodies, converting them in such manner as to be suitable for a number of different uses in road building.

These trucks are being distributed among the counties of the state at actual cost of handling and repairs.



Showing new dump body built in State Highway Shops.

A number of the steel ammunition bodies have been converted into hopper bodies by installing false bottoms. Then again, a cargo body, by pivoting it near the rear end, and by adding a hoisting device, has been converted into a dump body.

Also a large number of the trucks have been equipped with entirely new bodies.

Equipment has been installed on most of the trucks, to pull road scrapers and drags.

Over 27,000 of the army trucks have been distributed among the states for road construction purposes.

Of this number, Colorado has received 485 trucks and 22 tractors.

Besides these, the state has received about $500,000 worth of spare parts, and other materials, such as picks, shovels, cranes, derricks, wheelbarrows, rope, and spikes from the war department.

All of these materials are distributed to the counties on a strictly cost-of-handling basis, such as freight, packing and shipping charges.

IF ITS A PETROLEUM PRODUCT WE HAVE IT

Our Fleet of Trucks are at your service

Our staff of Lubricating Experts will advise and assist you in the most modern methods of correct Lubricating.

THIS ADVISORY SERVICE is at your disposal. It is supplemented by an organization throughly experiened in Motor power necessities. Write us for information.

Sommers light, medium and heavy Tractor Oils are manufactured to meet every requirement.

THE SOMMERS OIL COMPANY is the western distributors for the Famous QUACKER STATE Motor Oils and Greases.

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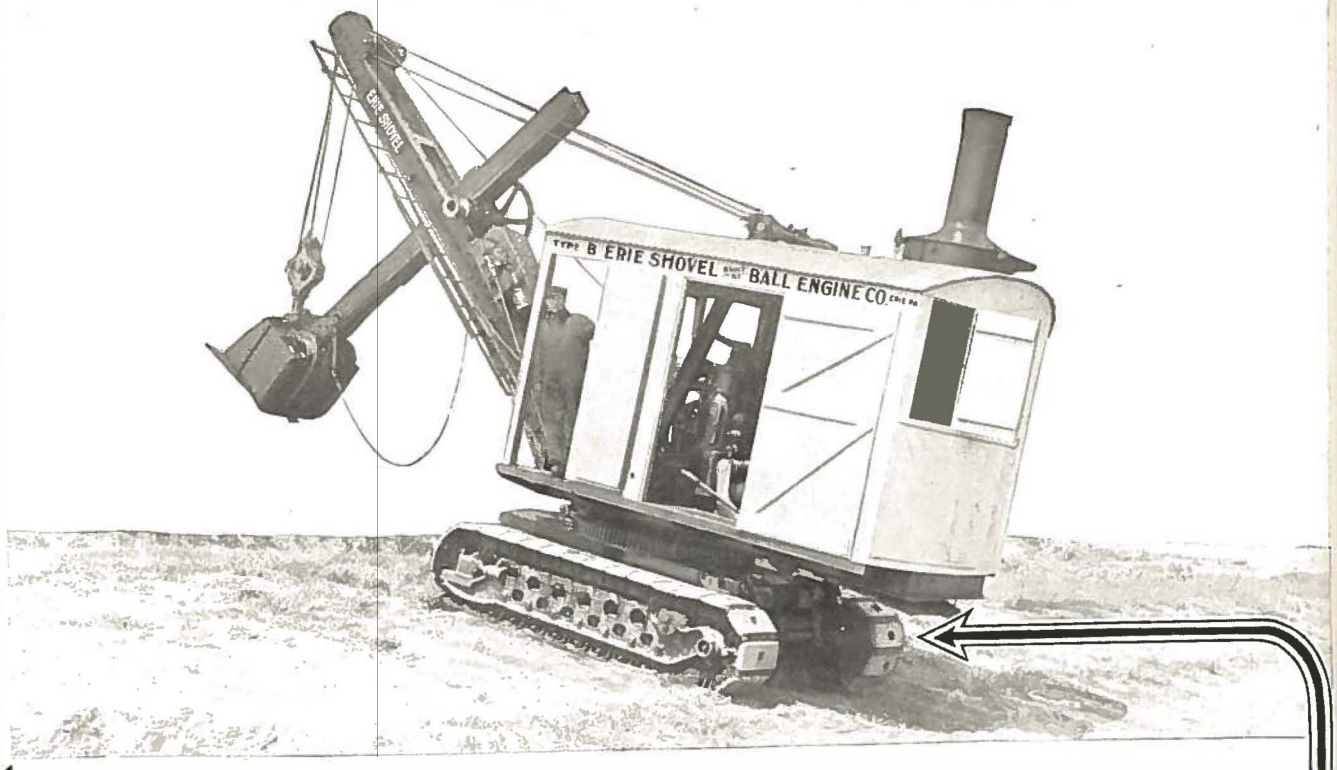


One of the latest type ¾ yard Erie Steam Shovels on Caterpillar Type Mounting has just been purchased by the Colorado State Highway Commission from

H. P. WILSON & COMPANY

DISTRIBUTORS OF

"Caterpillar" Tractors and Contractors' Equipment

DENVER, COLORADO

This makes fifteen Erie Steam Shovel owners in this state and each and every one a strong booster.

We believe you would be benefited by consulting with us on cutting your construction costs as we have associated with us both Engineers and men who have had years of practical experience in the field as contractors.

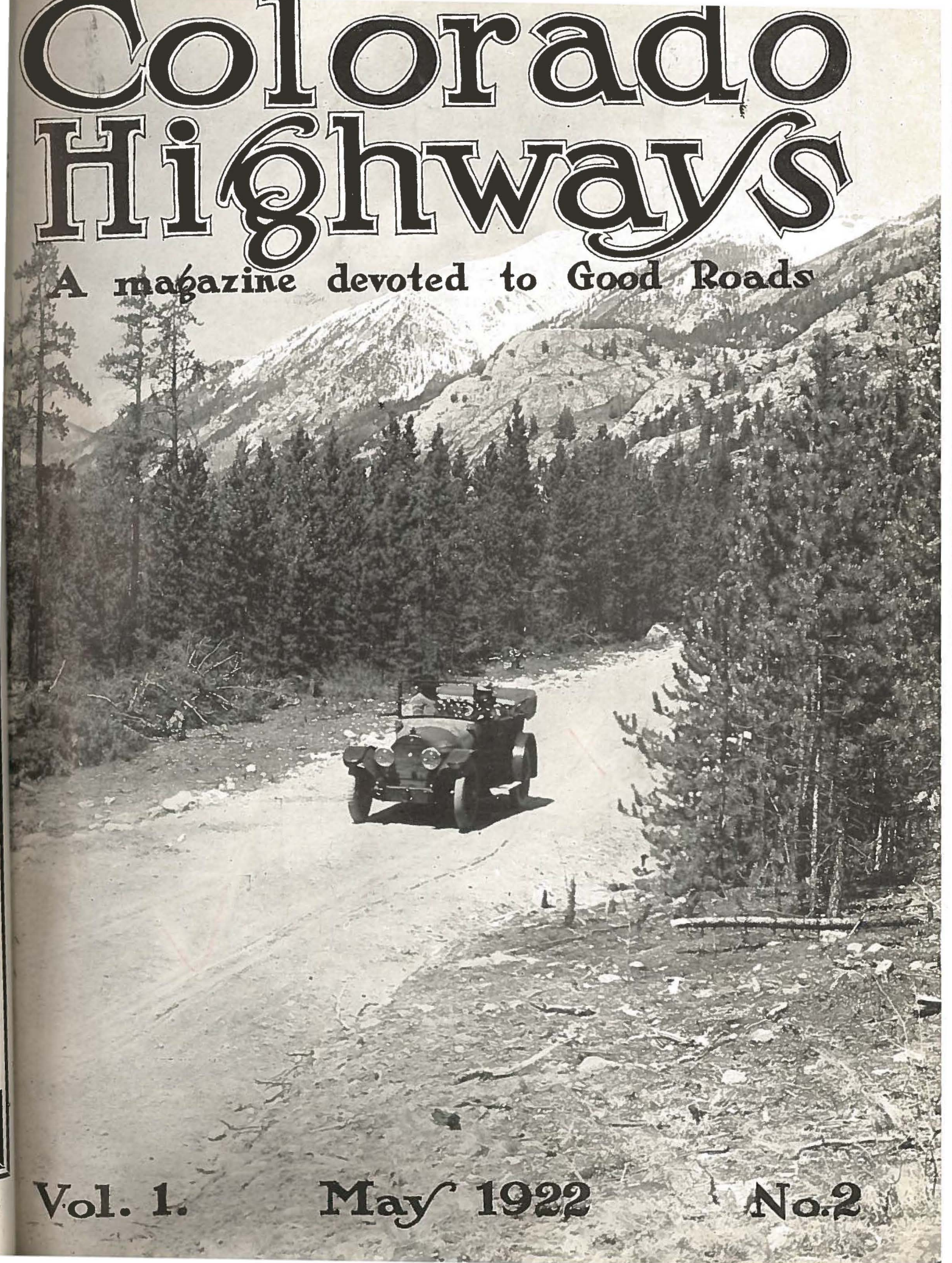
Greatest Improvement in Steam Shovels in the past 10 years—

ERIE Lubricated

caterpillar type mounting

Colorado Highways

A magazine devoted to Good Roads



Vol. 1. May 1922 No. 2

Colorado Highways
"BETTER ROADS"
VOLUME I. MAY, 1922. NUMBER 2.

MAINTENANCE PATROL WINS APPROVAL

Repairs Promptly Made Reduce Highway Costs—Government Sets Standard of Maintenance on Federal Aid Projects—Half State Highway Mileage to Be Patrolled

By ROBERT H. HIGGINS,

Superintendent of Maintenance, State Highway Department

"A stitch in time saves rebuilding many miles of highway."

This is an old but true saying. It never was more truer than in this day of heavy traffic and speeding automobiles.

To construct and not maintain modern roads is a flagrant waste of public funds. The writer has contended for years that those whose duty it was to disburse road funds are negligent to their trust, when they continue, year after year, to spend practically all their available cash for construction of roads and fail to provide sufficient funds to maintain them after completion.

Almost everything that man builds begins to deteriorate as soon as the construction forces leave the job. This is more especially true in the case of roads.

The state and county road authorities in the past have not given maintenance the attention due. Congress has taken cognizance of this fact.

In the Federal Aid Act of 1921 there is a clause which compels the state to maintain all highways built with assistance of Federal Aid. This maintenance must be carried on in accordance with government requirements, or as requested by the U. S. Bureau of Public Roads inspectors.

When a state fails to maintain its Federal Aid Roads in accordance with these requirements, the U. S. Bureau of Public Roads can contract or authorize the work to be done by independent parties, and the state must pay the cost of the work done in cash into the federal treasury.

Any amount thus paid into the federal treasury is divided among the other states and the offending state's share of Federal Aid is reduced by that amount.

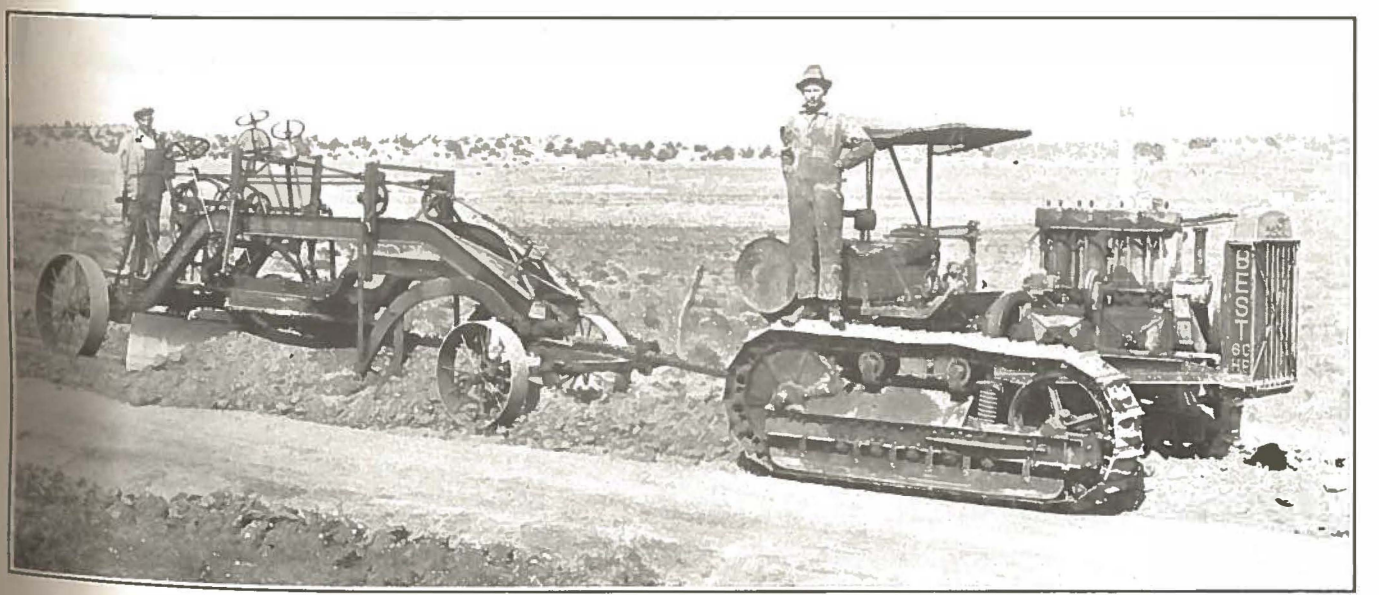
In case the state refuses to pay, the government can stop all further Federal Aid construction in the state until the sum is paid.

I make the prediction that unless the roads already constructed in this state are maintained, and by that I mean a continuous, day-after-day maintenance or patrol similar to the section gang maintenance in vogue on railroads, the taxpayers of Colorado will refuse to vote further sums for road building.

To continue to enjoy the good will of the taxpayer the state and county authorities must keep up the roads previously built.

The automobile and motor truck is revolutionizing transportation and road problems. For a few years it was a race between road builder and truck

(Continued on page 15)



Picture shows a track layer and combination grader and scarifier in operation on the Walsenburg-La Veta Highway.

SURVEYORS OPEN NEW SCENIC HIGHWAY

Undergo Great Hardships in Zero Weather—Blaze Trail to One of Colorado's Scenic Wonders—Submit Plans for Highest Bridge in the State

It was 30 degrees below zero. Three feet of snow blanketed the terrain for miles around a blinding field of white.

In a small cabin, shivering over a tiny blaze was a lone figure. He was one of the members of a road surveying party the unlucky member that morning, for it had come his turn to get up and make the fire.

There were four in the party. They had been out two months. Fuel was not plentiful and provi-

Left to right, R. S. Ladd, W. C. Peterson, transit man; Ed. Morris, and H. T. Reno, resident engineer.

sions were getting low. One of the worst blizzards of the winter had just passed. Snow had fallen continuously for two days.

Now the sun had come out. A few slabs of precious wood were blazing in the open hearth and the ice in the water bucket had started to melt.

"Just a part of the day's routine" said Horace T. Reno, resident engineer of the State Highway Department, in charge of the surveying party, in describing his experience on one of the toughest "jobs" in the state.

"We were sent out early last October to relocate the road about a mile west of Sapinero in an effort to eliminate a mile of 7 percent grade which was objected to by the U. S. Bureau of Public Roads.

"Our party has been on the job almost continuously ever since. We have made three surveys, and I believe we have finally succeeded in eliminating all of the grade. The old road is considered one of the most dangerous in the state. Several times autoists have turned back from the climb up the mountain near the Lake Fork of the Gunnison, their nerve failing them before they reached the top.

"The road is very narrow and it takes a driver of iron nerve at present to negotiate the climb, but under the survey we have just completed, I believe the road, if constructed as now proposed, will prove one of the most interesting from a scenic standpoint in southwestern Colorado.

"We worked in snow two and three feet deep during the month of January and the first week in February. It was 30 below zero all during January and 43 below on one occasion. In February the snow became crusted enough so we could use web snow shoes. For five weeks we worked on snow shoes.

"During that time I had occasion to make a trip from Sapinero to Cimarron, a distance of 23 miles, to observe snow conditions. Fourteen miles of this trip was made on snow shoes and the last six miles in mud. We were ten hours in making the trip. And we didn't walk for three days after.

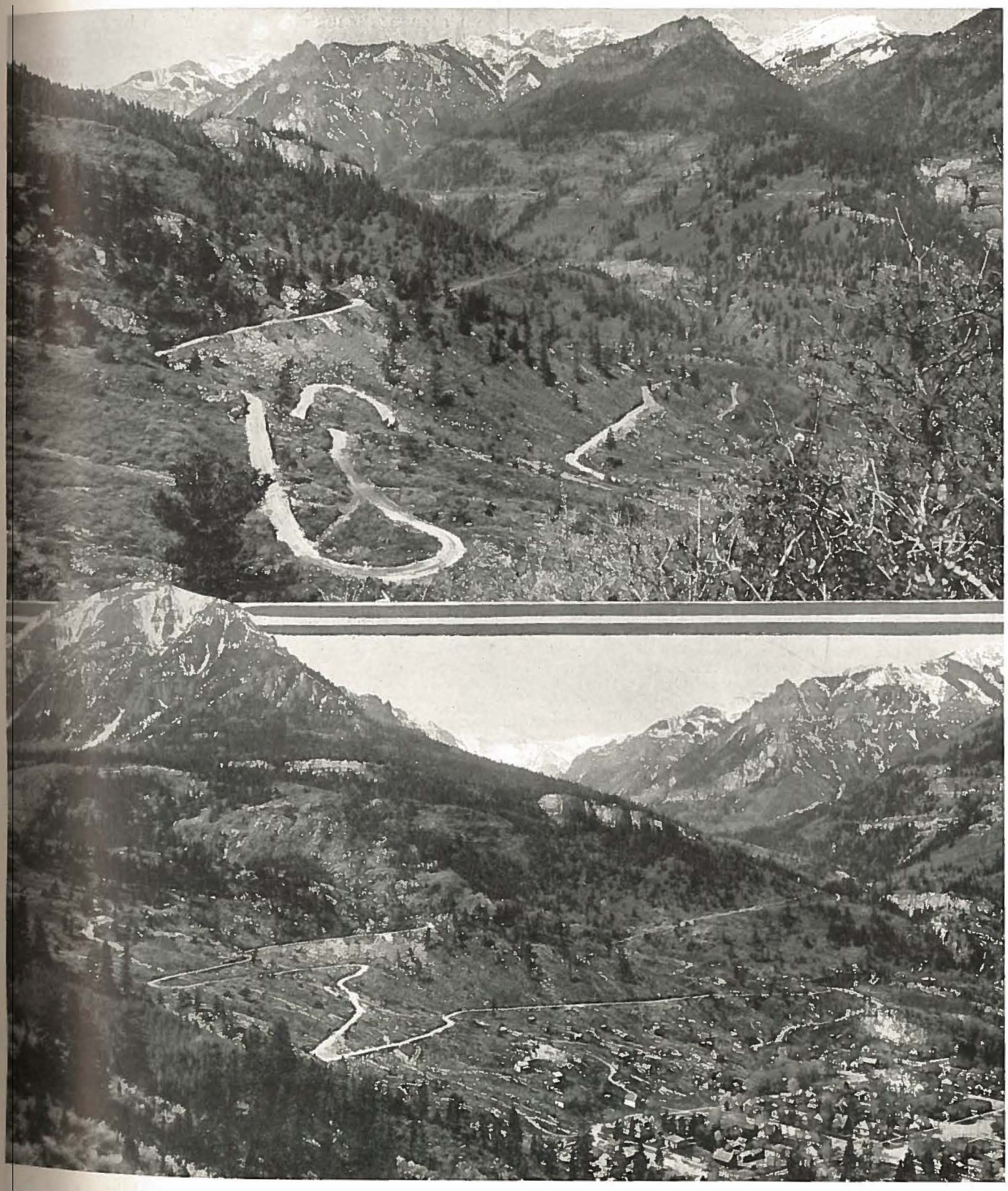
"We have finally succeeded in locating a line which cuts out all of the 7 percent grade. This was done by crossing the Lake Fork of the Gunnison river, about a mile wes tof Sapinero, with a high bridge im-

(Continued on page 15)

Buzzard's Nest Ed. Morris and R. S. Ladd.

Bob Ladd and W. C. Peterson.

SCENES ALONG OURAY-SILVERTON HIGHWAY.



The Ouray-Silverton Road is one of the most picturesque in Colorado. Upper picture shows part of the heavy construction, a double hairpin loop, and the lower photograph a part of the pioneer mining town of Silverton.

Colorado Highways
"BETTER ROADS"

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Owing to the necessarily limited edition of this publication, it will be impossible to distribute it free to any persons or institutions other than the state and county officials actually engaged in the planning or construction of highways, instructors in highway engineering, newspapers and periodicals, and civic associations. Others desiring to obtain Colorado Highways can do so by sending 10 cents for each number desired. Associations desiring to distribute the magazine can obtain it at cost in lots of from 500 copies up.

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EDITORIAL COMMENT.

Maintenance!

This is the big word in Colorado highway affairs today.

Elsewhere in this issue is printed an article by Robert H. Higgins, Superintendent of Maintenance of the State Highway Department, describing the work now being carried on in this state.

In accepting funds from the Federal Government for the building of highways the state has obligated itself to maintain them up to a certain standard.

Officials of the U. S. Bureau of Public Roads insist that this obligation be fulfilled.

In making up the highway budget for 1922, the Advisory Board set aside $700,000 to be expended by the state on Maintenance.

Already a system of patrols has been worked out in conjunction with the counties.

The sum authorized by the Advisory Board for maintenance is matched by a like sum by the counties.

At present about 100 crews of men are employed on maintenance.

By the middle of June this force will be doubled. And when the horde of automobile tourists arrive this summer they will find Colorado's highways in A-1 condition.

These crews are equipped with the most modern road machinery.

They are employed regularly on the state highways and work every day it is possible.

A fine example of maintenance efficiency is the 28-mile stretch of highway from Aguilar to Trinidad in Las Animas county.

For the past month several crews of men were kept busy with scarifiers and drags on this much traveled highway, until now it stands up with the best roads in the state.

The work accomplished on this particular stretch of highway is one of many exhibits of the support and co-operation which the highway department has received from the boards of county commissioners throughout the state.

This expression of support is most commendable. It reveals a keen public interest among those charged with the duty of carrying on the affairs of county government.

All of these elements are certain to result in the true success of Colorado's 1922 highway building program, which is the largest in its history.

Conditions are approaching normalcy.

Undoubtedly 1922 will be a banner year in road building.

By launching its biggest highway construction program at this time, Colorado will relieve considerably the unemployment situation in this state.

For the last three years road building was hampered by a labor shortage, inadequate transportation facilities and unfavorable bond market.

All these conditions have passed.

Labor is now more plentiful, material costs have receded and Congress has appropriated federal aid funds for the current year.

And, finally, it is now possible to market road bonds.

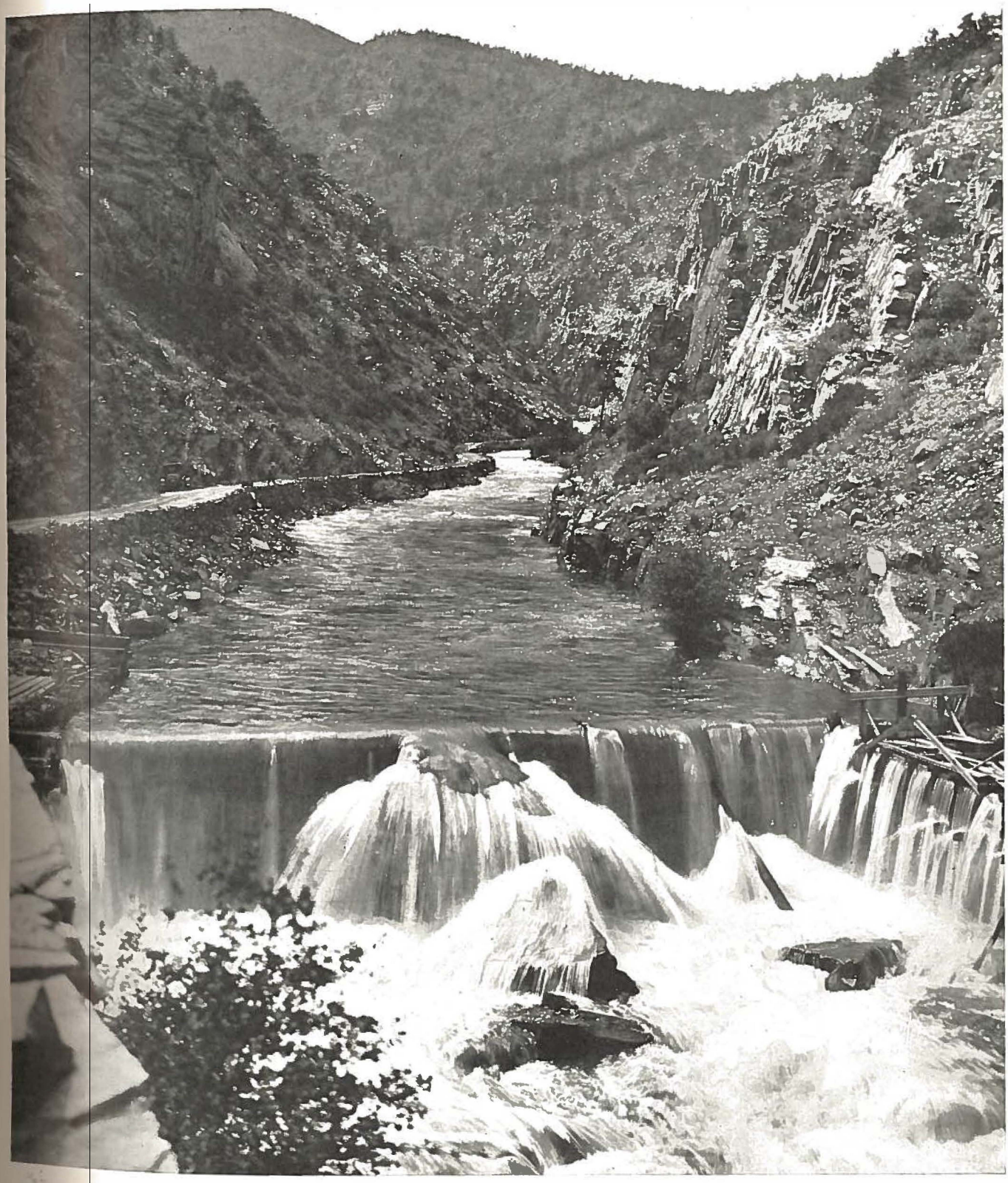
The outlook for the road builder was never brighter.

The State of Alabama has passed a $25,000,000 road bond issue. It will be used for the construction of a state highway system.

In 1920 an amendment to the state constitution was passed by a referendum vote authorizing the issuance of $25,000,000 of road bonds. Through a legal technicality the measure was declared unconstitutional by the supreme court.

But the desire of the people of Alabama for modern roads was not to be set aside. At the recent election the vote was 25 to 1 for the issuance of the bonds.

ENTRANCE TO THE BIG THOMPSON CANON.



Scene at the Point of the Diversion Dam, where the Road begins its winding way up the Big Thompson Canon, the entrance to the Estes Park Gateway, Larimer County, one of Colorado's big tourist centers.

COMMUNITY SPIRIT WINS TWO ROADS

Citizens of Grand Junction Raise $30,000 for Construction of New Highways to Connect Rich Undeveloped Sections on Western Slope

By JOHN J. VANDEMOER, *Division Engineer*

What community spirit can accomplish is strikingly emphasized in two road projects on the Western Slope.

About a year ago the Grand Junction Chamber of Commerce decided that if the city was going to have a healthy growth and development it must reach out to the north and south as well as to the east and west.

In order to carry out this decision, the organization, backed by the loyalty and support of the citizens of the community, raised the sum of $30,000 in cash for the purpose of constructing two highways.

One of the new roads runs to the north and is known as the Grand Junction-Rangeley highway. It taps the Uintah Basin section, which contains vast oil possibilities. The other road runs south into the Paradox Valley, which includes the main source of uranium, vanadium and radium deposits in the world today.

The city of Grand Junction is located at the confluence of the Colorado and Gunnison Rivers, and is known as the metropolis of the Western Slope.

It is a thriving city of 10,000 inhabitants and is fortunate in having the kind of a community spirit that supports to the limit. Its Chamber of Commerce is composed of a group of the biggest men in the community, and is headed by one of the ablest men in that section of the state.

A marvelous industry has sprung up in the Paradox Valley in recent years. The Standard Chemica Company has recently completed one of the fines mills in the world for the treatment of ores mined i that section. It is located 16 miles below Naturita.

To date about $4,000,000 has been spent in the de velopment of these rare mineral properties.

The town of Rangeley is located 60 miles to th north, while Uranium, the south road terminus, i approximately 70 miles from Grand Junction.

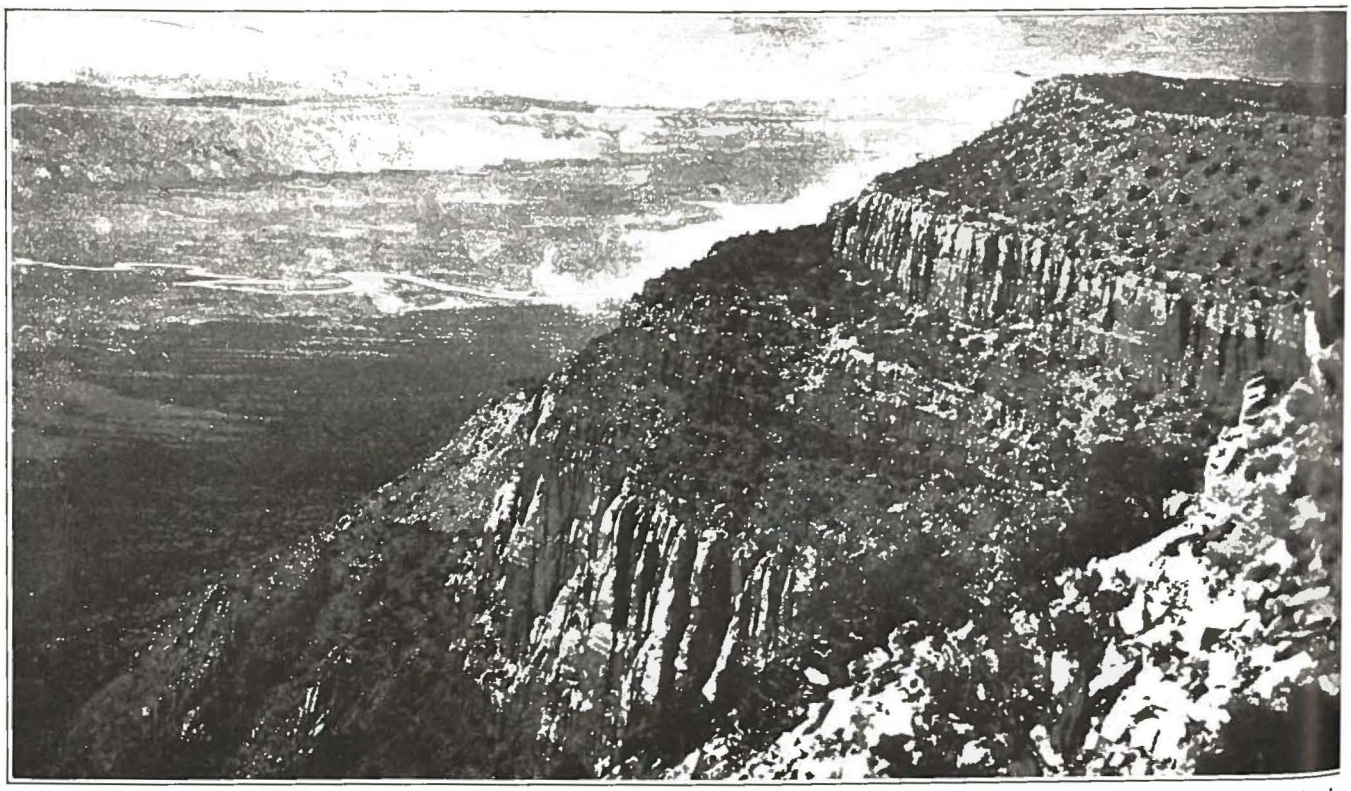
It is expected that the two roads will be com pleted by the end of the present construction seasor

Engineer F. C. Merriell of the State Highwa forces, is now engaged in making a survey of th Douglas Creek section of the road.

The Grand Junction-Rangeley project wa started last summer, with the object of connecting th Grand Valley with the vast, undeveloped basin lyin to the north of Fruita. When completed the ne road will give an all-season road into that territor

Recently the road was accepted by the Stat Highway Department as a state project, and the wor started by the Grand Junction Chamber of Commerc will be completed with the aid of state funds.

Work on the road to Uranium also will be rushe to completion. Operations are now under way on tl road up the Dolores river from Gateway to the Par dox Valley.



A remarkable photograph of the Paradox Valley, taken from the southeasterly rim, near Camp Marvel. View is look approximately parallel to the long axis of the valley (N. 45 W.). The Bedrock Postoffice is at the extreme left edge of the picture. The La Sal Mountains in Utah are the skyline in the center. This picture shows the Dolores River meandering across the valley at right angles to the long axis, hence the paradox. (Photo by courtesy of the Radium Company of Colorado.)

TOURISTS FLOCK TO SCENIC CENTERS

Colorado Roads Already Dotted with Cars—Half Travel Business Now On—Patronage Distributed Among Many Communities Over State

It's playground time again for the millions, and Rocky Mountain and Mesa Verde National Parks, the Pike's Peak and Silverton regions are calling to the vacationist and tourist: "Come up to cool canyons and snow-fringed heights in the Colorado Rockies."

Already the highways are dotted with cars, and railroads are carrying more passengers, for there is a reciprocal exchange of tourists this year between the Great Lakes region and the Rockies. It's the very latest in stimulating the business of travel. Colorado's highways will be used this summer as never before, judging from inquiries coming to tourist information bureaus and demands made upon booking agencies.

Initiation of travel is the big thing, and has been approached by the Denver Tourist Bureau from a three-fold viewpoint: First, to cut down unnecessary competition between the Great Lakes and the Rockies for patronage in the Middle West. Second, to induce travelers to make a circle trip, putting educational urge on a plane with recreational desire. Third, to make all Colorado responsive to the need for coordination of travel activities, through an interchange of scenic literature and road information, not only between towns of the state, but between Colorado points and cities in the Great Lakes region.

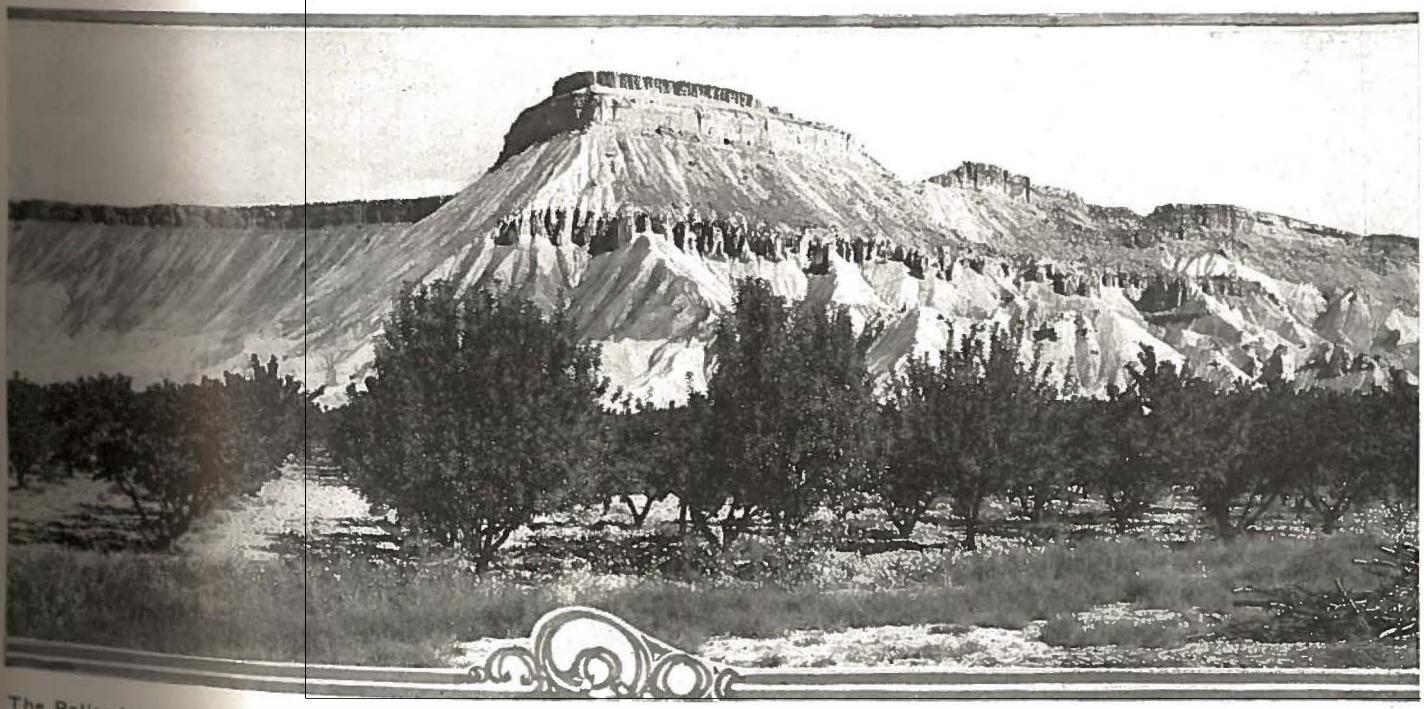
In other words, an effort is being made to get the traveler to make a circle swing, going to the objective point one way and returning home by another route, thus affording him a greater appreciation of the scenic West and distributing his patronage among many communities over the state. And highways easily get half of the travel business these days.

There are about 100 scenic drives out of Denver, of varying lengths, including the new Echo Lake trip to the Mount Evans region and the never-Summer Circle (Fall River) Drive over the Continental Divide, the ultimate success of which is attributable to the Colorado highway department. Stephen T. Mather, director of the National Park Service, while in the state recently complimented the Colorado highway department for the excellent support it gave the federal government in bringing in the Fall River road.

In making a sweeping denial of rumors afloat that the federal government plans to assess all tourists entering the Rocky Mountain National Park this summer, he said: "The state has borne the burden of the road development in the Park to date, and until the national government can show a liberal expenditure itself it could not levy such a toll."

Colorado, anticipating the plea of the head of the National Park Service for more automobile camps, is doing even more—spreading the gospel of good roads as an incentive to greater travel generally. Idaho Springs, Loveland, Fort Collins and Greeley are convinced of the big returns, financially, from the visits of travelers.

Pueblo has opened a tourist bureau of information. Trinidad is pushing ahead with its auto camp. Canon City and Salida are wide awake. Delta, Montrose, Colorado Springs, Sterling, Grand Junction and Durango—these are a few of the communities that are responding to a visualization of the travel industry and thereby assisting the National Park Service in its efforts to bring the national playgrounds, through travelable highways, nearer to America's millions.



The Palisades on the Grand River in Mesa County, from which the prosperous fruit shipping town of Palisades takes its name, and a typical orchard of the section.

COLORADO 7% ROAD SYSTEM SELECTED

Eight East-and-West and Five North-and-South Roads are Submitted to U. S. Bureau of Public Roads as Part of New Federal Highway System

Eight east-and-west and five north-and-south highways, traversing every section of Colorado and connecting with interstate highways traversing the States adjoining Colorado, are provided for in a system of interstate highways submitted to the Bureau of Public Roads at Washington by L. D. Blauvelt, State Highway Engineer.

The system, worked out by Mr. Blauvelt in conjunction with the seven members of the State Highway Advisory Board, has the approval of the Colorado representatives of the Bureau of Public Roads and there is little doubt that it will be approved in the form in which it has been submitted.

"The task of selecting 7 per cent of the 48,000 miles of road in Colorado for a Federal Aid system has not been an easy one," said Mr. Blauvelt. "In making our selections the members of the advisory board and myself were first actuated by the desire to improve roads which would serve the most people. 'The greatest good to the greatest number' was our first consideration.

"Next we sought to select those main State highways upon which a good deal of improvement work has been done since the State of Colorado took up the matter of road building on a large scale. I believe we have designated a system of roads which will afford every section of the State ample means of transportation.

"The system we have selected will not please everybody, but that cannot be helped. Some localities, no doubt, will believe they have been slighted, but for their information I want to say that their roads will be improved just as much as the highways included in our 7 per cent system.

"I wish to call attention to the fact that restriction of Federal Aid money upon 7 per cent of the roads of the State will make a larger sum available for State roads than is now the case. I am going to see to it that all State roads not included in the 7 per cent system, are improved just as they have been improved in the past. The only difference is that the improving will have to be done with State money alone, and not with government funds, as heretofore."

Following are the main State highways as fixed in the plans submitted:

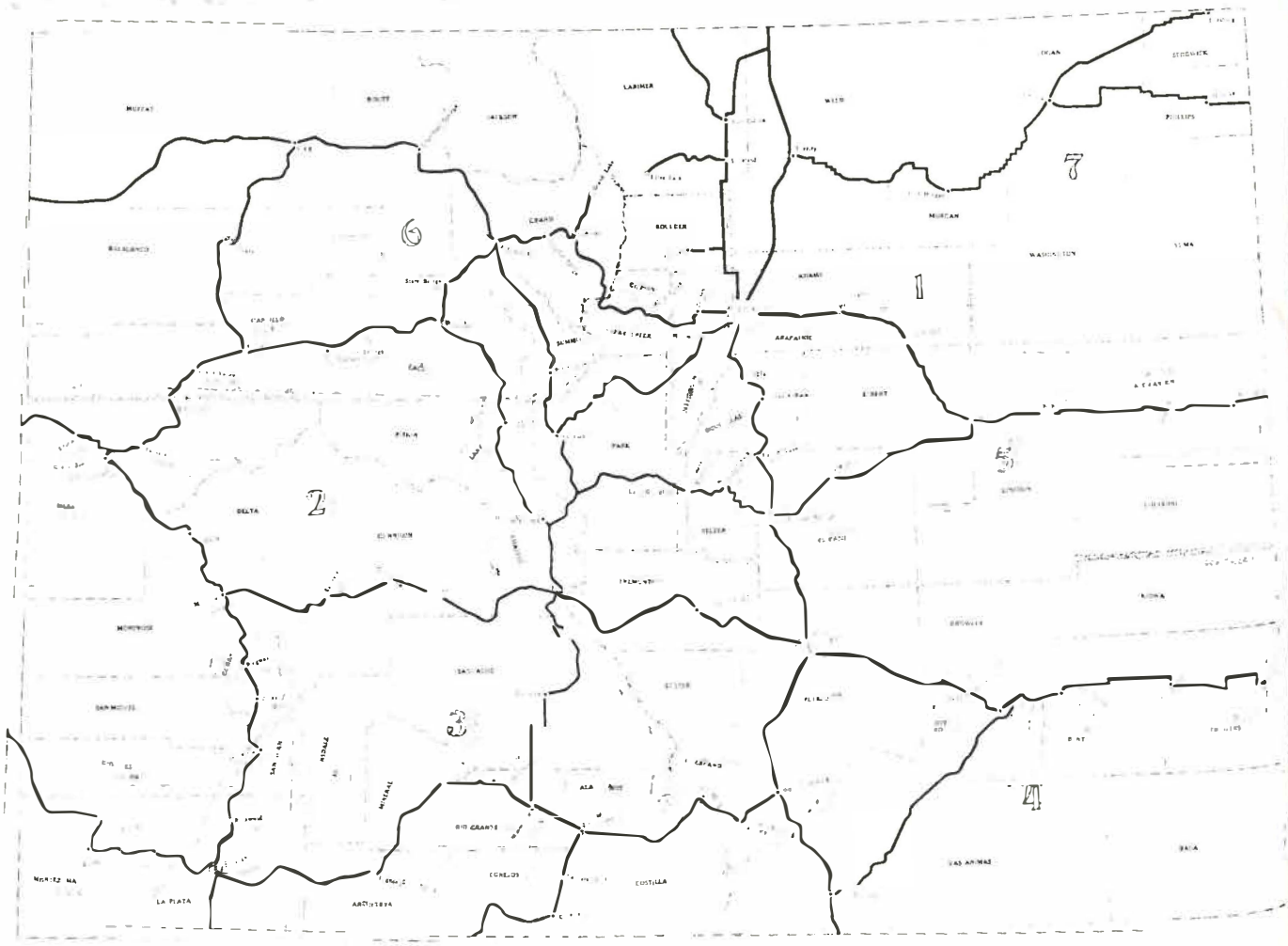
From the Wyoming State line south of Tie Siding, through Virginia Dale, Livermore, Fort Collins, Loveland, Berthoud, Longmont, Lafayette, Denver, Colorado Springs, Pueblo, Walsenburg, Aguilar, Trinidad, Starkville, Morley and Raton Pass to the New Mexico line.

From the Wyoming State line, south of Cheyenne, through Nunn, Eaton, Greeley, Platteville, Fort Lupton, Brighton and Denver. At Denver this road connects with the highway through Fort Collins, Longmont and Lafayette.

From the Wyoming State line, south of Cheyenne, southwest through Wellington to Fort Collins. At Fort Collins this road connects with the road from Virginia Dale and Livermore.

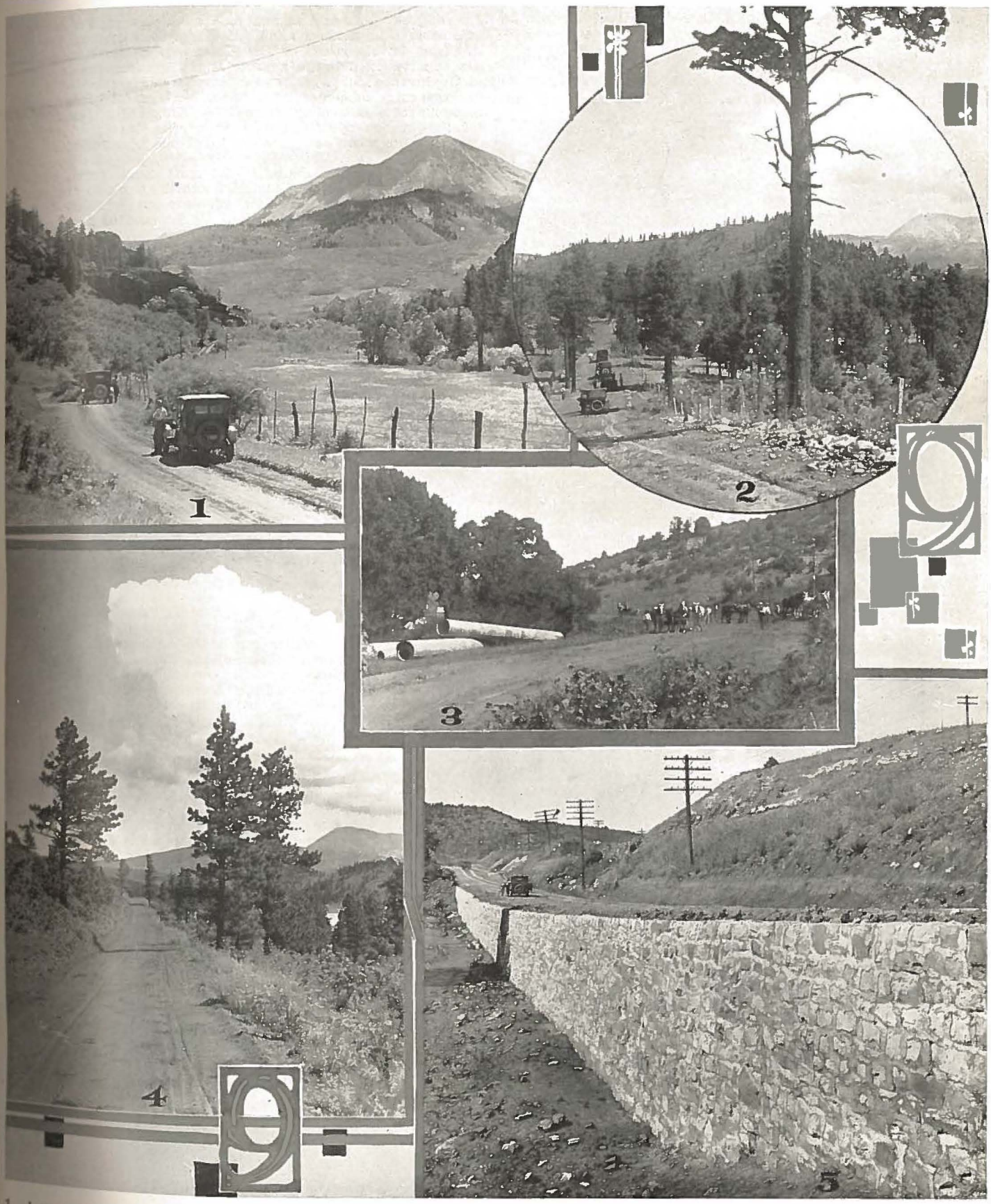
From the New Mexico line, north of Aztec, through

(Continued on page 16)



Map showing Colorado's 7 Per Cent Road System connecting Interstate Highways, as submitted to the U. S. Bureau of Public Roads for approval. It shows the operating divisions of the State Highway Department, indicated by the numbers within the shaded lines, which differ slightly from the "districts" prescribed in the present State Highway act.

HIGHWAY SCENES IN SOUTHERN COLORADO.

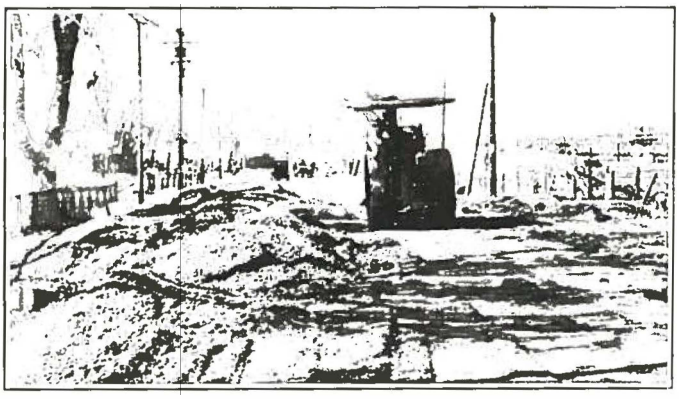


1. Looking through a break in the "stone wall" toward one of the Spanish Peaks. This wall is continuous from Colorado Springs to the Texas line. 2. Scene along the road from Stonewall to La Veta, Spanish Peaks to right, 3½ miles north of Stonewall. 3. Road Grading outfit working near Trinidad. 4. Showing Monument Lake, five miles north of Stonewall. 5. Rubble wall 12 feet high, 5 miles from Trinidad, just south of Starkville.

Denver to Arvada Road Nearly Completed

Work of laying six-tenths of a mile of concrete paving between Denver and Arvada will be completed within sixty days.

This project is an extension of the mile of paving which was laid on this highway last fall. It is one of the heavy traveled roads out of Denver.



Steam roller at work on sub-grade.

The paving which is being done by J. Fred Roberts, contractor, takes the concrete pavement into the town of Arvada. For the last 30 days the contractor has been engaged in building the sub-grade, which is said to be one of the best in this section of the state.

The Denver-Arvada highway forms a part of the detour which is now being used by "north and south" traffic between Denver and Bromfield while paving operations are under way on Federal boulevard, where four miles of concrete pavement is being laid.

Scene showing fine piece of sub-grade leading into town of Arvada.

Cheap Team Hire Encourages Winter Road Construction

Prices for the hire of teams in winter offer considerable inducement for carrying on certain classes of road work where conditions are favorable during the winter months, according to figures collected by the Bureau of Public Roads on federal aid projects.

In January and February teams without drivers could be secured at 28 cents an hour in the states between the Ohio and Mississippi Rivers; from 31 to 52 cents an hour in the group west of the Mississippi, from Kansas and Missouri north to the border; from 25 to 35 cents an hour in the Mountain States; and around 42 cents an hour in the group composed of Texas, Louisiana, Arkansas and Oklahoma, where considerable work was done.

Data on Road Construction to be Put in Usable Form

A great deal of valuable data on highway construction are soon to be made available to all persons connected with highway development, by the Bureau of Public Roads. In its supervision of large appropriations by Congress for federal aid road construction, the bureau has assembled complete records of contract prices for all types of roads in all sections of the country since 1916. In addition, engineers of the bureau operating in each of the 48 states, report monthly on labor and material used on jobs inspected by them.

To put this information in the most usable form, statistical machinery has been installed and the work so arranged that a small force can make available a great variety of information at a small percentage of the cost of such work

In the rare old, olden days.

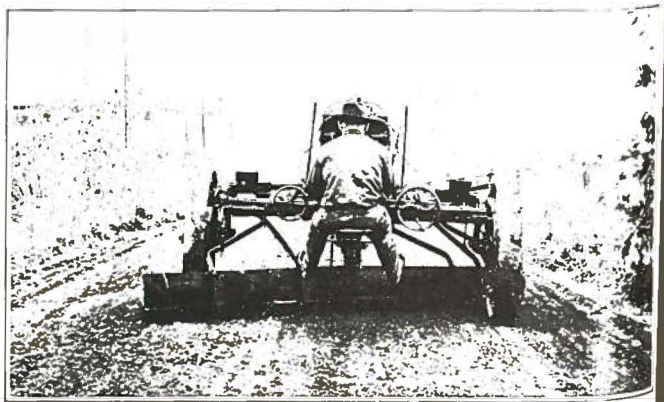
when done by hand. The data assembled will consist of monthly reports on the status of federal aid work, prices paid for labor and contractors' bids for new work in all sections of the country. From time to time, reports covering a large volume of work will be made on costs of various types of surfacing and grading, percentages of various types of roads built, proportion of total cost which goes into grading, surfacing and other items of construction, together with any other information for which there may be need.

FIRST AMONG NATIONAL PARKS.

Rocky Mountain National Park, in Colorado, had 273,737 visitors from every state in the Union last year, which was more than the combined attendance of Yellowstone, Yosemite, Glacier, Grand Canyon and Lassen National Parks.

SAILING IN THE CLOUDS.

Colorado has the highest yacht anchorage in the world at Grand Lake, at an altitude of 8,369 feet, where a regatta is held every summer for a Lipton cup.



One of eighteen "Road Maintainers" in use on Colorado roads

Sign Posts Along the National Highways

According to the report of the Bureau of Public Roads of the Department of Agriculture, federally-aided roads constructed under the joint supervision of the Government and the states during 1921 total 11,930 miles. This work cost the Federal Treasury $94,057,089, while its total cost amounted to $231,963,682. The states and counties in which the sections were located paid the balance. Of the total mileage given above, 8,595 miles were completed and 3,335 miles of the work were on projects which were not entirely completed. The mileage mentioned was scattered in every state in the Union.

The Federal Government shared in the cost of about one-half of all the road construction in the United States during 1921, having some part in 31,228 miles of new work. When it is considered that this mileage is considerably more than enough to encircle the earth at the equator and is equivalent to more than 10 per cent of all the improved roads existing in the United States on January 1, 1921, and is equal to practically 8 per cent of the entire completed road system of France, some idea of the progress being made can be gained.

America's road-building job is at last under way on a vast national scale.

A large force of men are now working to open the Dayton-Kane road in Wyoming to the summer tourist travel, according to Z. E. Sevison, Wyoming State Highway Engineer.

With returns received from all States, the Bureau of Public Roads of the United States Department of Agriculture reports that the motor vehicle registration for the year 1921 totaled 10,448,632. This represents an increase of more than a million over the 1920 figures, or a number equal to the total number at the beginning of 1913.

Labette County, by virtue of having just completed surfacing 10.52 miles of federal aid road between Oswego and Altamont in 43 actual working days, contends a new record has been made for the state of Kansas in gravel road construction. This work was carried on at the rate of approximately a quarter of a mile per day, or one mile of road in four days' time, which record, it is declared, has never been equaled anywhere in the United States.

In effort to standardize certain features of road building specifications, with a view to economy in construction, highway officials of Pennsylvania, New Jersey, Delaware, Maryland, Virginia, West Virginia, and Kentucky, and officials of the Bureau of Public Roads, met recently at the department of agriculture to revise specifications, so that one material may be used in these states at a smaller cost.

The Ohio State Highway Commission opened bids for the construction of various hard surface highways at a meeting held March 31, when it received figures from approximately 500 bidders.

Erie County, Pennsylvania, will float a $3,000,000 bond issue for road purposes, according to a resolution just passed by the county commissioners.

Commissioner Sisson of the New York State Highway Department has requested auto truck owners throughout the state to load their trucks to one-half of their rated capacity for the next few weeks during which the improved highways will be undergoing unusual strain due to frost action and excessive moisture.

The Automobile Club of Southern California enjoys the distinction of being the largest motoring organization in the world. It has a membership of more than 65,000, and exceeds in numbers the Automobile Club of France and the Royal Automobile Club of Great Britain. Activities of the club include sign-posting of highways, touring information, recovery of stolen automobiles, insurance at cost and preparation of maps.

Headquarters of District No. 13, Bureau of Public Roads, are now located at Phoenix, Arizona. Formerly the headquarters were in Albuquerque, New Mexico. A branch office will be established at Santa Fe, N. M. To expedite road business between the States and the Federal government was the reason for the moving of the headquarters.

California's 7 per cent system of roads to be constructed with Federal Aid has been submitted to the Bureau of Public Roads at Washington for approval. It comprises a total of 44,447.6 miles.

A bond issue of $795,000 has been voted by the taxpayers of Colusa County, California, for the extension and improvement of their highway system. The vote was 1609 to 499 in favor of the bonds.

Taylor County, Texas, has adopted the patrol system for maintaining its 75 miles of piked roads. A score of men are employed in the work.

More than $500,000 will be expended on Federal aid projects which were added to New Mexico's highway construction program recently. Eleven contracts were let last month, totaling $487,575, which was somewhat under the estimate.

It is interesting to note how the various states and counties traversed by the Lincoln Highway expended the $7,730,000.00 invested in new construction on that route in 1921. The Headquarters of the Lincoln Highway Association here has compiled a table showing what this money accomplished in the way of tangible improvement—in making smoother the path between New York and San Francisco.

The following table shows the mileage of each type of construction completed last year, the total being over 12% of the mileage between the two coasts.

Types of New Construction Completed on the Lincoln Highway—1921.

	Miles
Concrete	99.51
Brick	21.35
Bituminous Macadam	5.83
Gravel	174.85
Sand Clay	4.25
Permanent Earth Grade	91.77
Total	397.56

If the same progress made in building the Lincoln Highway in 1921 had been made each year since the route was dedicated, it would be finished today.

Colorado has the highest broad-gauge railroad and the highest skyline auto drive in the United States, at an altitude approximating 12,000 feet.

The state of Texas holds the record for most miles of surfaced federal-aid roads built in 1921, with a total of 1,116 miles. Minnesota was a close second with 1,066 miles.

Colorado, the roof of the continent, has forty-two of the fifty-five named peaks of the United States which exceed 14,000 feet altitude.

Morgan county, Alabama, recently voted a $440,000 road bond issue and will soon let contracts for the improvement of a large mileage of country highways.

Road work in Ouchita Parish, Louisiana, will be supervised by a committee of seven citizens recently appointed to hold office until June 1, 1924. Approximately $1,600,000 will be spent on road improvement in Ouchita Parish during the next two years.

Road Work and Builders the State Over

The opening of passes over the Continental Divide has been the subject of many inquiries received by the State Highway Department during the past few weeks.

In order that the general public may be informed of the condition of these various passes, the following information is given:

Berthoud Pass: Construction is now under way near Frazer. Changes are being made in grades and location of the road. About $140,000 will be spent by the U. S. Forest Service on the east and west sides of the pass this summer.

Rabbit Ear Pass: There is a splendid road over the pass proper, but the road from Kremmling to the Pass is being relocated and rebuilt.

Tennessee Pass: Construction work is in progress near Gilman (Battle Mountain) and east of Minturn.

Monarch Pass: The splendid highway over this pass will be open about May 15, which will be as soon as either the Blue Mesa or Black Mesa roads to Montrose and Delta are in shape to travel.

Poncha and Cochetopa Passes: Both are now open to traffic, but are not in the best of condition. By this route autoists can get through to the Gunnison country from the eastern slope.

La Veta Pass: This route will be open for travel not later than May 15.

Wolf Creek Pass: Will be opened about June 10.

Three dangerous railroad crossings between Clifton and Palisade will be eliminated with building of a new road between these two points this summer. Plans for the building of five miles of the road have been received by the State Highway Department from A. H. Batten, resident engineer. This is a federal aid project which provides for the grading and graveling of the road from Grand Junction to Palisade. The sum of $50,000 will be expended on the road.

Work of surfacing five miles of the Lincoln Highway north of Lafayette is under way. The project will cost $5,000, and C. T. Brock, district maintenance superintendent of the State Highway Department, is in charge.

The road system in the Pawnee district of Weld county is to be extended, according to County Commissioner D. C. Straight. Plans are being made to complete the grading of the road between Briggsdale and Hereford. This road will tap a rich dry land section. At a point five miles south of Hereford the road running west to Gault also will be graded this summer.

The new patrol system of highway maintenance has won favor in Boulder county, according to County Commissioner Sanford Buster. It is the verdict of all who have gone over the main traveled roads of that county that they are in better condition as a whole than ever before at this season of the year.

Work of double-tracking the South St. Vrain road is proceeding without interference with traffic. A steam shovel is being utilized by the Boulder county commissioners on the project.

J. Ralph Donaghy of Colorado Springs has been awarded a contract for the construction of a new bridge 1.3 miles south of Colorado Springs on the Pueblo road. It is to be made of wood and will be 100 feet in length. The new bridge will cost about $2,000.

Thirty teams are being employed in graveling the highway from Fort Morgan to Hudson and from Wiggins to the Lincoln Highway in Weld and Morgan counties.

Eugene Williams, prominent ranchman, has been appointed road supervisor of Saguache county. He succeeds Alva A. Simpson. The budget of the State Highway Department for 1922 calls for an expenditure of $77,375 in Saguache county. This includes $6,375 to be applied to the maintenance of 120 miles of state highways in the county.

State Highway forces are now busily engaged on repairs to the road between Carbondale and Redstone. When this work is finished the crew will commence work on the McClure Pass road.

About 100 men will be employed on four road projects which will be started this month between Ouray and Silverton. Over $200,000 will be spent this summer on the road between these two cities. The U. S. Forest Service has allotted $100,000 to the road this year. Contracts for this work have not been made. The other three projects between Ouray and Iron Mountain are already under contract to Lars Pilkaer, C. F. Perry and Pickering Brothers. This highway traverses one of the most beautiful mountain sections in the state.

With the increased mining activity in the Ouray and Silverton districts, and the present highway projects under way, the Ouray Herald says there will be more men employed in that vicinity this year than at any time during the past ten years.

An allotment has been made for the construction of a road from Glenwood Springs up Noname Creek, forming a one-day trip out of Glenwood Springs, to Hiproof, and returning via Transfer Springs. At one place in the box canon it will be necessary to build a bridge 200 feet lengthwise. The canon is only eight or ten feet wide at places and 60 to 80 feet deep.

Six tractors are now being used on maintenance work in the Colorado Springs road district. Eighteen miles of highway in the Black Forest will be regraded and improved. One of the tractors is now a part of the equipment used on the Pike's Peak Ocean-to-Ocean Highway. The Pueblo and Denver roads are being scarified and regraded.

A five and one-half inch rainfall closed the Lincoln Highway east of Sterling on April 28. The O. L. D. Highway also was made impassable out of Sterling for several miles. Asst. Supt. John Stamm placed large crews of men on the two roads and they were re-opened in a few days.

On May 17 bids on one mile of paving connecting with the present pavement between Littleton and Sedalia will be opened by the State Highway Department. At present the pavement extends to Wolhurst farm.

Plans for the Devil's Gap cutoff on the Canon City-Salida highway, five miles northwest of Florence, have been completed. The survey of the new road follows closely the old electric railway to the top of the Royal Gorge. With the completion of this road one of the worst stretches of the Rainbow Route Highway will be eliminated.

About $7,000 will be expended in improvement of the state highway between Basalt and Aspen this summer. The road will be regraded and widened where necessary.

Grading for one and one-third miles of concrete paving on the Midland Trail near Palisade has been started by W. B. Cheek, Fort Collins contractor. The completed federal aid project will cost $43,714.81.

The State Highway Department has donated the use of a heavy truck to the Victory Highway Association for use in maintaining this highway across Colorado. The association will furnish a crew of men to keep the truck in operation.

A new 70-foot two-span concrete bridge across the San Miguel river, near Naturita, is being constructed by the State Highway department.

Work of gravel-surfacing the Greeley-Windsor road is now under way. Plans for gravel-surfacing the Windsor-Fort Collins road to the Larimer county line are announced by John R. Wortham, county road engineer of Weld county.

Effect of Moisture on Concrete

After conducting a number of extensive experiments on the effect of moisture upon the expansion and contraction of plain and reinforced concrete, Torata Matsumoto, a graduate student at the University of Illinois, draws the following conclusions:

1. Concrete expands when it absorbs moisture and contracts when it is dried. Concrete of a 1:2:4 mixture is likely to contract during hardening as much as 0.05 per cent in an ordinary structure.

2. Contraction of concrete by the loss of moisture causes stress in the concrete when it is restrained by an external force. The amount of this stress is not as small as is generally supposed.

3. The shrinkage stress caused in the steel in reinforced concrete may reach the usually accepted working stress of steel when the amount of reinforcement is less than 1.5 per cent.

4. The shrinkage stress developed in 1:2:4 concrete may reach the ultimate tensile strength of the concrete when the amount of reinforcement is greater than 1.5 per cent. With richer mixtures the increase in shrinkage stress may be relatively greater than the increase in ultimate strength.

5. The greater the percentage of reinforcement the greater the tensile stress that may develop in the concrete, and concrete having a higher percentage of reinforcement than 1.5 per cent. is likely to have cracks formed unless proper provision is made.

6. In reinforced concrete out of doors, subject to alternate wet and dry conditions, cracks may readily be formed under the repeated stress which is nearly equal to the tensile strength of the concrete.

7. Reinforced concrete does not appear likely to be a durable material in a place where a corrosive influence on steel, such as sea air, is active, unless proper protection against the formation of shrinkage cracks is made.

8. It is suggested that the prevention of shrinkage stress in concrete might be accomplished in two ways, either by finding a cement giving less expansion and contraction, or by the use of a perfect waterproofing treatment.

9. It may be expected that an integral waterproofing compound might lessen the change of volume for a short time, but it would not prevent the final diffusion of moisture with consequent change in volume.

Overland Park camp grounds in Denver had a tent city last year that housed 39,854 automobile tourists of the United States, Canada, Mexico, and the Hawaiian Islands.

NOTICE

The State Highway Department has ordered a car load of steel I-beams, 20 ft. long, 10 inch channel, weight 25 lbs. per foot. Price will be approximately 2c per pound, f. o. b. Denver. County commissioners are requested to place requisitions early.

CONTRACTS AWARDED DURING MONTH

	Number	Location	County	Length	Type	Contract Price	Contractor
F A.P.	166	Swink, Southeast	Otero	2.012 mi.	Concrete pavement	$60,863.89	C. C. Madsen
S P.	563-B	Walden-Cameron Pass	Jackson	3.825 mi.	Earth graded	13,453.50	Henry Shore
S P.	605	East River, Near Almont	Gunnison	80 feet	Truss bridge	9,214.85	Monarch Engr. Co.
S P.	650	Mount Evans	Clear Creek	4.437 mi.	Mountain graded	33,687.12	E. H. Honnen
S P.	604	North of Olathe	Montrose	30 feet	I-Beam bridge	3,168.98	H. M. Fox
S P.	643	South of Colorado Springs	El Paso	570 feet	(3) Timber pile bridges	9,497.86	Plains Construction Co.

CONTRACTS BEING ADVERTISED

	Number	Location	County	Length	Type	Bids to Be Opened
F A.P.	130	Littleton-Sedalia	Arapahoe & Douglas	1.004 mi.	Concrete pavement	May 17, 1922

PROJECTS ON WHICH PLANS HAVE BEEN SUBMITTED TO BUREAU OF PUBLIC ROADS

	Number	Location	County	Length	Type
F A.P.	30	Denver-Morrison	Jefferson	0.944 mi.	Concrete paving
F A.P.	71-B	Durango-Mancos	La Plata	3.635 mi.	Gravel surfacing
F A.P.	162	Colo. Springs-Manitou	El Paso	1.363 mi.	Concrete paving
F A.P.	189	Steamboat-Hayden	Routt	5.620 mi.	Gravel surfacing
F A.P.	222-A	Denver-Lafayette	Adams-Boulder Jefferson	2.736 mi.	Concrete paving
F A.P.	228	Sterling, Southwest	Logan	4.412 mi.	Concrete paving
F A.P.	119-B	Cochetopa Pass	Saguache	7.477 mi.	Graded
F A.P.	163	Pueblo-East over St. Charles River	Pueblo	0 502 mi.	Truss bridge and approaches
F A.P.	165	Canon City-Florence	Fremont	9.385 mi.	Gravel surfacing

PROJECTS ON WHICH PLANS ARE BEING PREPARED

	Number	Location	County	Length	Type
F A.P.	7-C	Norwood-Naturita	Montrose	10.53 mi.	Graded
F A.P.	119-B	Saguache-Cochetopa	Saguache	7.477 mi.	Graded
F A.P.	165	Canon City-Florence	Fremont	10.833 mi.	Gravel surface
F A.P.	171	Delta-Grand Junction	Delta	6.620 mi.	Gravel surface
F A.P.	190	Dillon-Kremmling	Summit—approx.	1.25 mi.	Bridge and grading
F A.P.	208	Grand Junction-Palisade	Mesa—approx.	4 mi.	Gravel surface
F A.P.	213-B	Hesperus-Mancos	Montezuma and La Plata	5.302 mi.	Gravel surface
F A.P.	221	Ft. Collins-Loveland	Larimer—approx.	5 mi.	Concrete pavement
F A.P.	224	Morrison-Baileys	Park—approx.	5.6 mi.	Mountain graded
S P.	225	Denver-Bennett	Adams—approx.	1 mi.	Concrete pavement
S P.	673	Sampson Creek on Cherry Creek Road	Arapahoe—approx.	300 ft.	100-foot trust bridge and approaches
	682	South Platte River at Fort Morgan	Morgan—approx.	1,500 ft.	1,060-foot concrete bridge and approaches

UNCOMPLETED STATE PROJECTS UNDER CONSTRUCTION OR UNDER CONTRACT

(As of April 25, 1922)

NO.	NAME OF ROAD	COUNTY	APPROPRIATION	APPROXIMATE % COMPLETE
501	Gore Range, State Highway No. 40	Routt and Grand	$ 3,969.99	1%
505	Central City-Idaho Spgs., S. H. 54	Gilpin and Clear Creek	11,961.92	25%
505-B	Idaho Spgs.-Central City	Clear Creek	15,000.00	25%
508	Vernon Canon, State Highway No. 81	Jefferson	14,538.15	64%
511	State Highway 19, Grading & Surfacing	Yuma	17,736.60	10%
512	Lake City-Creede, S. H. 38	Mineral	8,512.87	57%
513	Grading and Surfacing S. H. 34	Baca	4,115.01	83%
515	Grading & Surfacing S. H.'s 16 & 10-S	Alamosa	9,545.62	96%
516	Grading & Surfacing S. H. 16	Conejos	14,783.53	98%
517	Grading State Highway 15	Archuleta	21,902.73	1%
520	Grading & Surfacing State Highway 30	Kit Carson	3,424.27	3%
522-B	LaVeta Pass Road	Costilla	20,000.00	Not Started
524	Grading State Highway 37	Custer	6,428.38	Not Started
526	Grading & Surfacing State Highway 33	Crowley	9,040.55	1%
529	State Highway 23, O. L. D.	Phillips	7,054.59	21%
535	Grading & Drain. State Highway 20	Montrose	2,567.17	98%
535-B	Grading & Drain. State Highway 20	Montrose	16,000.00	25%
551-B	Bridge over Rush Creek	Kiowa	5,000.00	56%
558-B	Long's Peak Road	Larimer	3,000.00	Not Started
561-B	Protection 5th St. Br. Grand Jct.	Mesa	8,000.00	31%
563-B	Cameron Pass Road	Jackson	19,000.00	Not Started
600	State Highway 12, Farmer Hill	Mesa	4,000.00	73%
603	State Highway 12, Delta County South	Montrose	8,000.00	30%
605	Almont Bridge over East River	Gunnison	10,000.00	Not Started
606	Grading & Surfacing State Highway 28	Gunnison	8,000.00	Not Started
608	Dallas-Divide	San Miguel	5,000.00	Not Started
610	San Luis-San Acacia-Jarosa	Costilla	7,000.00	Not Started
616	River Protection, Gr. & Surf. S. H. 38	Rio Grande	15,000.00	4%
617	Gr. & Surf. Hooper to Mineral Springs	Saguache	12,000.00	45%
618	Villa Grove North to Poncha Pass	Saguache	5,000.00	Not Started
631	State Highways 7-S and 8-S	Pueblo	11,000.00	2%
637	Victor-Canon City	Teller and Fremont	14,000.00	27%
638	Canon City, West	Fremont	7,000.00	93%
650	Chicago Creek toward Mt. Evans	Clear Creek	50,000.00	Not Started
651	Bridge at Lyons	Boulder	6,000.00	3%
656	Poudre Tunnel, Chambers Lake	Larimer	44,000.00	33%
658	Loveland to Loveland Canon Road	Larimer	12,000.00	Not Started
659	Bridges on State Highway 2	Larimer	15,000.00	2%
660	Estes Park Bridge	Larimer	2,500.00	2%
671	Bennett Bridge over Kiowa Creek	Adams	12,000.00	Not Started
675	State Highway 9, Iliff, East, Surf.	Logan	29,000.00	18%
677	State Highway 66, West	Logan	5,000.00	3%
678	State Highway 23, Sterling 7 Mi. East	Logan	11,000.00	13%
679	State Highway 19, Grad. & Surf.	Morgan	12,000.00	3%
680	Bridge at Orchard, State Highway 24	Morgan	20,000.00	Not Started
681	Ft. Morgan, West to County Line	Morgan	17,000.00	3%
683	State Highway 24-S, Grad. & Surf.	Phillips	8,000.00	Not Started
687	State Highway 7, Grad. & Surf.	Weld	29,000.00	22%
690	State Highway 24-S, Wray, North	Yuma	14,000.00	2%

STATE PROJECTS NOT YET CONTRACTED OR ON WHICH CONSTRUCTION HAS NOT YET BEEN STARTED

(As of April 25, 1922)

NO.	NAME OF ROAD	COUNTY	APPROPRIATION
501-B	Gore Range Road	Grand	$10,000.00
503-B*	Independence Pass Road	Lake & Pitkin	43,000.00
504-B	Wolf Creek Pass Road	Mineral	25,000.00
507	Willow Cr. Pass, S. H. 43	Jackson	14,538.15
509	Cripple Creek-Florissant S. H. 78	Teller	14,105.41
509-B	Cripple Creek-Florissant	Teller	15,000.00
511-B	State Highway 19, E. and W.	Yuma	10,000.00
512-B	Lake City-Creede, S. H. 38	Hinsdale	10,000.00
514-B	State Highway 70, Grad. & Surf.	Las Animas	10,000.00
515-B	State Highway 16, Grad. & Surf.	Alamosa	10,000.00
516-B	Antonito, West	Conejos	15,000.00
517-B	Grad. & Drain. State High. 15	Archuleta	15,000.00
518	Idaho Spgs.-Empire, S. H. 21	Clear Creek	8,858.49
518-B*	Berthoud Pass to Empire	Clear Creek	25,000.00
520-B	State Highway 30	Kit Carson	12,000.00
521	Grad. & Surf., S. H. 32	Cheyenne	9,981.67
521-B	Grad. & Surf., S. H. 32	Cheyenne	13,000.00
523-B	Rico-Lizard Head Road	Dolores	3,000 00
525	Grad. & Surf. State Highway 33	Kiowa	9,879.15
525-B	Grading, State Highway 33	Kiowa	7,000.00
526-B	Grad. & Surf., State High. 33	Crowley	5,000.00
527-B	State Highway 19, Akron, East	Washington	15,000.00
531	State Highway 18	El Paso	19,946.98
532	State Highway 30, Calhan	El Paso	19,280.13
536-B	Granby to Estes Park	Grand and Larimer	30,000.00
538-B	Coal Creek Road	Jefferson	6,000.00
601	Grand Junction to Rangely	Mesa	30,000.00
602*	Cedaredge, North to Co. line	Delta	5,000.00
604	State Highway 12, Bridge	Montrose	4,000.00
607	Erection Bridge, S. H. 63	Gunnison	2,000.00
611	Dove Creek Road	Dolores	25,000.00
612	Grad. & Surf. State Highway 69	Huerfano	10,000.00
613	State Highway 13, So. to St. line	La Plata	10,000.00
614	State Highway 26, Repairs	Huerfano and Las Animas	35,000.00
619	State Highway 13, Red Mtn., So.	San Juan	25,000.00
620	St. High. 13, Silverton-Durango	San Juan	5,000.00
630	Highway East of Las Animas	Bent	5,000.00
632	Bridge over Six-mile Cr. S. H. 5	Pueblo	$5,000.00
633	Br. & Grad. Poncha Pass Rd.	Chaffee	9,000.00
634	State Highway 18, Divide	Chaffee	2,000.00
635	Bridges over Buttes Cr. & Horse Cr. State Highway 34	Baca	21,000.00
636	Devil's Gap	Fremont	20,000.00
639	Bridge, State Highway 20-S.	Crowley	6,000.00
640	Grading, State Highway 8-S.	Custer	6,476.00
643	Pile Br. Colo. Spgs., South	El Paso	25,000.00
644	Grad. & Surf. Hartsel, E. & W.	Park	8,000.00
645	Castle Rock-Limon	Douglas	10,000.00
646	St. High. 17, Leadville, South	Lake	13,000.00
647	St. High. 10, Leadville to Pass	Lake	5,000.00
652	Grading St. Vrain Road	Boulder	10,000.00
653	Culverts and Brs.	Gilpin	15,000.00
654	Bridges over Bear Creek	Jefferson	8,000.00
655	Bridges over Soda Creek	Jefferson	3,500.00
657	Ft. Collins	Larimer	4,000.00
661	S. H. 21 & 38 Spruce Lodge, W.	Grand	12,000.00
662	Walden-Rabbit Ear Pass Rd.	Jackson	6,000.00
663	Walden, North on St. High. 50	Jackson	4,000.00
670	Culverts, Watkins Road	Adams	1,200.00
672	Improvement State Highway 7, North from Bennett	Adams	7,000.00
673	Cherry Creek Road Bridge	Arapahoe	20,000.00
674	Belleview Ave., Road & Brdg.	Arapahoe	15,000.00
676	State Highway 19-S South to County line	Logan	2,000.00
682	Br. on Road, N. from Ft. Morgan	Morgan	15,000.00
684	S. H. 24-S., Grad. & Surf.	Sedgwick	5,000.00
685	Bridge on State High., 20-S	Washington	6,000.00
686	State Highway 2, Larimer Co. line to State line	Weld	3,000.00
689	S. H. 66, East through Co.	Weld	5,000.00
691	Grad. & Surf. State High., 32	Lincoln	10,000.00
692	Grad. & Surf. S. H. 30	Lincoln	6,500.00
693	Grad. & Surf., LaVeta Pass	Huerfano	10,000.00

*Forest Aid Projects.

Maintenance Patrol Wins Approval

(Continued from Page One)

manufacturers. Use of trucks brought better roads. Then the truck manufacturers built bigger trucks and the type of road had to be changed to carry the increased loads.

This race continued until the road authorities saw it was a losing game. They were unable to keep the type of road up to the truck manufacturers requirements. Some of the state road authorities appealed to their legislatures and obtained laws limiting the load to be carried by users of highways.

At the present time nearly all the states of the Union, including Colorado, have such laws on their statute books.

Before the days of trucks it may not have been necessary for a patrol or constant maintenance of the highways, but since the trucks business has developed all over the country, it is of vital importance to patrol our roads with maintenance crews and see to it that all damage made by the trucks is repaired immediately.

It has been found that better roads can be maintained at a low cost by promptly repairing every break in the highways. If allowed to go on day after day, the road will soon have to be practically rebuilt.

This evolution in methods of maintenance and patroling of the main state highways thruout the state by the several counties is being given a tryout. To date splendid results have been obtained where the patrol system has been in effect for a month or more. In every case the county commissioners have become enthusiastic boosters of the patrol system.

The patrol system has proven its worth in other states, where the maintenance problems are much more difficult than in Colorado, and I feel confident that by the close of the present year the system will have won favor in this state, and likewise the approval of the dyed-in-the-wool pessimist.

About fifty per cent of the state highway mileage, totaling some 4,000 miles, will be maintained by the patrol system this year.

Surveyors Open New Scenic Highway

(Continued from Page Two)

mediately above the Denver & Rio Grande Western railroad bridge at that point. The bridge will have a span of 235 ft., towering 125 ft. above the river. If built this will be one of the show bridges of Colorado, and, I believe, the highest bridge in the state.

"It will form a link in the Rainbow Route to the Blue Mesa.

"Three surveys were made of the line. The first had one mile of 7 percent grade and a 100 ft. tunnel at a cost of about $30,000 per mile. On the second survey we had a switchback, using a curve of 60 ft. radius taking a 35 ft. cut, following the line of the present road. This eliminated all but 2,000 ft. of the 7 per cent grade, and reduced out cost by around $10,000.

"The third survey, using the high bridge, eliminates all of the 7 per cent grade, reduces the cost of excavation grading to $25,000; allows us to build the new road while using the old, and will permit old road being used as a cattle and sheep drive after the completion of the new road.

"It also eliminates one grade crossing of the D. & R. G. W. railroad and takes the road out of danger of floods in the Gunnison river. The length of the proposed project is three miles."

At present the road is closed by snow, but the roads officials of that district hope to have it open for tourist traffic by May 15. The new road will be 18 feet wide and will make available to the auto tourists one of the finest scenic routes in the state. Total cost of the project is estimated at $90,000.

Mr. Reno is one of the engineers who located the famous Moffat railroad line in 1904 and 1905. He was with a party of twenty-two living in tents that was engaged for ten months locating the line from the top of Rawlins Pass down thru Arrow, Idlewild, Fraser and Tabernash. The snow was three and four feet deep and the thermometer below zero all winter.

The party lost just two days work all winter on account of high winds.

On the present survey at Sapinero no attempt was made to work before 9:30 a. m. The weather was so cold that the oil froze in the transit and it was necessary for the transit man to hold his hand over the screw to get it warm enough to turn.

The whole survey is considered one of the most difficult that has ever been attempted by the engineering division of the State Highway Department and was carried on under the supervision of Captain John J. Vandemoer, Division Engineer, with headquarters at Grand Junction, who also is an old Moffat Line Engineer.

Colorado 7% Road System Selected

(Continued from Page Eight)

Durango, Silverton, Ouray, Ridgway, Montrose, Delta, Grand Junction, DeBeque, Rifle and Meeker to Craig.

From the Nebraska line, through Julesburg, Brush, Fort Morgan, Greeley, Platteville, Brighton, Denver, Idaho Springs, Berthoud Pass, Granby, Kremmling, Steamboat Springs, Hayden, Craig, Maybell to the Utah line.

From the Nebraska line, through Holyoke, Haxtum, Fleming and Sterling. At Sterling this road connects with the highway coming from Julesburg.

From the Kansas line, through Burlington, Stratton, Limon, Agate, Bennett, Watkins and Denver. At Denver this road connects with the road to the Utah line via Berthoud Pass.

From the Kansas line through Burlington, Stratton, Limon, Mattison, Ramah, Peyton, Colorado Springs, Ute Pass, Divide, Lake George, Hartsel, Buena Vista, Leadville, Tennessee Pass, Redcliffe, Wolcott, Glenwood Springs, Rifle, DeBeque, Grand Junction, Fruita, Mack to the Utah line.

From the Kansas line, through Holly, Lamar, Las Animas, La Junta, Manzanola, Pueblo, Florence, Canon City, Salida and Buena Vista. At Buena Vista this road connects with the road coming from Colorado Springs via Ute Pass.

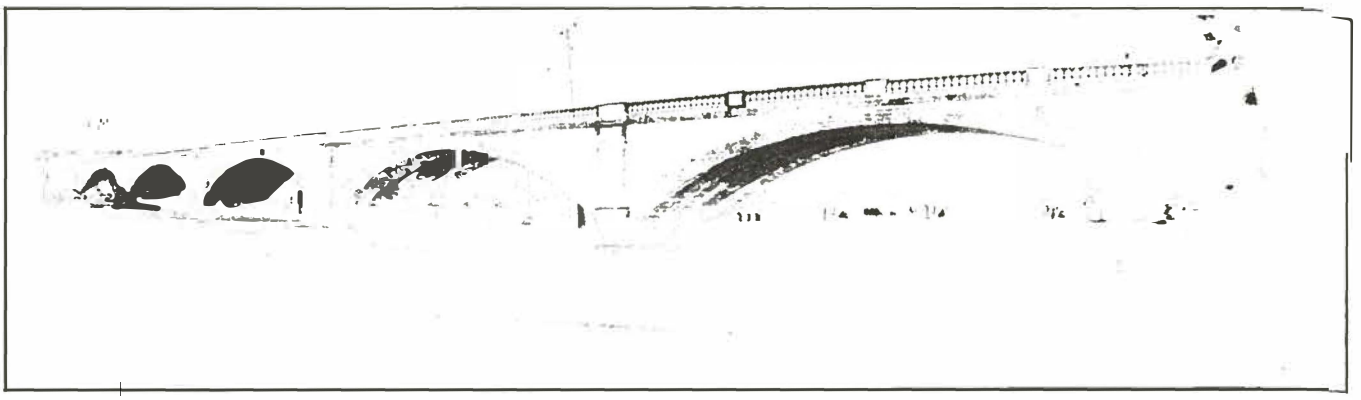
From Salida west over Monarch Pass, through Gunnison, Sapinero, Montrose, Delta and Grand Junction. At Grand Junction this road connects with the highway coming from Leadville via Tennessee Pass.

From Walsenburg, via La Veta Pass, through Blanca, Alamosa, Monte Vista, Del Norte, South Ford, Wolfe Creek Pass, Pagosa Springs, Bayfield, Durango, Cortez, Dolores to the Utah line.

From Loveland, through Estes Park, via Fall River road and Millner Pass, Grand Lake and Granby. At Granby this road connects with the highway from Denver to the Utah line via Berthoud Pass.

From Denver, through Morrison, Turkey Creek canon, Conifer, Bailey's, Jefferson, Fairplay and Buena Vista. At Buena Vista this road connects with the highways coming from Colorado Springs and Pueblo.

From the New Mexico line north of Chama, over Cumbres Pass, through Conejos, Alamosa, Monte Vista, Saguache, Poncha Pass, Salida, Buena Vista, Leadville and Wolcott to Kremmling.



LONGEST CONCRETE BRIDGE IN COLORADO.

New Huerfano River Highway Structure Has Five 80-ft. Spans—Splendid Example of Concrete Construction.

By ROBERT DUBOIS,
Bridge Engineer, State Highway Department.

The Huerfano river concrete bridge is open to traffic. It represents one of the largest bridges of concrete type in Colorado, and likewise is one of the finest examples of concrete bridge construction in the state.

It is located about 20 miles east of Pueblo, on the new Santa Fe Trail, a highway that is not only one of the main roads in the Arkansas Valley, but also is the artery for the heavy tourist traffic from Kansas, Oklahoma and Texas to the mountain playgrounds.

The former bridge across the Huerfano was of combination trusses, built almost 30 years ago, two spans of which failed, because weakened by the drillings of woodpeckers at the hip joints. The new bridge is of concrete arches, five 80-ft. spans. The foundations all reach bedrock, though at one end it was necessary to go down 20 ft. below the stream bed.

The cofferdams were sheathed with a single layer of Oregon fir, two by sixes. That the cofferdams for the 20-ft. hole had to withstand considerable pressure is attested by the fact that a piece of fir 2 by 6 incorporated into the walling came out only ¾-in thick. In spite of this pressure, however, no great difficulty was experienced with the cofferdam, which did not make at any time more water than a single 6-in. pump could handle.

When one cofferdam was down about 8 feet, and another all assembled, the river came up and removed them, taking along also some of the equipment.

Piling for the centering was cut locally by the contractor, cottonwood being used. Five-pile bents, on a maximum of 12-ft. centers, were used. The segments were made of narrow strips cut to the curve of the arch, nailed onto two by twelves. These were lagged with two by sixes. The centering for all the arches, and the outside forms for the spandrel walls, were finished, and the arch steel tied in place, before any of the arch concrete was run.

Once started, however, one ring 5-ft. wide was poured over one arch each day, giving high yardage for the contractor's estimate that month. The spandrel walls required considerable care. Not only was it necessary to pour a vertical lift 18-ft. in a continuous run, but, there being no overhanging handrel along the top, especial attention had to be given the bracing to achieve a true, plumb, wall. Excellent results were attained.

After much of the dirt fill was in place, the centering was struck and the handrail poured. Here again much attention was given to attaining true lines, with the desired results.

The concrete work was almost done, when the flood of June hit the Arkansas Valley, tying up temporarily most of the roads. Part of the old temporary crossing was taken out, and since bridge timbers were badly needed for temporary bridges on other crossings, it was decided to open the new bridge for traffic incomplete as it was, and not attempt to repair the old bridge, but instead to use that bridge material for a temporary bridge over the St. Charles River, near Pueblo.

A long fill was put in on the Pueblo end of the bridge, improving greatly both the grade and the alignment. The new bridge also removes a bad section of road, there having been a sharp, blind turn down a steep hill to the valley. The new bridge has straight approaches on easy grades.

The bridge was designed for the State Highway Department by the writer, who also did the resident engineering work during construction. It was built by the Pueblo Bridge and Construction Company, under contract. Their foreman was Thomas Gross, who produced a bridge of unusually good appearance.

The Uncompahgre Valley

This picturesque, fertile area is sometimes described as the "Garden Spot of Colorado."

It lies in portions of Delta, Montrose and Ouray counties

Here is located the famous Gunnison Tunnel reclamation project, which supplies water for over 90,000 acres of rich agricultural lands. It is the largest irrigation system in Colorado, and one of the most successful reclamation projects in the country.

The Uncompahgre Valley boasts of:

One of the very best general farming districts in Colorado.
Plentiful water supply.
No crop failures.
Extremely fertile soil.
Unusually fine fruit orchards.
Fine beet fields.
Fastest growing section in the State.
One of the most popular transcontinental auto tourist centers.
Surrounded by picturesque mountain scenery.
Especially noted for its livestock.
Splendid mountain ranges for cattle.
Unexcelled alfalfa fields.
Lands particularly adapted to cultivation of small grain.
Phenomenal agricultural yields.
Miles and miles of good roads.
Scores of beautiful lakes in nearby mountains.

A very large portion of the Uncompahgre Valley is supplied with rural electric service, which is utilized for home lighting and general farm power purposes.

Yet the development of the Valley is only in its infancy. To accelerate its development, this company is giving its undivided support. Its prosperity means our prosperity.

Good roads are indispensable to the progress and happiness of every community.

That's the reason for this advertisement. We are desirous of seeing more and better highways not alone in the Uncompahgre Valley, but the entire State of Colorado.

THE WESTERN COLORADO POWER CO.

IF IT'S A PETROLEUM PRODUCT WE HAVE IT

Our Fleet of Trucks are at your service

Our staff of Lubricating Experts will advise and assist you in the most modern methods of correct Lubricating.

THIS ADVISORY SERVICE is at your disposal. It is supplemented by an organization throughly experienced in Motor power necessities.

Tractor Oils to meet every requirement.
Write us for Information.

Western Distributors for the Famous Quaker State Motor Oils and Greases.

Sommers Gasoline and Oils have been specified for the 20 U. S. Army airplanes which will maneuver over Denver and Colorado on May 24-29

DENVER FILLING STATIONS
North end of 20th St. viaduct
W. 49th Ave. and Federal Boulevard
15th St. and Cleveland Pl.

The Sommers OIL COMPANY

E. 29th Ave. and York St.
Overland Park
951 Santa Fe Drive
Littleton, Colorado

Gasoline & Kerosene
Oils & Greases

WHOLESALE WAREHOUSE, 1570 W. 12th AVE.
DENVER, COLORADO.

PHONES CHAMPA 2623-4

Austin Rip Snorter in conjunction with 10-ton Holt "Caterpillar" Tractor

The efficient and economical method for road construction and maintenance.

Many Colorado cities and counties are using the above machinery and their low cost of operation, if known by you, we believe, might change your present methods.

We would like to have the opportunity of giving you further details.

H. P. WILSON & COMPANY

DISTRIBUTORS OF

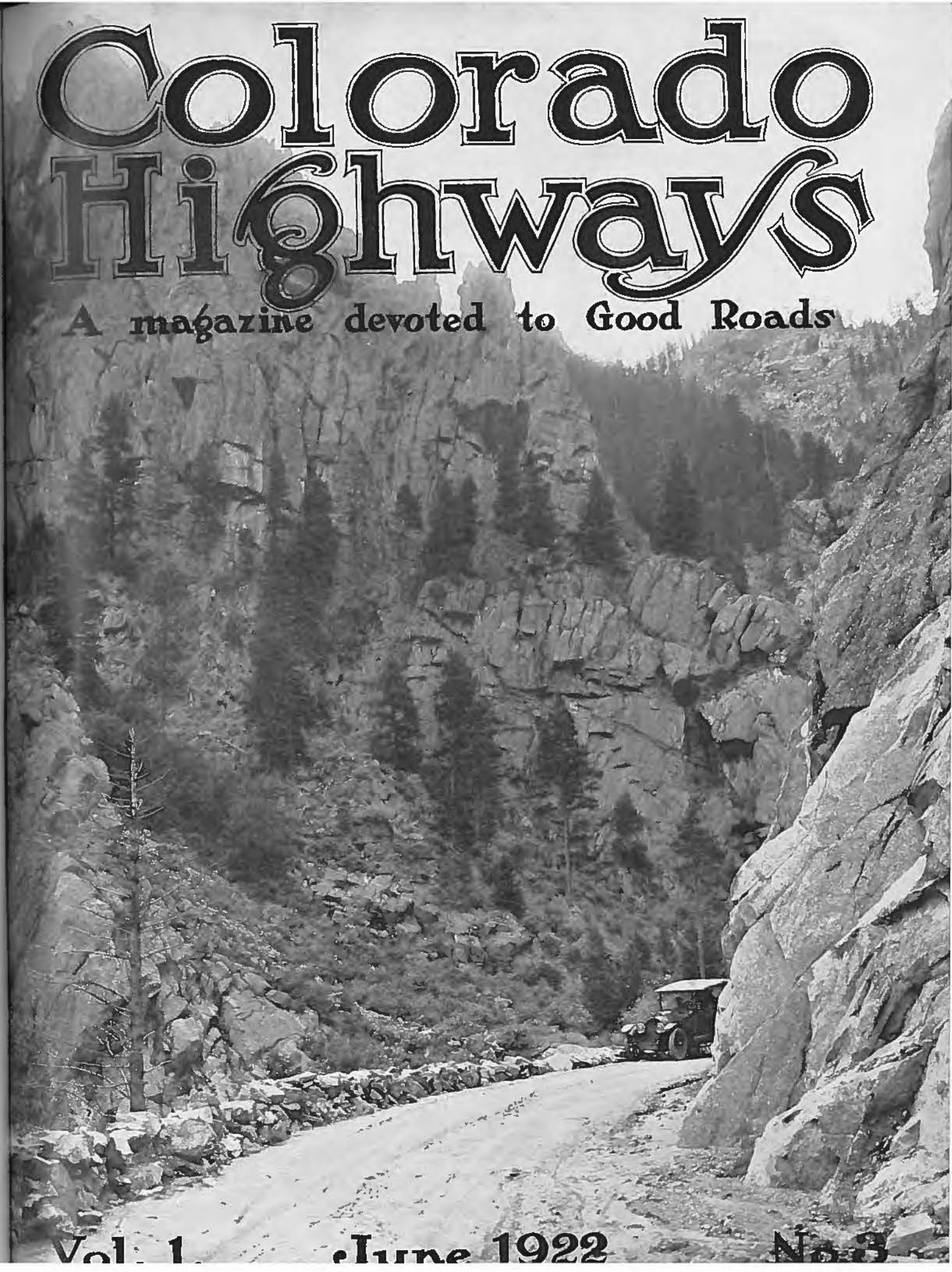
"Caterpillar" Tractors and Contractors' Equipment

DENVER, COLORADO

THE BRADFORD-ROBINSON PTG. CO., DENVER

Colorado Highways

A magazine devoted to Good Roads



Vol. 1 June 1922 No. 3

AVERY
One-Man "Road-Razer"

Shave Your Roads Smooth with an Avery One-Man "Road-Razer"

Maintaining a road frequently after it is built, to preserve drainage, is just as important as building the road properly in the first place to get drainage.

The old way to maintain roads and streets was to use drags of different kinds. But dragging has been found to be very unsatisfactory.

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With the "Road-Razer" you do not merely drag your road and streets. You **shave** them. The blade has a sharp cutting edge. It doesn't skim along the surface jumping from one hard clump to another—it doesn't drop into the chuck-holes and gouge them ont deeper: Instead, it cuts into the hard bumps, humps and ridges and shaves them all off. Then the "wide shaving" blade carries the dirt along to fill in the ruts, boles and depressions, leaving a smnoth road behind. The blade is also flexible, being made in three sections, so that you can fit or make any curve or crown of the road desired.

The "Road-Razer" way is the quickest, cheapest and most efficient method of maintenance devised. It is at last the solution to the dirt and gravel road maintenance problem. It solves the problem of impassable roads and streets whether impassable because of mnd nr snow, as it shaves them smooth in summer and keeps them open when the snow falls.

The Avery One-Man "Road-Razer" is **sold on approval** on the basis of **no-settlement-until-you-are-satisfied.** We will ship one of these machines anywhere on payment of freight, subject to acceptance and settlement after satisfactory demonstration. Yon don't take any chances at all in finding out about this machine. We show you what it will do right on **your own roads or streets.**

Be the man who really brings GOOD ROADS to your community for the FIRST time. You can do it with the use of this machine—the only machine of its kind and the result of many years of experience in building road machinery.

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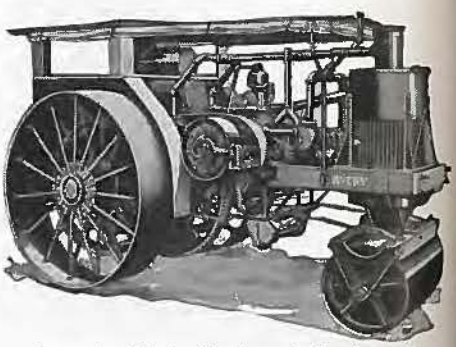
Avery Special Road Tractors are guaranteed to build roads 50% cheaper than animal power—and better and cheaper than other tractors.



Avery Road-Roller-Tractor. Packs the road as you build it—squeezes out the air pockets and leaves a compact smooth road ready for traffic.

Avery Six-Cylinder Speed Truck. With good "Farm-to-market" roads, there is a demand for dependable trucks.

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Colorado Highways
"BETTER ROADS"
VOLUME I. JUNE, 1922. NUMBER 3.

New Roads Without More Taxes

Proposed Measure Would Permit Use of Motor Vehicle Tax to Retire $6,000,000 Highway Bonds

BY EDWIN MITCHELL
Auditor, State Highway Department.

STATES and localities are now spending most of their money for two purposes—schools and roads. There seems to be almost no limit to the need for additional funds for these two purposes alone.

In order to get the good roads that are economically justifiable, our system of Highway financing and operation must be developed.

The present generation wants good roads and if we turn over to the future generation an asset in the form of good roads, the future generation should pay for the privilege of participating in the benefit of that asset. The present taxpayers should not, by direct taxation, pay the entire cost of highways which will also be used by future generations. Highways should be built by Bond Issues based on a period of forty to fifty years so that each generation may bear its just share.

The one mill levy, which Colorado has for road purposes, is a direct charge against all taxable property. This charge is offset, however, for land values are increased to a certain extent by the roads leading to it. These roads would have been built as a matter of public policy and the one mill levy would have furnished good roads for the horse and wagon. The auto, however, has supplanted the horse and wagon and the auto owner demands better roads. He demands a class of roads that once built and properly maintained, will last for all time. He not only wants a better class of roads, but he wants them now. Taxable property should not bear the entire cost of the class of roads that the autoist demands, and with the present general receipts of the Highway Department, this class of roads cannot be built now. The logical conclusion is, that if the roads are built now, the autoist—the user of the roads—should at least pay the additional cost of the class of road that he demands. With the large number of autos now using the highways, depreciation charges, caused from driving over poor roads, requires that we build good roads now. To build good roads now bonds must be issued.

Roads may be built and paid for within the year but unless our program calls for the proper maintenance of these roads after being built, we have but wasted our time and money. Maintenance must step in after the road has been built and forever maintain it to the original standard. This will include for maintenance a much broader field of operation than has hitherto been given to it. The road-bed with its proper "fills and cuts", its concrete culverts and bridges, will be there for all time. The surface will wear out. Under maintenance the road-bed will be resurfaced. A standard road will thus be passed on, as an asset, to future generations. Why then should not future generations pay a portion of the original cost? Each generation must pay its part of the original cost and its own maintenance costs.

If we have now decided that the taxable property should not be further taxed; that better roads should be built at once; that maintenance shall be charged with keeping the roads up to the standard, so that an asset will be passed on to posterity and that posterity should participate in the cost of the roads, then our only solution of the problem is to issue long time bonds.

Can bonds be issued without increased taxation? The answer is—yes. The receipts of the Highway Department include one-half the fees received from the sale of Motor Vehicle Licenses. This now amounts to about $500,000.00 per annum. If licenses were issued for two years instead of one, a saving of practically $100,000.00 could be made biennially and the saving would be added to the above sum. The license fee will be increased eventually and especially the license fee on trucks, which are now being subsidized by the railroads.

The Government, through what is known as Federal Aid, apportions to each state a certain amount of money for road construction, with the proviso that we meet the same on a certain percentage basis. To meet this Federal Aid in 1923-4-5-6, we will have to have a bond issue of $1,500,000.00 for each of the above years. With our other receipts this will

(Continued on page 13)

Where the Wary Trout Hides in Deep Pools—Poudre River Canon Scene

Farmers Benefit By Bond Money

Fine Results Obtained From Employment of Farm Teams on Roads in Seventh Division

BY A. B. COLLINS,
Division Engineer, State Highway Department.

THE Seventh Division is comprised of Larimer, Weld, Morgan, Logan, Sedgwick, Phillips, Yuma, and Washington counties, the banner agricultnral connties of the State. The 1922 Bndget of the State Highway Department awarded to the Division a grand total of $1,162,457.00 for new construction work, divided in its use as follows:

For Federal Aid Purposes, all of which, in this Division, is confined to concrete paving projects, $325,000.00.

For State Projects, $337,457.00.

Bond money for 1921 and 1922, apportioned to the various connties and to be expended on the State Highways under the direct snpervision of the State Highbway Departinent, $243,243.

In determining the use of this Bond Money, the various Boards of County Commissioners recognize the necessity of co-ordinating the Bond and State Project expenditnres in improving and connecting into a continuous system, the Highways of the Division. With the vast amount of work to be performed with the funds at hand, it was obvious that to obtain a connected system of improved Highways, financial corners mnst be sharply cnt. Force acconnt and day labor methods mnst be eliminated and contracts avoided wherever possible. As an alternative, it was decided to nse available farm teams, and make their earnings contingent upon the work performed.

From a careful observation of the work accomplished by energetic workers with good teams, working consistently for eight hours a day, due consideration being given tn varying lengths of haul, size and condition of horses and equipment, etc., it was determined to offer twenty-five cents per yard mile for banling various kinds of surfacing material, and fifteen cents per yard for the labor charge of loading; this price to be effective throughout the Division.

The farmers in the different counties in the Division responded freely to this offer and at no time has the work been handicapped by shortage of teams. Since the middle of March, employment has been furnished to nver a thousand teams, operating on this basis, and the resnlts have been mnst satisfactory. It is estimated tbat by fall, at least two thousand farmers will have participated in the work in tbe Division. The distribntion of State fnnds in this manner is of inestimable benefit to the commnnities in which the work is conducted.

The system employed precludes the possibility of argnment over pay, it being possible for the haulers to know each nigbt the amount of their wages for the day. Working from the same pit, under identically the same conditions, a friendly spirit of rivalry prevails among the workers as to the amount of work they accomplish, with the result that the laborers are well contented, reasonably paid and the State and County receive one dollar's worth of road work for every dollar expended.

In conducting the work in this manner, the available pits along the road to be improved are located and distances determined from the pits to the roadway, the work is stationed off in hundred foot stations, and checkers with specially prepared check sheets assigned to the Project. These check sheets carry across the top margin, the various team numbers which have been assigned the haulers when they go to work. These numbers together with the name of the man to whom the number has been assigned are entered in a ledger in the office. The check sheets show each day the nnmbers of the stations at which the different teams have unloaded, the number of loads hauled, the amount of the load, the hours worked, etc. At night these station numbers are reduced to distances entered in the ledger under the name and nnmber of the team and the day's earnings figured accordingly.

The wages vary considerably, as the teams are permitted to haul when and as long as they care to. It is noticeable that operating from the same pit for the same number of hours, one man may earn $3.50 per day and his neighbor $7.50 these differences arising throngh a personal equation of the workers and the use nf more efficient teams. The men, however, are qnick to recognize the contributing factors to the difference in earnings, and no dissatisfaction arises from this source.

Depending primarily upon the length of the hauls necessary, the various Projects in the Division are runoing fr

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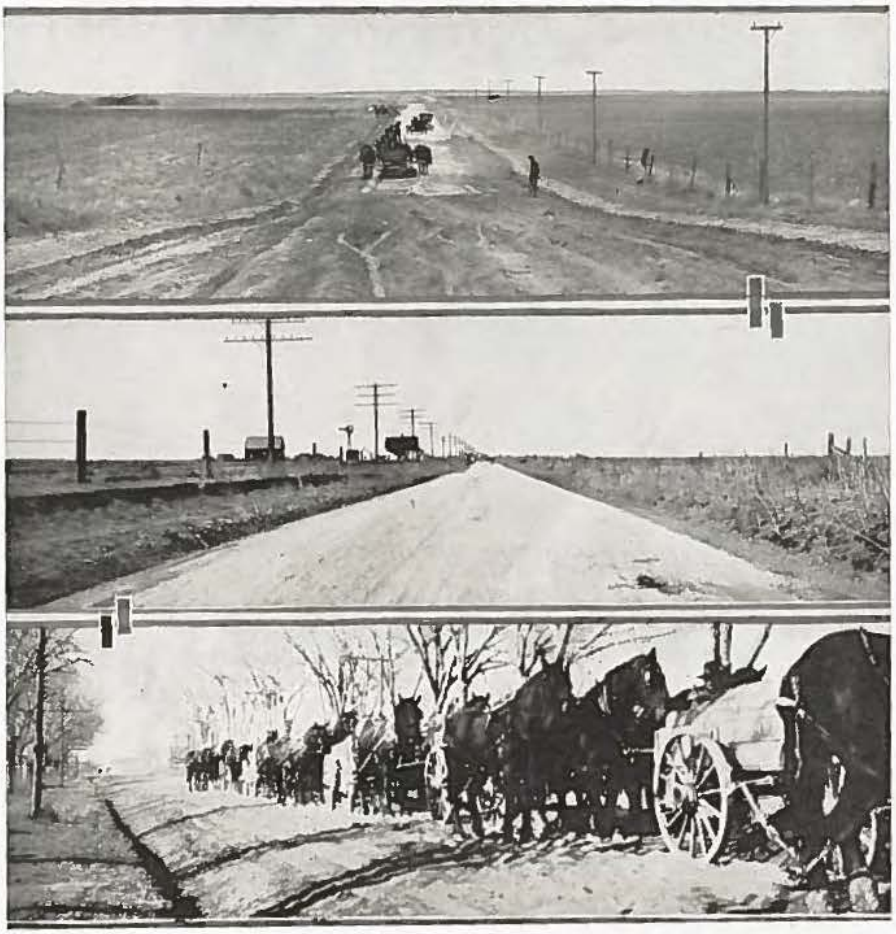

Top—Hard surfacing south of Holyoke, Colo., with farm teams. Phillips County Bond money.

Center—Section of completed roadway—Golden Rod Highway—State Project No. 679, Brush to Akron. Surfaced with farm teams. 500 cubic yards gravel per mile.

Below—Farm teams delivering gravel surfacing for State Project No. 679, south of Brush in Morgan County. 120 farm teams employed on this work. Golden Rod Highway.

Tenderfoot Trail Real Thriller

Dream of Years Realized When Citizens of Salida Donate Services in Building Scenic Highway

BY O. R. MEACHAM,
Editor, Salida Record.

ACOMMENDable civic improvement, financed entirely by the public spirited citizens of Salida, Colorado, both in the way of volunteer labor and money contributions, is just now nearing completion—the Tenderfoot Spiral Drive illustrated herewith.

It is destined to become one of the most popular short automobile drives in the entire Rocky Mountain region, both from a scenic point of view and from the "thrills" experienced by those who look over a vast panorama of exqnisite mountain scenery and fertile valleys.

Punch Bowl—Salida's Spiral Drive

In some places the road threads around the monntain like a huge serpent, and seemingly almost straight down is the Arkansas river and the City of Salida, a beautiful mountain metropolis of 5,000 people.

The road gains an elevation of about 600 feet in a distance of 1.6 miles. It is wide enough for two autos to pass and therefore perfectly safe.

This project has been in the minds of the citizens of this city for many years, but it remained for the Lions Club, recently organized, to concentrate the community spirit and then leaven it with the "pep" characteristic of this organization, and a dream of years became a reality.

From this picturesque driveway may be seen many points of interest, not the least of which is the "Angel of Shavano", which has gained such wide prominence during the past year, and it does not need a powerful stretch of the imagination to see on the face of this grand old mountain, which is higher than Pike's Peak, a snow angel with outstretched arms.

The collegiate group of mountains, Princeton, Harvard and Yale, the historical Ouray and the old chief's wife, Chipeta, are to be seen at their best from this vantage point. The Rio Grande railroad, just beginning its winding ascent to the Continental Divide and over Marshall Pass, the silvery Arkansas river and its tributary, the South Arkansas, between which nestles the City of Salida, are all spread out before the visitor like an immense painting which must be seen to be appreciated.

One great factor in the building of this scenic highway was the help obtained from the boys of the state reformatory only 25 miles away, through the courtesy of Warden Capp. On several occasions a force of 150 men were at work two and three days at a time. The railroad boys arranged for a day each week and at such times the line of survey resembled an army of ants on the march. The Elks had "days", and citizens in groups were to be seen at all times.

It was the personification of co-operation, and the new-born spirit still lives to conquer even greater tasks.

Arkansas Valley Commissioners Hold Road Meeting at Pueblo

Lower taxes was the principal topic of discussion at the bi-monthly meeting of the Arkansas Valley Association of County Commissioners held in Pueblo on June 9.

A large attendance from the Fourth District was present. W. L. Rees, president of the association, presided at the meeting.

Those attending were: Crowley county: E. H. Muir, clerk; J. E. Donley, J. H. Cowden, N. F. Tarbox, commissioners; Huerfano county; Frank Tafoya, clerk; William Russell, Clyde Benedict, Wirt Bailey, John Rebel, commissioners; Las Animas county: Juan B. Romero, clerk; L. F. Easterly, Joseph Ray, A. G. Prosser, commissioners; Otero county: Cram Walker, clerk; W. F. Green, George Barr, J. E. Stubbs, commissioners; Pueblo county: William Barber, clerk; W. L. Rees, J. P. Harbour, O. G. Smith, commissioners; Prowers county; W. B. Gordon, county attorney, H. McGrath, commissioner.

O. G. Smith, member of the Pueblo commission, led the discussion on taxes with the reading of a paper on the benefits and burdens of state tax. He condemned the method of collecting taxes a year after they are assessed and cited instances where the counties have lost thousands of dollars on personal property.

Robert H. Higgins, superintendent of maintenance of the State Highway Department, made a short talk on road affairs.

The association passed a resolution in which Major L. D. Blauvelt is praised for efficient handling of State Highway work for the past year. Regret is also expressed at his leaving the Department to take up the duties of chief engineer for the Colorado tunnel commission.

George L. L. Gann, member of the State Highway Advisory Board, explained to the commissioners the proposed $6,000,000 bond issue to meet Federal Aid funds for the next four years.

"It is simply a case of whether the people of Colorado want to get $6,000,000 for nothing or not", said Mr. Gann. "By the terms of the proposed bill, taxes will not be increased. The state treasurer is authorized to use the motor vehicle license tax receipts to pay the interest on the bonds and establish a sinking fund."

While the association took no official action in reference to the bond issue, the individual members appeared to favor the proposed bill.

President Rees called attention to the destructive practice of over-loading trucks. He advocated a higher tax on the trucks used exclusively for commercial purposes. It was suggested that the motor vehicle tax be doubled and a law passed taking automobiles and trucks ont of the personal property class.

The next meeting of the association will be held at Walsenburg on July 29. This date was set in order to allow the members to attend a commissioners' meeting schednled at Fairplay on July 15.

AUTOISTS ON HONOR

Oakland County, Michigan, has adopted a new system of motorcycle police which carries with it a requirement that the traffic officers treat all fast drivers with due respect and solicit their co-operation in making the Oakland highways safe. The county officers believe that the exercise of common sense by traffic officers will do more toward stopping excessive speeding than the old plan of hauling the speedsters before the court and subjecting them to a heavy fine.

Those who violate the speed laws are put upon their honor to obey the laws and to assist the officers to do their duty rather than to invite their antagonism.

It is believed that this system will serve to abolish abuse to which motorists have been snbjected on the conntry highways.

The U. S. Forest Service will spent $700,000 this year on forest roads in Montana, according to agreements recently completed.

Colorado Highways

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Owing to the necessarily limited edition of this publication, it will be impossible to distribute it free to any persons or institutions other than the state and county officials actually engaged in the planning or construction of highways, instructors in highway engineering, newspapers and periodicals, and civic associations. Others desiring to obtain Colorado Highways can do so by sending 10 cents for each number desired. Associations desiring to distribute the magazine can obtain it at cost in lots of from 500 copies up.

Subscription Price, $1.00 per year.

EDITORIAL COMMENT.

Marked improvement of Colorado roads is in evidence in nearly every county in the state.

Reports indicate that greater improvements are to be expected before the end of the present building season. Scores of projects are now under way.

Plans for scores of others are being drafted. It means that Colorado is now in the midst of its greatest road building program.

It must be expected for a time that tourists will be inconvenienced by detours with this large number of projects under way. But considering the weather conditions which have disrupted construction operations, the roads and detours are in splendid condition.

Much of this is due to the efficient service rendered by the maintenance crews of the counties of the seven highway districts. The work of these patrols is now under full swing.

All of which bids fair for the traveling public.

Too much importance can not be attached to the nationwide "Safety First" campaign, which started on June 1.

Statistics show that 1,273 persons were killed on grade crossings in 1920. The U. S. Bureau of Standards has not yet announced the figures for last year.

Records of the bureau show there are 251,939 railroad crossings in the country. Only 399 were eliminated in 1921. Figures show that each elimination cost $50,000.

The object of the "Careful Crossing Campaign" is to educate the public to think and act "safety first."

The campaign has the full support of the State Highway Department. Wherever possible, grade crossings are being eliminated in this state, with either overhead bridges or subways.

A striking example of the work being done by Colorado in this direction is found in the new construction on the Denver-Colorado Springs highway.

One of the most dangerous crossings in the state is to be eliminated at Wolhurst farm. Near Grand Junction three crossings are being eliminated in one stretch of roadway.

Soon the two crossings at Broomfield on the Denver-Boulder Highway are to be eliminated by a cut-off. Others too numerous to mention are also marked for elimination.

In this work the State Highway Department has the support of the U. S. Bureau of Public Roads.

Service is the watchword of big business today.

Buyers of all kinds of commodities have been taught the value of service. They now look for it and weigh it in dollars and cents.

If that is true in merchandise, why not in road building and maintenance.

Service is what the taxpayers buy when they authorize bond issues and pay their taxes. Likewise the automobile owner when he pays his license fee is entitled to service.

And right here it might be said that road officials are realizing more each day the importance of rendering service to those who travel over the roads.

Bad places in the roads should be fixed immediately. To wait for them to become impassable is inexcusable. It should not be necessary for the traveling public to make complaint.

By fixing the bad places as they appear the county and auto owners save money.

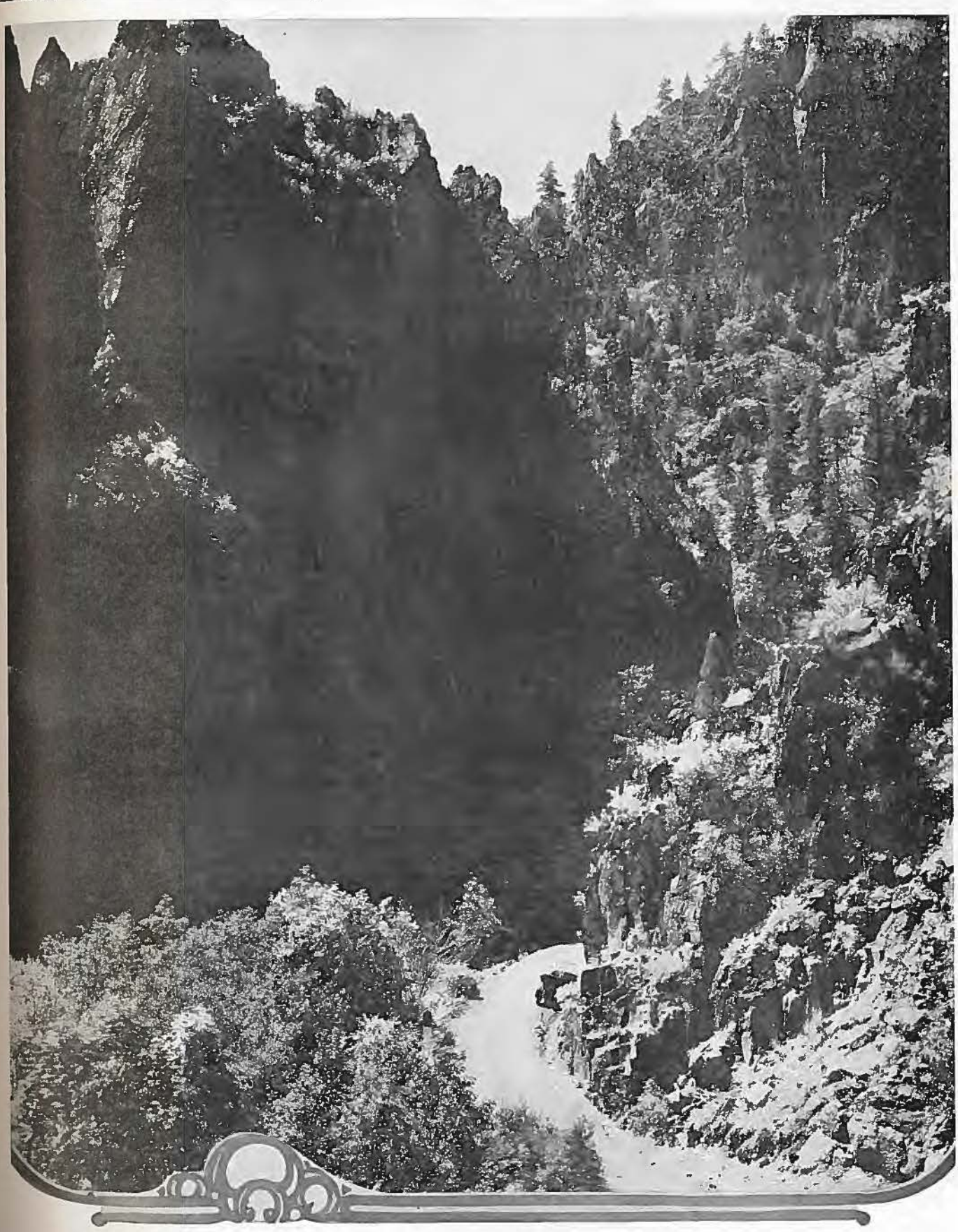
A large portion of the funds derived from the recent highway bond issue apportioned to the counties of the Seventh District, is finding its way into the pockets of the farmers.

A system has been worked out whereby the farmers hire out their teams to the road builders in the various counties. They are paid by the load and the system works out so that each farmer receives pay for the actual amount of work he does.

Records of the department show that some startling economies, as well as splendid results have been accomplished already under the plan.

It is one of the finest examples of "more miles of road per dollar" to be found in the State.

Fleeting Vistas, Endless Curves, Vast Cliffs! Phantom Route



The road up Phantom Canon, Fremont County, that once was a railroad right-of-way

Paved Roads Draw Tourists

Traffic Census Reveals Popularity of Colorado Springs-Manitou Concrete Highway to Peak Resorts

BY E. E. JACKSON
Secretary Chamber of Commerce, Colorado Springs, Colo.

EACH year an increasing number of automobile tourists visit the Colorado mountain wonderland. Every year sees the main traveled highways to the mountain playgrounds in a better state of improvement and an increasing number of tourists from every state in the Union avail themselves of this comparatively new method of "seeing America".

That Colorado appreciates these visits is shown by the fact that much has been done to make their stay comfortable. Not long ago, when travel was principally by railroad, satisfactory hotels were the foremost requirement. But today, when thousands of tourists arrive by automobile, another item is needed to make travel comfortable or even possible. This item is improved roads.

One of the heaviest traveled roads in the state leads out of Colorado Springs to Manitou and the mountain region beyond. This road carries all the traffic bound for the Garden of the Gods, Cave of the Winds, Balanced Rock, Pike's Peak, and other spots of scenic interest. From it many entrancing views may be seen and Pike's Peak dominates the landscape for many miles.

Manitou-Colorado Springs, Colorado—Pike's Peak in Background

An official traffic census taken in the latter part of August, 1920, reveals the popularity of this route. Between the hours of 7:00 a. m. and 11:00 p. m., the average number of motor-driven vehicles passing a given point during a 10-day period was six cars per minute. The peak load was reached between 4 and 6 p. m., when there was an average of one car each 5½ seconds. This traffic count included the trucks which use this road for hauling supplies to Manitou and the mountain resorts beyond.

A part of the route is now paved with concrete and an extension which will bring the pavement almost into Manitou is planned. Along most of the route the pavement consists of two 12-foot strips of concrete, 7 inches thick, one strip on each side of a double track car line.

This year an additional mile of concrete paving will be placed from the city limits of Manitou to connect with the city pavement, and the gap between the city limits and the "Manitou Road" will be filled as soon as some flood protection work now under way can be completed. Ruxton Avenue, in Manitou, running up to the Soda Springs near the Cog Road depot will also be concrete paved this year.

Arriving at Manitou, the tourist is again on concrete pavement. The highway passes through the city over Manitou Avenue, the principal street, which makes many turns to avoid excessive grades. Manitou nestles snugly in the hills at the foot of Pike's Peak and viewed from above, her streets resemble a series of terraces.

The dense traffic and the destructive effect of heavy rains on the steep grades made a permanent covering for the street imperative. Approximately $3,500 was expended each year to keep the street in passable condition before the concrete pavement was placed. The work of paving Manitou Avenue was begun in the spring of 1921, and special efforts were made to have the street completed and opened to traffic by June 15, when the heavy tourist travel begins. Three mixers were used and the job was completed before the time set. The pavement is 6 inches thick with a 12-inch monolithic curb next to the car tracks.

Another heavily traveled route in this vicinity was paved with concrete. This road leads south from Colorado Springs, 3½ miles to the beautiful Broadmoor Hotel. Most of the pavement was placed during 1920, but sections on newly made fills were not paved until 1921 to allow ample time for settlement. The pavement is 18 feet wide and was built under the direction of the Colorado Highway Department.

The cost of paving this road was shared by the Federal Government, the State of Colorado and Spencer Penrose, the owner of the Broadmoor Hotel. The new road eliminates the steep grades in the former road and enables the tourist to enjoy the scenery along the route. West of the road towers the impressive bulk of Pike's Peak and the Continental Divide. On the east lie the great plains of Colorado. The road climbs steadily upward, ending at the hotel at the very base of the foothills.

Colorado has always been the tourist's favorite playground. And now that the mountain fastnesses are being penetrated by concrete highways, Colorado has another attraction which lures the motor tourist to the "Queen Jewel of the Rockies." Thus both the tourist and the people of Colorado reap the benefits of the paved roads.

AUTOISTS APPRECIATE NEW ROAD WORK

Durango.—Local men, recently making the trip over the state highway between Pagosa Springs and Durango, commend very highly the work of Contractors Shields and Kyle on the road work they are now doing between Pagosa and Dyke.

So efficiently and yet so differently is this piece of road work being done that it is noticeable to those who have occasion to use it. The stretch of highway to be improved is not torn up in an impassable condition, but on the other hand only a short piece at a time and then before another stretch is torn up, what is already started is completed with a graveled surface.

The contractors are using modern machinery and extra shifts of men to complete the improvement in the shortest time possible.—Durango Herald.

SAGUACHE ROADS APPROVED

Saguache, Colo.—The Saguache County Commissioners at their last meeting authorized the construction of a road from the Cochetopa Pass road to Cathedral. Funds were allotted to meet the co-operation by the Forest Service. It is expected that work will start on the road about the middle of June. Construction of a road to Carnero ranger station also has been approved, and work will start immediately.

Roads Increase Farm Values

Cultivated Areas in Remote Districts of Colorado Doubled Thru Aid of Improved Highways

BY HOWARD D. SULLIVAN,
Statistician, State Board of Immigration.

GOOD roads and improved methods of highway transportation have been perhaps the most important factors in the agricultural development of Colorado in the past decade. Since 1909 the cultivated acreage in the state has increased more than 100 per cent, and much of the land now being cropped that had not been broken in 1909 is in districts somewhat remote from railroads, where crops must be hauled several miles before they can be shipped. While there were very poor roads or no roads leading into these remote districts and highway transport was slow and costly it was not found profitable to raise crops, and the land was used almost exclusively for grazing purposes or was not used at all.

In the past ten years fair highways have been opened into many of these remote districts. Southern Yuma county is now one of the most important wheat growing districts in Colorado and much wheat also is grown in southern Washington county. In 1909 there was 41,000 acres of wheat harvested in Yuma county and 11,000 acres in Washington county, and most of this was grown in the north-central parts of the counties, along the line of the Burlington railroad. In 1919 there was 151,000 acres of wheat harvested in Yuma county and 160,000 acres in Washington county, and most of it was grown in the southern parts of the counties, much of it 30 miles from a railroad. But it was marketed with little difficulty, over fair roads, largely by means of motor trucks. Good roads and motor transportation have here opened up one of the finest non-irrigated districts in Colorado.

Agricultural development in Baca county between 1909 and 1919 was more rapid than in any other part of Colorado. In fact the records of the census bureau show that only one or two other rural communities in the United States enjoyed more rapid development during this decade than Baca county. Yet there is not a mile of railroad in the county and crops are hauled as much as 60 miles to shipping points. In this county the census bureau found about 24,000 acres of crops in 1909. County Assessor Roy Winters reported more than 80,000 acres of wheat in the county in 1921 and the total area under cultivation was above 200,000 acres.

Of course this county is badly in need of a railroad, and it will have one before long. The agricultural development which has been made possible because of good roads and motor transportation has demonstrated to officials of the Santa Fe railroad that Baca county can do its full share toward supporting a branch line, which it proposes to extend westward from the main line in Kansas, and it now appears that this will be the first piece of new railroad to be built in Colorado after a long period of inactivity in railroad building. If this railroad is built within the next two years it is safe to forecast that agricultural development in Baca county will be greater in the decade between 1919 and 1929 than it was in the previous decade, for it takes railroads as well as highways to develop a big agricultural country.

Many more examples might be cited to illustrate the agricultural development that has taken place in Colorado in the past decade in districts far removed from railroads, which development was largely influenced by highway construction and motor transportation. There was almost no railroad building in Colorado in the decade ending with 1920 and hundreds of miles of railroad in the state were abandoned during the period. Yet that was the period of greatest agricultural development in Colorado.

It is encouraging to note that roads are now being made constantly better in the agricultural districts of Colorado and new roads are being opened up and improved. First consideration should be paid always to the roads necessary for moving traffic of the state. Our farmers, stockmen, merchants, manufacturers and workmen are with us the year 'round and their activities are the foundation of the state's prosperity. They pay the taxes that support our road building activities. We could have no highways without them, and naturally they must receive first consideration in the location and construction of highways. That the roads built for our farmers and manufacturers and merchants are being used more and more each year by tourists is a good thing for the state, even though the tourist pays nothing directly toward building or maintaining them. Yet it should be borne in mind always that these roads are built primarily for Colorado people, to aid Colorado industry.

The development of a highway system that will best serve the economic needs of the people of Colorado will meet the needs of the tourists. Our own people want to visit the beauty spots of the state, and they are always willing to spend their own money for the construction of roads that will make the beauties of our mountains easily accessible, provided the roads which are economically necessary are built first. Certain main line highways through the mountains are necessary to complete our economic road system. These have been and are being

(Continued on page 13)

Grain land in the valley and rich pastures in the hills—a stockman's paradise in Colorado

Major Blauvelt Resigns as Highway Engineer to Direct Work on Tunnel

MAJOR L. D. BLAUVELT resigned his position as chief engineer of the State Highway Department on June 8.

His retirement comes after one year of highly successful direction of affairs of the department. Maj. Blanvelt leaves the Highway Department to become chief construction engineer for the Moffat Tunnel Commission.

Gov. Shoup appointed him as head of the Highway Department following passage of the present highway law by the last general assembly. At that time a complete reorganization of the Department was made.

As a result of this reorganization the Department is now functioning hetter than ever before, say officials.

Major Blauvelt's retirement as chief highway engineer was the cause of much regret among road officials throughout the State. At the same time they were pleased that he should have been selected as the constrnction engineer of the great Moffat tunnel, work on which will be started immediately.

Members of the State Highway Advisory Board expressed their appreciation of the Major's services with the department in a resolntion passed at a special two-day session of the board held in Denver on June 5 and 6.

The resolntion, which was introduced by William Weiser of Grand Junction, reads as follows:

WHEREAS, Major L. D. Blauvelt has for one year last past filled in a most acceptable manner the office of State Highway Engineer fnr the State of Colorado, and

WHEREAS, The said Major L. D. Blanvelt has announced to this Board his appointment as Chief Engineer for the Moffat Tunnel Commission and his consequent resignation as State Highway Engineer.

NOW, THEREFORE, BE IT RESOLVED, That the State Highway Advisory Board hereby regret the loss of the services of their State Highway Engineer and wish to express to him their appreciation for the splendid services rendered to the Highway Department of the State of Colorado during his incumhency, and

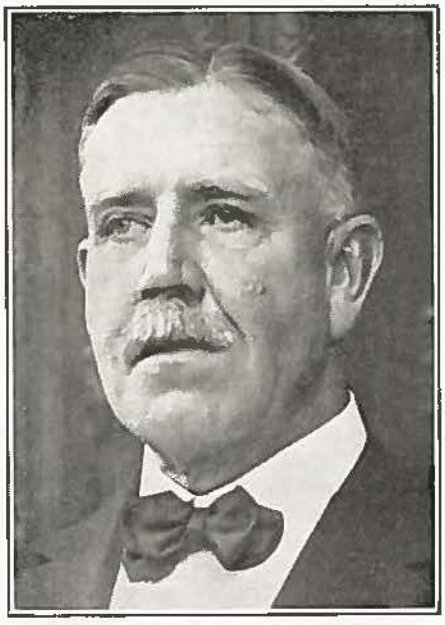
BE IT FURTHER RESOLVED, That the Board hereby tender their best wishes to him in his further pursuits as Chief Engineer for the Moffat Tnnnel.

H. A. Edmonds of Fort Collins was re-elected chairman of the board. George L. L. Gann of Pueblo was renamed vice-chairman.

The meeting was called for the purpose of discussing routine matters and to confer with Maj. Blauvelt before he retired from the department to take up his duties with the Tnnnel Commission.

New federal aid projects in varions sections of the state were discussed at a conference attended by J. W. Johnson, federal district engineer of the Bureau of Public Roads; Majnr Blanvelt, Oliver T. Reedy, senior assistant engineer, and members of the advisory board.

Officials of Clear Creek county conferred with the State Highway officials relative to a three-mile stretch of road in the Mount Evans district. The proposed road is not connected with the Mt. Evans



Major L. D. Blauvelt

scenic road project, bnt will connect two stub roads in the region.

Engineer Reedy will be in charge of the Highway Department pending the appointment of a successor to Major Blauvelt.

Governor Shoup has not indicated whom he will name to the position.

Civil Service to Hold State Tests

No'ice has been sent out over the state hy the Colorado Civil Service Commission of examinations to he held for various positions in the state government. The examinations will he held from June 19 to July 27, and will consist nf assembled and non-assembled examinations.

The examinations start with stenographers, clerk and stenographers, and registrars on June 19 in Denver, Fort Collins and Pueblo.

Among the positions for which competitive examinations will be held are game and fish commissioner; auditor, state highway department; supervisor, motor vehicle department; deputy building and loan inspector; auditor-statistician, state inspector of oils; appraiser, inheritance tax department; pure food and drug commissioner; senior assistant highway engineer; highway purchasing and traffic agent; special accountant, highway department; chief clerk, highway department; snperintendent of maintenance, highway department; depnty bank commissioner; chief of claim department, state industrial commissioner, secretary and rate expert, public utilities commission.

Bond Issue Campaign Launched

A $6,000,000 highway bond issue to meet federal aid appropriations for the next four years is to be initiated by civic and commercial organizations and highway boosters throughout the state.

This was decided at a meeting held in Denver on June 8. By the terms of the proposed bill the Highway Department's half of the receipts from state motor vehicle licenses is to be used to pay interest and provide a siuking fund to retire the honds.

Advocates of the measure declare in this way the houd issue will impose no additional tax hnrden upon the property owners.

A committee of five was appointed to prepare the petitions initiating the measure. They are:

Attorney General Victor E. Keyes; Attorney Rodney J. Bardwell, president of the Denver Motor Clnh; Secretary of State Carl Milliken, State Treasurer Arthur J. Stong, and State Auditor Harry E. Mulnix.

Circulation of the petitions, which must be filed by July 6, will be in charge of R. H. Davis, president of the Denver Civic and Commercial Association; I. F. Keeping, president of the Lions Clnb; F. L. MacFarland, president of the Rotary Clnb; Harry Goodheart, president of the Kiwanis Clnb; F. L. Cavally, president of the Optimists Clnh; W. W. Bradford, president of the Gyro Clnb; and F. C. Oehlmann, secretary of the Motor Clnb.

Voting of the $6,000,000 bond issue, advocates say, insures a fnnd of $12,000,000 to he expended on Colorado roads in the next four years. The funds derived from the bonds will be used to match federal aid appropriations dollar for dollar. The money will be used at the rate of $1,500,000 per year.

Members of the finance cummittee selected to handle the bond issue campaign are: J. E. Zahn, H. G. Naylor, J. Fred Roberts, F. J. Denison, president of the Denver Country Clnb, and Tom Boiterll, president of the Lakewood Country Clnb.

New Warning Signal Marks Danger Point

At a recent meeting of the National Association of Road Bnilders the snbject of danger signals on the highways of the country was discnssed at mnch length.

Several of the speakers advocated the elimination of advertising signals and all other boards along the roads which obstruct the view of drivers.

It was suggested hy a speaker from Illinois that a new signal which contains no lights or mechanism be adopted by the association as a standard for all the states.

This signal which has been in use in the middle western states for the last four years is said to be a positive danger marker. It works hy throwing back light from the lamps of antomobiles and other vehicles in the form of a powerful red glare.

The Denver Motor Clnb is now testing one of the new warning signals on a particularly sharp turn in Bear Creek Canon. Two of the signals also have heen installed on the bridge over Cherry Creek on the approach to the Fonrteenth street viadnct.

Art Neglects Pony Express

Pioneer Heroes Who Carried "Message to Garcia" in 1860 Taught West Value of Speed

(BY TOM BOTTERILL)

ANOTHER Indian rider has been placed in the Civic Center at Denver. Two blocks up the hill there is an Indian killing a buffalo. Just across the street more Indians are perched around a mounted pioneer. Denver is acquiring quite a nifty stock of Indians.

And out in the parks the pioneer miner and the pioneer agriculturist are becoming familiar figures.

But of pioneer transportation monuments, not one anywhere!

Not a stage-coach! Not a Pony Express rider! Not an early-day locomotive! Not a single tribute to the industry that is really responsible for the West of today! It is a puzzling truth that really useful things are most neglected by art and by literature. And transportation most neglected of all. Every man in Denver knows in a general way who Sitting Bull was, but not one man in five thousand can tell who secured the first railroad for Coloredo, or how it was done, or when.

And not one man in ten thousand can tell you the history of the Pony Express.

Yet the Pony Express was the thing that really woke up the region which is now the State of Colorado and gave it its first clear vision of its own possibilities.

I confess that no figure in pioneer history gives me such a thrill as does the Pony Express rider of 1860. He was a real hero, that fellow! He "carried the message to Garcia" not once but a hundred times. He taught the West the value of time by showing it the advantages of speed.

Here is the history of the Pony Express in brief:

* * *

California contained many Confederate sympathizers who wanted to bring about withdrawal from the Union, and their efforts made urgent the need of quick transportation between California and Washington, D. C. But there was, of course, at that time, no wire communication beyond the Missouri river, and to go by boat from New York to San Francisco required three weeks.

The men who organized and operated the Pony Express lost $200,000 in eighteen months, but they rendered the nation a most valuable service at a most critical time. It cost them $100,000 tn equip for the service; $30,000 a month to maintain it; and over $100,000 for the Nevada Indian war aod miscellaneous expenses, but the total receipts did not exceed $500,000, notwithstandiog the fact that the earnings on some single trips were as high as $1,000.

At 4 o'clock in the afternoon of April 3, 1860, Henry Wallace started on a pony from the old Patee House, St. Joseph, Missouri, with mail for San Francisco.

Fifteen miles away a fresh pony was waiting for Wallace; seventy-five miles away a fresh rider to relieve him.

Between him and the coast were 240 points and sixty riders. And one of these riders left San Francisco eastbound at exactly the same time Wallace left St. Joseph westbound.

A view of the old Landmark Treasure Mountain, taken from the summit of Wolf Creek Pass, Mineral County. Snow crowns the crest of the peak the year around.

The ponies were the pick of the West, bought at prices as high as $250 and $300; the riders were star men, paid $75 to $100 a month.

Tbey were undertaking to do something which the old stage companies and steamship compaoies said was impossihle and ridiculous, and which the puhlic viewed with astonishment and even with derision.

They were undertaking to establish a ten-day mail service hetween the Missouri river and the Pacific coast by means of "Pouy Express."

Here was the schedule: From St. Joseph to Salt Lake, 124 hours; to Carson City, 218 hours; to Sacramento, 232 hours, and to San Francisco, 240 hours. This meant au average of eight miles an hour, and the first trip was made on time. Most of the later trips also were made on time and in the summer the average speed was increased to ten miles per hour.

It was the schedule of eight miles per hour that the old stage and steamship companies had proclaimed impossible. When it was accomplished the public was thrilled to higb enthusiasm and the riders become heroes.

The charge for carrying letters weighing two ounces or less was $5. The mail was brought from the East to St. Joseph over the old Hanoibal & St. Joseph Railroad, then the pioneer railway to the Missouri river. Denver was included in the service by means of a branch route down from Julesburg.

President Lincoln's anxiously awaited inaugural address was brought from St. Joseph to Denver, a distance of 665 miles, in 69 hours. The pony making the run into Denver on that occasion covered his ten miles and eighteen rods in thirty-one minutes, which remaiued the fastest time ever made over this division.

The Century Magazine for October, 1898, contained the following description of the Pony Express riders by Mr. W. F. Bailey, of Denver, at that time one of the executive officers of the Colorado Midland Railway, who further states that when the service finally got iuto perfect working order it required 80 riders, over 400 horses and 190 stations in the 1,950 miles between St. Joseph and Sacramento:

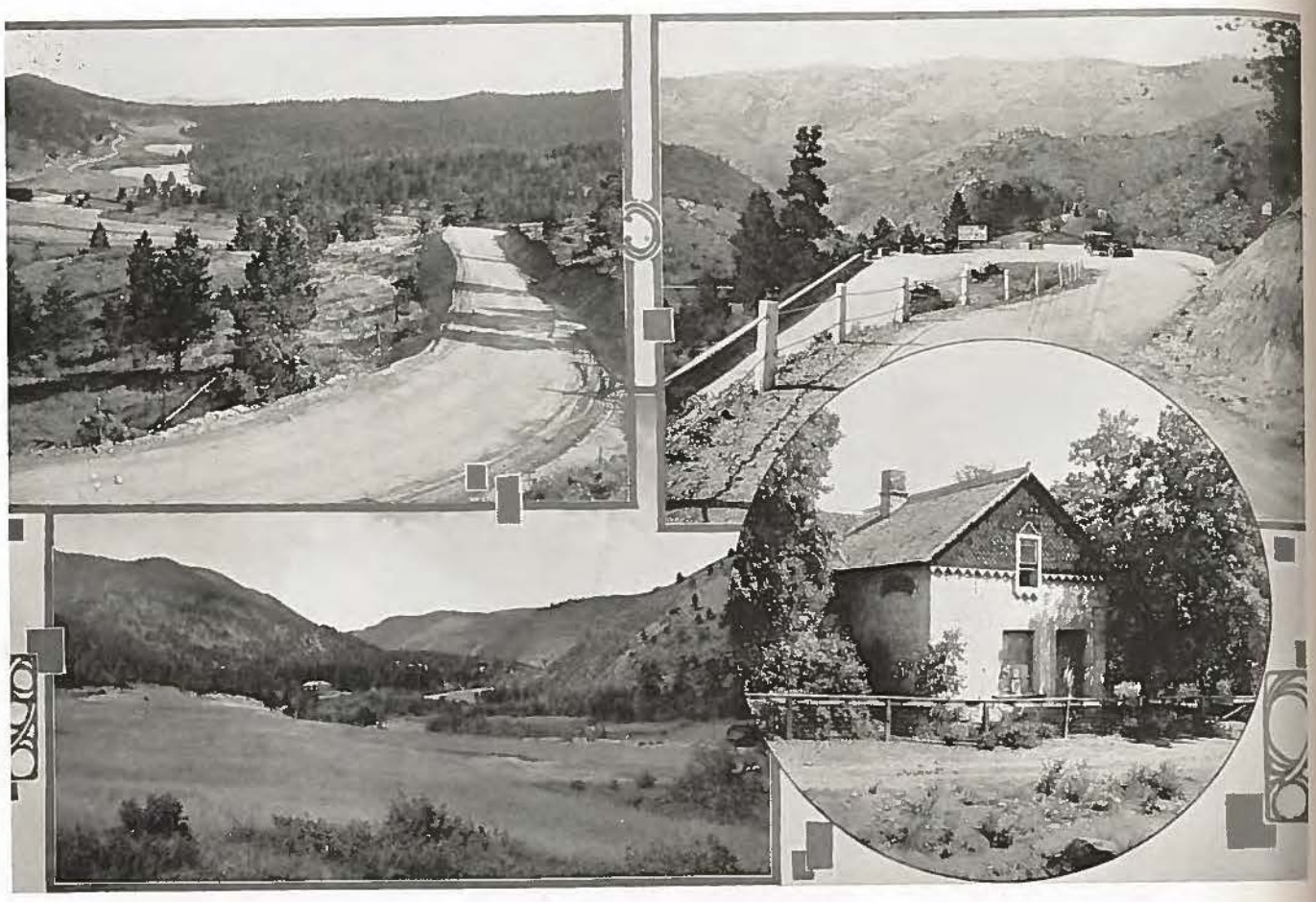
"The Pony Express riders dressed as their individual fancy dictated, the usual costume being a buckskin huntiug shirt, cloth trousers, high boots, slouch hat and a pair of army Colts. For the horse, a bridle and light riding saddle, with saddle bags of heavy leather. Each bag had four pockets called cantinas, one in front and one behind each leg of the rider; in these bags the mail was placed and they were transferred from pony to pony from one terminus to the other."

The Pony Express ended its career October 22, 1861, when the overland telegrapb line from Omaha to San Francisco was completed.

Along The Victory Highway

Route Across Colorado is Already Built Thru One of Most Scenic Sections of America

BY J. E. ZAHN.



Scenes along the Victory Highway in Colorado. Top right: Curve and embankment on Floyd Hill. Top left: Just west of Bergen Park on Floyd Hill. Lower left: Cassell's Resort in Platte Canon from distance. Lower right: 1858 house in Vernon Canon

THE most interesting phase of highway development in Colorado, it seems to me, centers around the bill commonly known as the Phipps Bill, which provides Federal funds for the building of roads in the various states in conjunction, of course, with state funds supplied by the various highway commissions.

Under this hill it is required that the several states shall select 7 per cent of their total road mileage upon which all Federal funds must be applied, the theory being that by this practice the most important roads will he designated by the various states and a foundation thus laid for the development of a state highway system in years to come.

Of this 7 per cent, part of the highways nnder the Phipps Bill are to he designated as "primary" or interstate in character, the remainder heing designated as "secondary" or intercounty in character, the plan of the Government being not only to develop a basis for a future state system of roads, but also, by exercising the authority vested in the Bureau of Public Roads which must approve all state plans, to develop that national system of highways which has been a dream of many years, wherein the primary roads of each state, built in part by government and part by state funds, shall correlate with the primary system of each adjoining state and thus, in time, supply east and west and north and south highways from Canada to Mexico and the Atlantic to the Pacific.

In Colorado our state system of roads, that 7 per cent of our total road mileage required by the Phipps Bill, has already been selected and a hasic system of highways established to be developed in years to come into such a uetwork of paved roads as many states already have.

In this selection the various transcontinental highways being developed through Colorado have been well provided for, the Santa Fe Trail, the Midland, the Pike's-Peak-Ocean-to-Ocean, and The Victory Highway, some of these heing so routed as to touch Colorado Springs first, then reaching iuto Denver, The Victory Highway being an exception to this routing, as it passes directly east and west through Denver and supplies what is probably the shortest line between Denver and Salt Lake City.

With most of the other highways we are familiar, because of the fact that they have been in existence for some years and have served their purpose well in bringing automobile tourist travel into Colorado Springs or Denver as the case might be. With The Victory Highway, however, less than a year old, we are not so familiar, and I shall devote some space to the plan involved in the development of this new cross-country road which has attracted so much attention iu the last few months. Starting at New York, The Victory Highway lies to the east of The Liocoln Highway, crossing the Delaware River from Camden, New Jersey, to Philadelphia over the proposed Philadelphia-Camden hridge uow under constructiou, which is to be the largest suspension hridge in the world with a clear span of 1,700 feet from pier to pier.

From Philadelphia south through Wilmington, Delaware, and Baltimore, this new road reaches into Washington and thence through Maryland across a corner of Pennsylvania, through Wheeling, W. Va., across Ohio, Indiana and Illinois to St. Louis. This route is mainly that followed hy the National Old Trails and is

entirely surfaced from New York to St. Louis, a matter of about 1,000 miles, with the exception of a stretch of gravel in Indiana,, approximately 50 miles, which is now being paved.

In this stretch between New York and St. Louis, The Victory Highway, I believe, has achieved a greater degree of development than that arrived at by any other transcontinental highway. In Missouri, however, where east and west travel has always found bad roads, the same condition will be found in 1922, only more so perhaps, for the route of The Victory Highway across Missouri will be under construction all year, and well on into 1923.

This situation, annoying in the present, offers much of promise, for with the completion of the Missouri section of The Victory Highway, a paved road reaching from New York to Salina, Kansas, with the exception of possibly 40 miles between Topeka and Salina, will have been developed to attract a tremendons flood of automobile tonrist traffic from the eastern states, where approximately 80 per cent of the ten million automobiles in the United States are to be found.

From Salina, west, the line of The Victory Highway is good—in part already surfaced with gravel—into Denver and generally comfortable to travel over at the present time, coming toward Colorado by way of Oakley, thence up through Colby by way of Burlington and Limon, the route of the old Golden Belt Highway.

From the Kansas line west, The Victory Highway iu its route across Colorado has a greater mileage than in any other state and is already built, in part by Government funds, in part by state, through one of the most scenic sections of America, the Rocky Mountain National Parks.

Already well improved from Denver to the Utah line, The Victory Highway is to receive in 1922 an adeqnate appropriation and has been selected as a primary road. From the Utah line to Salt Lake City, except in the Uintah Basin, which adjoius the Colorado line, The Victory Highway is comfortahly passable and is to be fnrther improved.

From Salt Lake to the west are to be found those highway problems which for years seemed unsolvable, yet which today are nearing their solution under the wise provisions of the Phipps Bill in its allotment of Federal Funds to desert states, the proportion of Government money set aside for Nevada being 87 cents for every 13 cents to be put up by the State, while in Utah the state supplies only 25 per cent of the total cost of Federally designated roads.

By this liberal allotment of Government aid, worked out by Senator Phipps, the desert problems involved in transcontinental highway development are to be finally met and conquered on the line of The Victory Highway, the only transcontioental route between Salt Lake City and San Francisco, up to the present time, to be designated as a primary road and when this condition is reached, the most scenic of cross-country highways will draw its toll of automobile tourists to Colorado, where The Victory Highway crosses the crest of the Rockies, the Continental Divide, over Berthoud Pass and Rabbit Ear Pass, where the State of Colorado is busily at work on a broad and safe highway of easy grades and from which on every side are to be seen snow capped peaks, tier on tier, the most impressive mountaiu scenery to be found on any highway reaching from the East to the West.

FOREST SERVICE TO SPEND HALF MILLION IN COLORADO

Expenditures totaling $586,000 of national forest highway funds for the constraction of 106 miles of roads in Colorado have jnst been approved by the secretary of agriculture. This money was made available for roads serving the national forests and for roads within or adjacent to the forests that are of primary importance to states, counties and communities.

Eight projects have been approved for construction. Seven and one-half miles of the Berthoud Pass road will be completed at a cost of $140,000, while $26,000 will be expended in the elimination of switchbacks on the Durango-Silverton road and in surfacing poor sections. One hundred thoasand dollars will be expended upon the Red Mountain project to which the state will build an adjoining section.

Twelve miles of the Cumbres Pass road located in Conejos county will be completed at a cost of $130,000 with the county constructing a co-operative section. Twenty thousand dollars will be appropriated by the state to increase the $60,000 federal fnnds required to constrnct 15 miles of the Hardscrabble road located iu Custer county. Three and one-half miles of the Independence Pass road euding at Curtiss hill will be completed at a cost of $35,000. A project five and one-half miles in length over Cameron Pass will be built for $71,000. Forty-five thousand dollars will be expended in the construction of the Arapahoe Glacier road located in Boulder county. The expeuditure of forest road money for all these projects has heen requested by the state highway commission.

PATROL CREWS FOR D. S. O. HIGHWAY

Silverton, May 27.—E. E. Hatcher, of the State Highway Department, was up from Durango headquarters this week in conference with the Board of Commissioners of San Juan county with reference to maintaining a portion of the D. S. O. Highway in San Juan county during the summer months for the pnrpose of keeping open drains, culverts and ditches while the snow is melting and to have all loose rocks and other debris of the past winter removed by the time the highway will be in use. A like patrol will be maintained in La Plata connty.

The Commissioners are fully jnstified in maintaining the patrol suggested by Mr. Hatcher for the damage that usually occurs as a result of melting snow is greatly in excess of the probable cost of a patrol. The time gained by having the highway ready for instant use is also a feature that can not well be measured in money cost.

The Forest Reserve will complete some work under way during the past season and will also eliminate the "switchbacks" between Silverton and Molas lakes, a work contemplated since the highway was constructed. This agency, while completing work formerly begun and constantly improving the highway, does not take from the various counties its maintenance nor of seasonal repairs.—Silverton Standard.

Shanavo Group of Mountains in distance as seen from Salida's Tenderfoot Trail

Road Work and Builders the State Over

Approximately $65,000 is Morgan county's share of the state road work this year. Plans call for the expenditure of this sum on four projects—two bridges and two road-grading and surfacing jobs.

The bridges proposed will span the Platte river at Orchard and Fort Morgan. Grading and surfacing of the road west of Fort Morgan to the county line will be completed. About $12,000 will he used in the grading and surfacing of the highway south nf Brush to tbe nine mile coruer. The Orchard bridge will cost $20,000, while Ft. Morgan bridge will cost about $15,000. Work on the plans is now progressing.

Arrangements have been completed by J. L. Thompson, chairman of tbe Bent county board of commissioners, for the layiug of half a mile of concrete paving from the city limits of Las Animas to the new bridge being constructed over the Arkansas river. James Bell of Pueblo, resident engineer of the State Highway Department, is now engaged in making the necessary surveys for the new road.

It is estimated that the paving project will cost $13,000. Bent county has to its credit about $24,000 from the state bond issue and highway fund. Chairman Thompson expects the board will be able to get the work started early this summer and to push it rapidly to completion.

William Weiser, member of the State Highway Advisory Board, representing District No. 2, and Highway Engineer L. D. Blauvelt made an inspection trip of the highways in Montrose and San Mignel conntles on May 15 and 16. They were accompanied by G. H. Schofield of Norwood and J. J. Vandemoer, division engineer.

An ambitious street-building campaign has been launched by the city of Grand Junction under the direction of George Garrett, city manager. Several thousand dollars worth of new equipment including a road roller and scarifier has been purchased to carry out the work.

A new stretch of roadway on the picturesque Canon City-Colorado Springs Highway was thrown open to traffic on Sunday, May 14. The cost of the Federal Aid project, four miles long, was $40,000. This new roadway begins at the El Paso county line and is wholly in Fremont county. It is now one of the best stretches of motor highway in that section of the state.

The route is free from bridges and practically immune from washouts and damage from rainfall, due to splendid drainage. It is the first Federal Aid project completed in Fremont county.

Two of the three main-traveled auto roads from Salida across the Continental Divide were opened to traffic early in May. These were the Blue Mesa road to Montrose and the Cochetopa Pass road. Opening of the Monarch Pass Highway was delayed on accouot of heavy snow. Tennessee Pass also was opened May 15.

Passes over the Continental Divide opened during May included Raton, La Veta, Cochetopa, Poncha and Tennessee. Monarch Pass was opened on June 10; Berthoud and Hoosier on June 15, and Rabbit Ear is expected to be opened June 20.

A fine example of how roads are built in Weld county is given in the recent construction of eight miles of new rnadway in the Gault district. Dan C. Straight, county commissioner, got a rnad petition for appraisal. Tben be appointed Forrest Powars, A. F. Peters and former commissioner W. C. Leyis as reviewers. When the trio started to lay out the road they found the grader just completing the last mile of the job. The road was graded off after the petition was in. Exactly one week was required to build the eight miles of road.

"Speed is our middle name when it comes to road building," explained Commissioner Straight.

Work of locating a better route ont of the Black Canon is proceeding rapidly, according to J. J. Vandemoer, division engineer of the State Highway Department.

It has ahout been decided to cross the Lake Fnrk river with a 250-foot cantilever bridge suspended 125 feet high. This will cross over the railroad bridge and will touch two perpendicular walls.

By the construction of tbe cantilever bridge a heavy grade out of the canon will he obviated. Also it will put the road on the Blue Mesa at a minimum cost. It is estimated that the bridge will cost $40,000. Wben completed it will be the highest highway bridge in Colorado.

There has also been allotted by the State Highway Department the sum of $90,000 for the improvement of the road between Sapinero and Cimarron, and $60,000 east of Sapinero.

With the completion of these projects this road will be one of the best in the state. A big part of the work east of Sapinero has already been completed. Plans call for the construction of a roadway 20 feet wide from the suspension bridge to Little Pine Creek.

CRAIG FIRST TO NAME VICTORY AVENUE

Honor for having the first "Victory Avenue" in the country falls to Craig, Colo., say officials of the Victory Highway Association.

By recent action of the Craig city council the main thoroughfare of the town which has beeo known as "Main Street" since the town was founded, was changed tn "Victory Avenue".

In anticipation of the increaeed numher of auto tourists who will travel over the Victory Highway this summer, a modern, comfortable campiog ground has been constructed in the Community Park grounds. Thus all tourists who visit Craig this season will find almost every convenience for their comfort.

On May 22, about two score of public spirited citizens of the city donned overalls, gathered up their grubhoes, hammers and saws and put the camp in shape. The grounds were cleared of underbrush, and the trees neatly trimmed. Tables and benches were built and outdoor ovens installed.

Also the volunteer workers erected a sbelter house and comfort stations. City water is being piped into the grounds. Electric lights also are provided.

As now completed it is said to be one of the most complete camp grounds in the state. It is called "Victory Camp Ground."

A comprehensive survey is being made of all the highways in Moffat county this year. There is also a complete system of maintenance in vogue. Particular attention is being given by the surveyors to the elimination of dangerous curves and heavy grades on the primary roads.—Lillie O. Haughey, Clerk and Recorder Moffat County.

On June 23 the State Highway Department will open bids on a 100-foot timber bridge over Breckenridge creek, located eleven miles north of Ordway. The bridge will form an important link on State Highway No. 20s.

A contract has been let to Miller, Douglas and Hanes, Denver contractors, for the paving of nearly three miles of the Denver-Longmont highway. This paving will connect with the eight miles of paving now under construction nn Federal Boulevard. Plans are drawn for the construction of a half mile of new road north of the interurban railroad at Broomfield, which will eliminate the two grade crossings there. Both of these projects will be completed by early fall.

SURFACING WORK STARTS

Steamboat Spriogs, Colo.—The Northwestero Coostruction Company has a crew surfacing the Pine Grnve federal aid road south of here. A part of the work was dooe last fall. Several pieces of the road for a time were in bad condition because of poor drainage, but the road is reported in good condition.

AN AID TO BAD ROADS

The House of Representatives at Washington has passed a bill limiting the amount of federal funds that may be spent upon a mile of road, exclusive of bridges, to $12,500 in the fiscal year 1923 and to $10,000 in the fiscal year 1924. The effect of this chaoge, if it should be approved by the senate, would be to make it practically impossible to build permanent, hard-surfaced roads and would limit federal aid to such roads as are flimsily built.

It is not believed, however, that the senate will approve of such false economy. The only economical roads are permanent roads, and the house action is either the result of very poor judgment or else it is a thinly disguised manifestation of certain congressmen who are well known to be hostile to the whole good roads movement.—Pueblo Chieftain.

New Roads Without More Taxes

(Continued from page 1)

give the Highway Department an annual budget of about $5,000,000.00 for the next four years, or a total of $20,000,000.00.

If the people desire that the Federal Aid road construction be continued, then they should, at the coming election, authorize the State Treasurer to issue forty-year bonds as stated above and have him set aside such portion of the Highway Department's receipts from the sale of Motor Vehicle Licenses, as may be necessary to cover the annual interest charges for the first ten years and then yearly the additional sum of $50,000.00 for each issue to retire the principal.

This method will permit of a continued road building campaign for the next four years WITHOUT ADDITIONAL TAXATION.

Farmers Benefit by Bond Money

(Continued from page 2)

four hundred to one thousand dollars per mile for the completed work.

The grading is done with county equipment entirely. The Project on which the equipment may be concentrated bears the actual operating charges only, and in this manner grading costs are held to a minimum. The total grading charges for all State and Bond Expenditnre work performed in the Division this seasou will run under seventy-five dollars per mile.

This procedure for handling the work has the hearty endorsement of the Commissioners throughout the Division, and they are on all occasions co-nperating with the State to the fullest extent, in an effort to secure the results which the traffic in the section demands.

The conduct of the work along the foregoing lines offers these advantages:

1. The distribution of State funds locally, and where most needed.
2. The elimination of profits, the State paying only for what is received.
3. The elimination of supervision.
4. The elimination of arguments and dissatisfaction which arises among workers when placed on an eqnal earning hasis, hy making earnings contingent upon actual work performed.
5. The fostering of au interest in the farmers iu road construction, and a community spirit of co-operation with the State, which is highly commendable.

Roads Increase Farm Values

(Continued from page 7)

built, and all of them are popular tourist routes.

Colorado will continue to be one of the most important states in the Union with tourists, for the scenery and climate of Colnrado are unrivaled. But the condition of the main economic highways leading into aud through the state will always have more influence in governing the automobile tourist movement into the state than any other highway factor. This is what the auto tourist hears about all along his route to Colorado. If he starts out to visit Colorado he is rather apt to do it, regardless of what he hears about the main highways he will have to travel. But if he has simply started west what he hears about the condition of trunk highways is always a governing factor in determining where he goes.

NEW ROAD TO DOVE CREEK

Durango, Colo.—A new highway is to be built from Ackmen to Dove Creek this summer, says J. A. Clay, member of the State Highway Advisory Board. This project when completed will give a splendid road all the way from Durango to Dove Creek. The road will be 18 feet wide and most of the grading can he done with machinery. It is estimated that the road can he graded and drained for less than $1,000 per mile. Next year the road will be surfaced.

GUNBARREL ROAD CLOSED

Monte Vista, Colo.—The famous Gunbarrel road is closed pending repairs and the construction of a uew steel bridge, which it is expected will be completed in about 30 days. Travelers are now compelled to detour at Stoeber's Lane, or use the Soldiers' Home road. Contractors are laying a new concrete floor on the bridge. Removal of the temporary bridge in use during construction of the new bridge was made necessary hy high water.

STATE HIGHWAY DEPARTMENT

CASH STATEMENTS OF THE STATE HIGHWAY AND BOND FUNDS FOR THE MONTHS OF DECEMBER, JANUARY, FEBRUARY, MARCH, APRIL AND MAY. FISCAL YEAR 1921 - 1922.

STATE HIGHWAY FUND

RECEIPTS	December	January	February	March	April	May	TOTAL	
U. S. GOVERNMENT	$217,157.52	$112,107.18	$41,729.42	$40,726.10	$81,507.04	$49,611.45	$542,838.71	
One Mill Levy	62,358.69	57,413.33	44,436.19	334,177.29	281,052.72	41,177.21	820,615.43	
Motor Vehicle Tax	16,443.93	70,000.00	65,000.00	110,000.00	50,000.00	35,000.00	346,443.93	
Internal Improvement		26,000.00	13,000.00	12,500.00	8,800.00	6,500.00	66,800.00	
Gasoline Tax	29,736.11	15,000.00	10,000.00	30,000.00	18,000.00	30,000.00	132,736.11	
Counties—Federal Aid	53,426.02	99,258.44	77,247.21	58,622.13	54,980.15	37,446.83	380,980.83	
Counties—Merchandise	14,109.05	23,370.00	10,834.20	17,954.61	7,023.01	10,724.75	84,015.62	
Cement Sacks	1,894.44	5,170.82		2,968.87	8.10		10,042.23	
Miscellaneous	1,501.98	36.00	90.00	1,092.60	1,108.36	320.95	4,149.89	
Cancelled Vouchers			1.40				1.40	
								$2,388,624.15
DISBURSEMENTS								
Overdrafts 11-30-21							$438,209.57	
VOUCHERS ISSUED								
Administration	$4,210.67	$5,703.48	$5,020.60	$5,544.43	$5,555.64	$6,170.53	$32,205.35	
Administration Roads	11,170.70	12,181.11	15,665.84	14,007.06	15,295.70	13,426.90	81,747.31	
Construction	198,168.90	72,833.23	137,218.86	87,357.45	128,313.65	178,490.63	802,382.72	
Maintenance	8,358.56	26,317.61	25,596.04	35,712.87	42,903.95	62,328.09	201,217.12	
Property and Equipment	6,861.84	14,923.26	10,500.75	17,741.87	17,476.84	24,284.20	91,788.76	
BALANCE							741,073.32	
								$2,388,624.15

BOND FUND

RECEIPTS	$100,000.00	$100,000.00	$100,000.00	$100,000.00	$100,000.00	$150,000.00	$650,000.00	$650,000.00
DISBURSEMENTS								
Overdraft—Federal Aid	$53,271.18						$29,615.94	
Balance Counties	23,655.23							
Vouchers Issued, Federal Aid	58,887.87	40,239.08		$40,288.64		$62,821.74	202,237.33	
Counties	400.00	13,642.26	31,919.65	33,226.62	51,433.25	119,136.62	249,758.40	
Balance Federal Aid							19,491.49	
Balance Counties							148,896.84	
								$650,000.00

Sign Posts Along the National Highways

Through generous response to an appeal from the Finance Commissioner, the fire, police and health departments of New Orleans have saved the 1922 paving program of that city. These three departments have given over $140,000 from the funds which had been apportinned to them.

The Custer Battlefield Highway Association will hold its annnal cnnvention in Sheridan, Wyo., on August 9-10. W. D. Fisher of Sheridan, is secretary.

Substitution of standard signs which will hear numbers for each highway corresponding to numbers on road maps is advocated by the National Highway Traffic Association. Existing signs of various types would he done away with, and all advertising boards and other signs climinated.

A comprehensive plan for the elimination of grade crossings also is suggested to all the state highway departments. The association also favors the passage of a law making it a misdemeanor to pass another motor vehicle going in the same direction on a curve, where the unobstructed vision is less than 500 feet.

Theodore Gary, chairman of the Missouri State Highway Commission, recently retnrned from a two months trip abroad. While in England he was shown an experiment rnad in which 23 sections of road of different types had heen laid. As a result of his visit, Chairman Gary says he now knows 20 types nnt tn build.

"In England they lay a foundation for a road," says Mr. Gary. "Then they open the road, use it until pot holes and depressions begin to develop, in maybe six or seven years. Then they surface it. The usage to which it has heen put has packed and knit the foundation so firmly that you know you have a permanent foundation that will stand up nnder all tests and practically for all time."

Mr. Gary also says that road builders of this country have not yet learned the meaning of drainage and maintenance. Our roads show it. He calls attention to the railroad beds of the country. Water drains away from the tracks and so they are smooth and hold up under the heavy load.

The Lincoln Highway Association has just published and is mailing to all of its members, as well as to the American press and all highway officials, a handsome illustrated booklet, entitled, "The Lincoln Highway, Its Eighth Year of Progress."

The Virginia Good Roads Association is sponsor for a statewide movement calling for a special session nf the legislature for the purpose of passing a $12,000,000 bond issue for state highway construction. The extra session wnuld also be asked tn pass a law placing a tax on gasoline to take care of the interest and rettring of the honds. The sum is to pay for the road building program for the next two years.

One of life's riddles is why the road critic who doesn't know what he is talking ahout is so anxious to tell everybody.

The Illinois State Highway Department has inaugurated a new system of inspection of road construction to insure the correct execution of contracts. State engineers will he detailed to every job and, in addition, traveling inspectors will visit the work from time to time without announcing their coming.

A recent compilation by the State Highway Department nf Missouri of the records from the various counties of the state shows that there are 4,207 miles of hard surface roads in Missouri. Of this mileage, 3,898 miles are gravel macadam, 175 miles are bituminous macadam, and 134 miles are concrete and brick.

CONTRACTS AWARDED DURING MONTH [June 1, 1922]

NUMBER	LOCATION	COUNTY	LENGTH	TYPE	CONTRACT PRICE	CONTRACTOR
Federal Aid Proj. 80	Morrison toward Denver	Jefferson	0.944 mi	Concrete Paving	$37,888.91	Peterson, Shirley & Gunther
Federal Aid Proj. 130	South of Littleton (Wolhurst)	Arapahoe & Douglas	1.004 mi.	Concrete Paving	29,714.36	Colorado Bridge & Co.
Federal Aid Proj. 222-A	Broomfield east and Broomfield north	Adams, Boulder & Jefferson	2.736 mi.	Concrete Paving	88,335.50	Miller, Douglas & Hayne

CONTRACTS BEING ADVERTISED

NUMBER	LOCATION	COUNTY	LENGTH	TYPE	BIDS TO BE OPENED
Federal Aid Proj. 162	Manitou toward Colo. Spgs.	El Paso	1.378 mi.	Concrete Paving	June 2, 1922
State Proj. 503-B	Independence Pass	Pitkin & Lake	7.037 mi. (approx.)	Mountain Grading	June 2, 1922
State Proj. 654	Bear Creek	Jefferson	0.298 mi.	Mountain Grading	June 7, 1922
State Proj. 673	Near Melvin, over Sampson Cr.	Arapahoe	100 ft. span	Low Truss Bridge	June 2, 1922

PROJECTS ON WHICH PLANS HAVE BEEN SUBMITTED TO BUREAU OF PUBLIC ROADS BUT NOT YET ADVERTISED

NUMBER	LOCATION	COUNTY	LENGTH	TYPE
Federal Aid Proj. 7-C	Norwood-Naturita	Montrose	10.526 mi.	Grading
Federal Aid Proj. 71-B	Southwest of Durango	La Plata	3.635 mi.	Gravel Surfacing
Federal Aid Proj. 119-B	Cochetopa Pass	Saguache	7.477 mi.	Grading (Surfacing portions)
Federal Aid Proj. 163	East of Pueblo, over St. Charles River	Pueblo	0.502 mi.	Truss Bridge and surfacing approaches
Federal Aid Proj. 165	Canon City-Florence	Fremont	9.385 mi.	Gravel Surfacing
Federal Aid Proj. 171	Delta, northwest	Delta	6.620 mi.	Gravel Surfacing
Federal Aid Proj. 189	Hayden, east	Routt	5.620 mi.	Gravel Surfacing
Federal Aid Proj. 213-B	East of Mancos	La Plata & Montezuma	5.302 mi.	Gravel Surfacing
Federal Aid Proj. 226-A	North of Brighton	Weld	8.228 mi.	Concrete Paving
Federal Aid Proj. 228	Sterling-Merino	Logan	4.405 mi.	Concrete Paving

PROJECTS ON WHICH PLANS ARE BEING PREPARED

NUMBER	LOCATION	COUNTY	LENGTH	TYPE
Federal Aid Proj. 168-A	West of Granada	Prowers	5.745 mi.	Gravel Surfacing
Federal Aid Proj. 190	Dillon-Kremmling	Summit	1.017 mi.	Grading and Bridge
Federal Aid Proj. 208	Grand Junction-Palisade	Mesa	4.0 mi.	Gravel Surfacing
Federal Aid Proj. 216-B	East of Granada	Prowers	7.8 mi.	Gravel Surfacing
Federal Aid Proj. 217	East of Pueblo	Pueblo	2.273 mi.	Concrete Paving
Federal Aid Proj. 218	Hasty-Lamar	Bent	11.82 mi.	Gravel Surfacing
Federal Aid Proj. 221	Ft. Collins-Loveland	Larimer	3.8 mi.	Concrete Paving
Federal Aid Proj. 224	Morrison-Baileys	Park	5.621 mi.	Mountain Grading
Federal Aid Proj. 225	East of Aurora	Adams	1.0 mi.	Concrete Paving
State Project 639	North of Ordway over Breckenridge Creek	Crowley	100ft. span	Timber Bridge
State Project 653	Nighthawk-Blackhawk	Gilpin		Culverts and Bridges
State Project 674	East of Littleton	Arapahoe	30 ft. span	Girder Bridge and Approaches

COMMISSIONERS MEET OCTOBER 16

The annual conventinn of the County Commissioners of Colorado will he held in Colorado Springs on October 16, according to a call just issued by Gus. J. Johnson, president.

A notice of the meeting sent to the county commissioners in the sixty-three counties of the state, reads as follows:

Gentlemen:

The deliberations of our next annual meeting we feel should he of import to the people of Colorado.

Our organization has accomplished much for the betterment of Colorado, under many adverse conditions. We are distinctively a legislative body when in annual meeting, while in our official capacity we are executive, and many times have to assume judicial authority. Our efforts have heen hampered heretofore because of our annual meeting occurring after the Legislature has met.

Your Executive Committee, by correspondence, has decided that it would be wise to hold our meeting before this Fall's election, and by virtue of a majority vote of said committee, it was decided that said meeting should be held at Colorado Springs, and that at such meeting the Legislative Committee shall present fully their plans, and the meeting shall be primarily for the discussion of said report and such new legislation as in the opinion of the Commissiooers shall he necessary.

Colorado Springs' invitation for this meetiog is very cordial, and they promise us a warm welcome. Special hotel rates have been made for the occasion.

Therefore, I, Gus. J. Johnson, President of The Colorado State Association of County Commissioners, do hereby call the annual meeting of said organization to convene in session at Colorado Springs, Colo., on Monday, Oct. 16, 1922, at 10 o'clock a. m., for a two-day session for the transaction of any matters that may properly come before it. May I not urge upon you a full attendance of your Board?

Sincerely yours,

GUS. J. JOHNSON,
President.

Attest:

T. W. MONELL,
Secretary.

FT. COLLINS-WELLINGTON ROAD TO BE GRAVELED

Fort Collins.—The Larimer county Board of Commissioners are considering a proposal to gravel surface the highway between Fort Collins through Wellington to the Wyoming state line. State Engineer A. B. Collins has been iu conferenee with the commissioners on the proposal which is planned for this summer.

Gravel probably will be hauled from the county pit three miles north of Welliugton. By this arrangement the longest haul will not be more than 18 miles.

This piece of work has loug been needed and the improvement will be most welcome to the citizens of Larimer county. The cost of the work will be paid from the 1921 bond issue.

HEAVY SNOW DRIFT ON MONARCH PASS

Montrose.—An unusually big drift of snow, at least 100 feet in depth, will add to the attractiveness of Monarch Pass this snmmer. George Toupaine of the State Highway Department forces has just returned from an inspection trip over the pass. He says that nearly all the snow in this drift will remain on the pass all snmmer. It is located just over the divide on the Salida side. With the opening nf Monarch Pass, east and west travelers will save about 70 miles on their trip.

Denver Man Invents Drag Attachment

The above illustration shows a new patented road drag which is the invention of J. A. Warren, a Deuver man. A special feature of the drag is the lifting device designed for attachment to a Fordson tractor.

The attachment and drag are manufactured in Denver and are now in use in tbirteen states. Weight of the drag and attachment is 600 pounds.

It is so constrncted that the operator can raise or lower the blades without leaving his seat on the tractor. Road officials report very good success in maintenance work with the outfit.

INTERIOR DEPARTMENT BILL BECOMES LAW

The Interior Department appropriation bill for the coming fiscal year, which contains several items of particular interest to the State of Colorado, has now been signed by President Harding.

Several matters were in dispute between the House and Senate, but the Senate conferees succeeded in retaining the appropriations advocated by Senator Phipps for the maintenance and improvement of onr two national parks, the Rocky Monntain and Mesa Verde. The total snm allotted for the former was $73,900 (in place of $59,900 recommended by the House), while Mesa Verde received $43,000. This will enable the building of about four miles of much needed entrance roadway, and it is believed that the construction of the necessary improvements will bring mauy additional visitors to Mesa Verde from all parts of the country.

The amount set aside for the operation and maintenance of the Uncompahgre reclamation project in Montrose and Delta Cnunties was $235,000. The Grand Valley project near Grand Junction was allotted $440,000, which includes a provision for the taking over of the so-called Orchard Mesa unit by the U. S. Government.

BLUE MESA ROAD OPENED TO TRAFFIC

The road from Sapinero to Cimarron over the Blue Mesa division of the Rainbow Route, was opened on May 10th.

A truck and two touring cars were the first to get over this section of the highway. They reported the road dry all the way except at a few cuts thrnugh drifts of snow between Windy Point and the Halfway House.

However, they experienced no difficulty in getting throngh. This is one of the main highways nf the western slope and is very popular with tourists.

Jolly B. Robinson, former district ranger of the Battlement Fnrest, will be in charge of the road construction work which the U. S. Forest Service has planned near the Mesa Lakes near Grand Mesa.

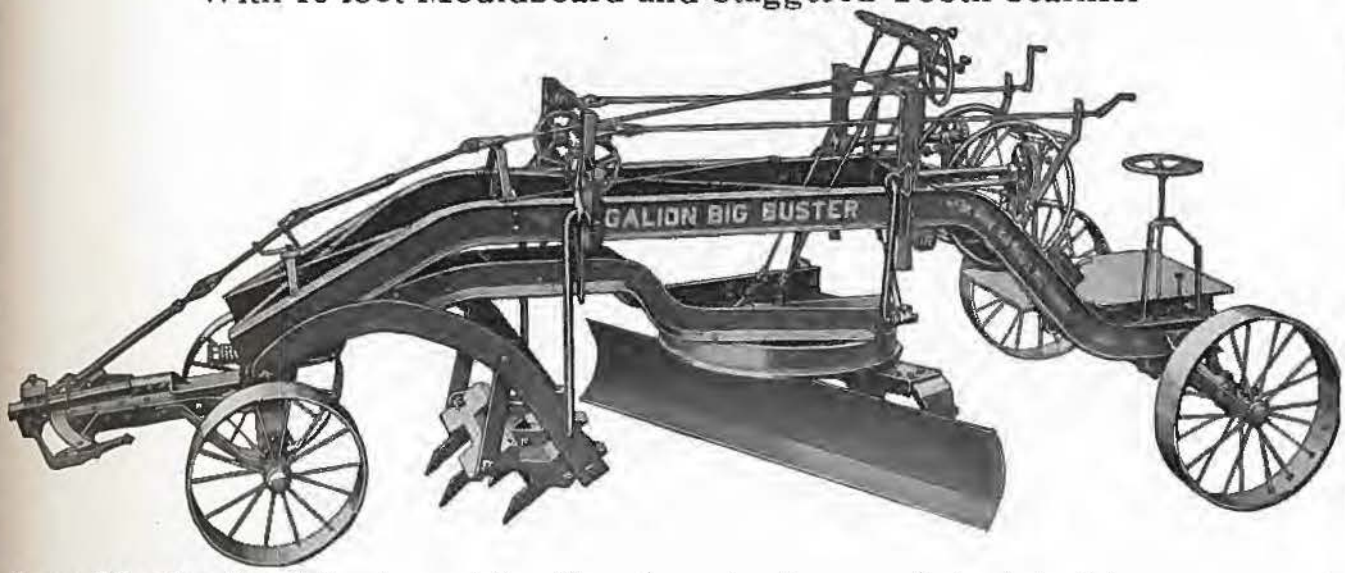
Good roads pay in bad weather, while bad roads waste, even in good weather.

For the Heaviest Road Work

GALION BIG BUSTER

Road Grader and Scarifier Combined

With 10-foot Mouldboard and Staggered Tooth Scarifier



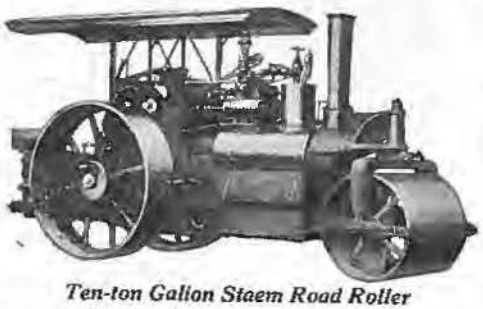
A combination Road Grader and Scarifier of massive frame and sturdy build, strong enough for the heaviest road work and for use with the most powerful tractors. Easily operated by one man.

A Proper Size Galion Road Grader for Every Class of Road Building Work, Ranging from 6-foot Blade Size to 12-foot Blade Size.

GALION ROAD ROLLERS

Ten-ton Galion Motor Road Roller

Pressure Scarifier Attachment furnished on either the Motor Roller or the Steam Roller when desired.



Ten-ton Galion Steam Road Roller

The Galion Complete Line of Road Building Equipment and Supplies Embraces Everything Needed by the Contractor and Road Builder.

What are you interested in? Write us right now! We will not "let the grass grow" in furnishing you *full information* and *prices*.

H.W. MOORE & Co.

1751-1761 Wazee Street, DENVER

Distributors for—COLORADO, WYOMING, UTAH, NEW MEXICO, ARIZONA, MONTANA, IDAHO.

The Galion Iron Works & Mfg. Co.

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STORMS DAMAGE LINCOLN COUNTY ROADS

The sum of $50,000 will be required to make repairs to state highways running north and south of Limon aod sonth of Hugo, says Ernest Montgomery, division engineer of the State Highway Department.

These roads were damaged by floods early in May.

It will be necessary to replace the damaged pile bridge over the Big Sandy directly south of Hngo. Two 100-foot spans are planned. Also bridges on the Union Pacific, Pike's Peak Ocean-to-Ocean and Farmers highways through Lincoln connty also were damaged by the storms.

Ten bridges must he replaced. Extensive repairs must be made to three others.

Construction of three wooden pile bridges on the Colorado Springs-Pueblo Highway has been started by the Plains Construction Company of Denver. Cost of the bridges will be $11,000. The largest of these will be a 500-foot structure across Sand Creek, a short distance out of Colorado Springs. The second bridge will be at a point 13 miles below the Springs, and the other will replace a wooden structure 16 miles south of the city. The contractors have promised to complete the projects in time for the heavy summer tonrist traffic.

H. T. Reno, resident engineer in charge of the Blue Mesa road project, will make his headquarters in Sapinero this summer. By plans recently completed the old road from Sapinero to Cimmaron out of the Black Canon will he used as a sheep and a cattle run when the new highway is completed.

ROAD BUILDING ROUTINE

The routine of getting a Federal Aid Project ready for construction consists rougbly, of submitting to the Bureau of Roads, first a Project Statement, giving a description of the project under consideration, together with a list of the strnctures involved and the estimated cost—this cost being estimated before any plans are made up.

After the Project Statement is approved at Washington, as a resnlt of a thorough inspection and investigation by the Burean, as previously described, the plans for the work are prepared by the Department, together with estimates based on these, and the whole again submitted to the Bnreau. These plans and estimates are checked in detail hy the Bnreau Engineers and finally approved for constructioo. After this latter approval is secured, the Departmeot may advertise for bids.

GRANITE FOR SURFACING

Alamosa, Colo.—If satisfactory price and deliveries can be arranged, State Highway No. 38 from Alamosa to Sonth Fork in Rio Grande and Alamosa counties will he surfaced with disiotegrated granite taken from Wagon Wheel Gap.

The railroad has heen asked to make a special rate of $10 per car on the material. Road engineers say it is the best material in the district for surfacing purposes and can be loaded on cars at the Gap very cheaply.

Present plans include the workiog over of all portions of the east and west road which are oot now graded. Then the highway which is one of the main roads to the Mesa Verde National Park will be surfaced for a distance of about 35 miles.

PULLING OUT ON A 28 PER CENT LOOSE-MADE GRADE

The OSGOOD 18¾ cu. yd. Steam Shovel Was Chosen by the Pactolus Gold Dredging Company, Denver, for this Job on the River Bottoms

The United States Government has three of these machines doing the heavy rock work on Berthoud Pass and the Mt. Evans Highway. Let us point out many other cases where the OSGOODS are performing this harder kind of service.

B. W. MILLER

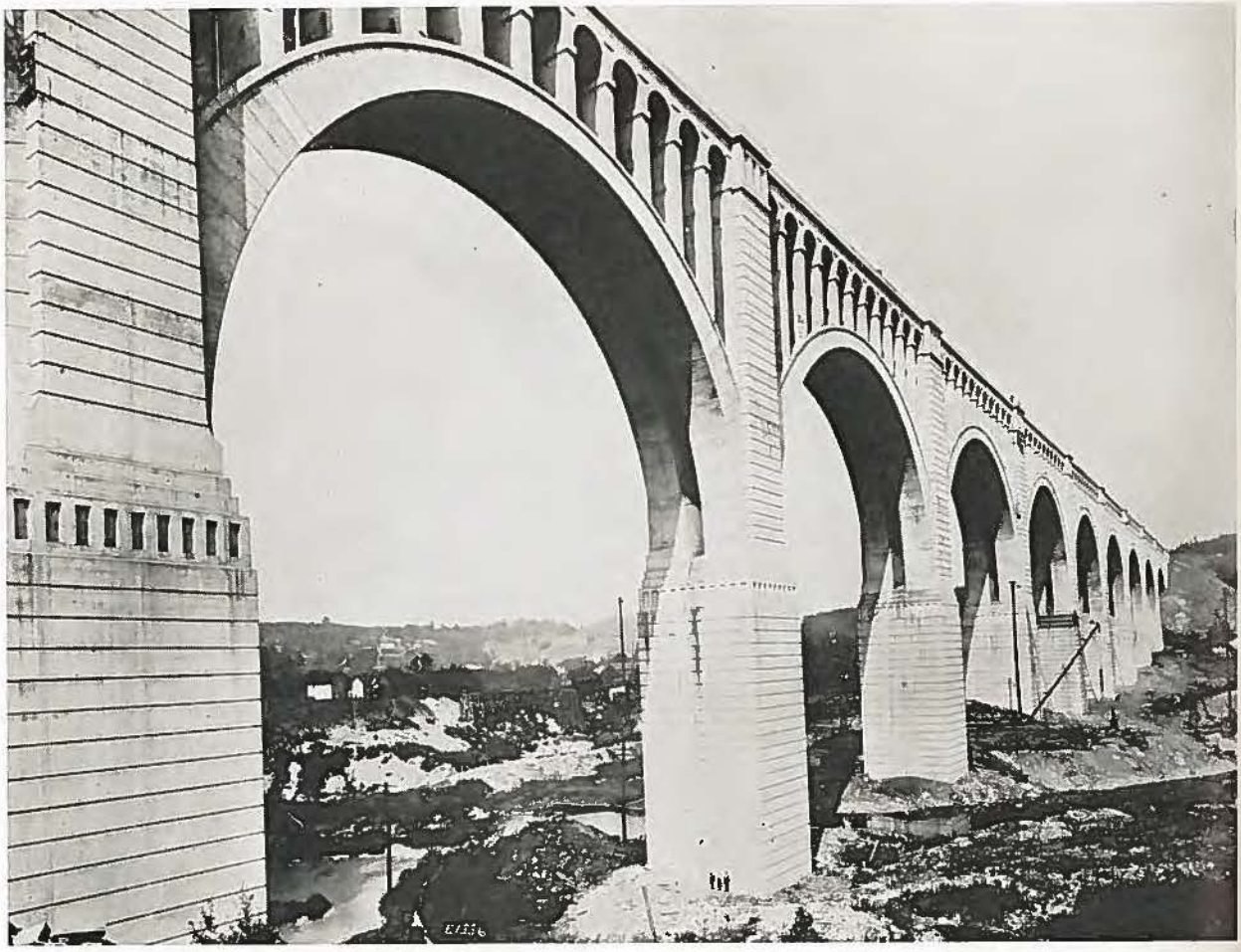
DENVER, COLORADO WESTERN REPRESENTATIVE, 305 BANK BLOCK CHAMPA 4783

Wherever there is work to be done which requires more than the average amount of endurance, strength or flexibility, the OSGOOD fits in remarkably well.

Convertible for Crane, Clamshell Dragline and Skimmer Scoop

OSGOOD

Provided with Low and High Speed for travel



Tunkhannock Viaduct--D. L. & W. R. R.

Near Hallstead, Pa. Completed 1916

Two track structure composed of ten 180-foot and two 100-foot semi-circular arches. Each main arch composed of two ribs 8 ft. thick at crown and 14 ft. wide. About 163,000 yards of concrete.

Engineer, G. J. RAY, Chief Engineer, D. L. & W. Ry.
Contractor, FLICKWIR & BUSH, Inc.

A LETTER WORTH READING

OFFICE OF

STATE OF COLORADO
MILITARY DEPARTMENT--QUARTERMASTER SECTION
STATE CAPITOL BUILDING
DENVER

May Twenty-Seventh,

1 9 2 2.

From: First Lieutenant Kenneth Walker,
Adjutant Post Field Flight
Fort Sill, Oklahoma.

To: Mr. E. E. Sommers, President,
The Sommers Oil Company, Denver.

Subject: Service and Quality of Peerless Gasoline and Majestic Motor Oil used in our recent flights over Colorado.

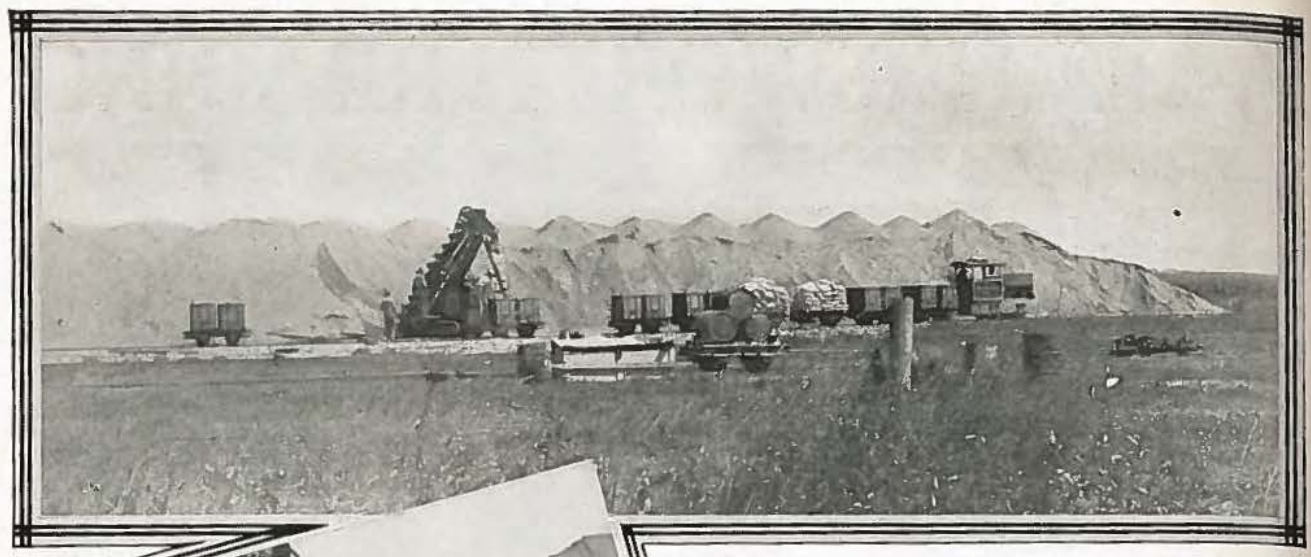
Mr. E. E. Sommers:

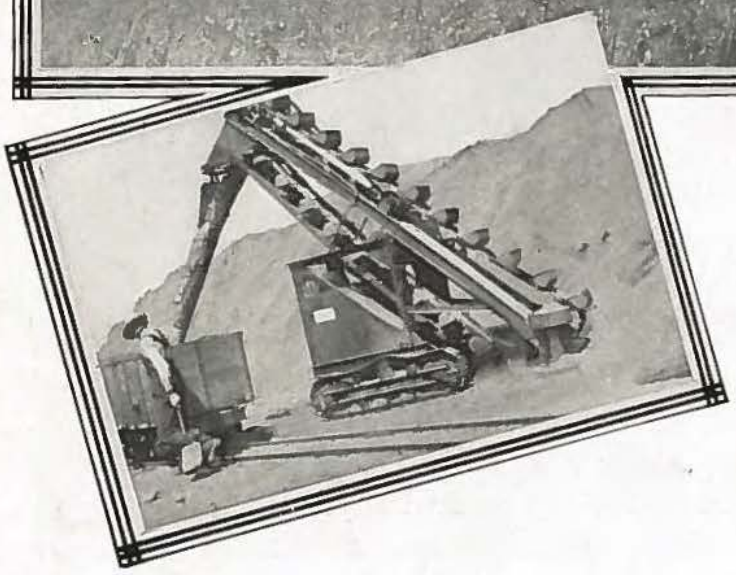
1. We wish to express our thanks for the efficient and adequate service rendered by your Company during our flights in Colorado.

2. While flying above your city, will state that your Peerless Gasoline and Majestic Motor Oil stood the hardest tests possible in operating the motors of our planes.

3. I can sincerely recommend your gasoline and motor oil as a superior grade in quality for use in either aeroplanes or automobiles.

Kenneth Walker,
First Lieutenant, Adj. Post Field Flight.
Fort Sill, Oklahoma.





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When it is an unusual loading problem, you always see a Barber-Greene wagon loader successfully performing on the job.

We cater to the contractors' most exacting requirements in high class and economical equipment.

H. P. WILSON & COMPANY

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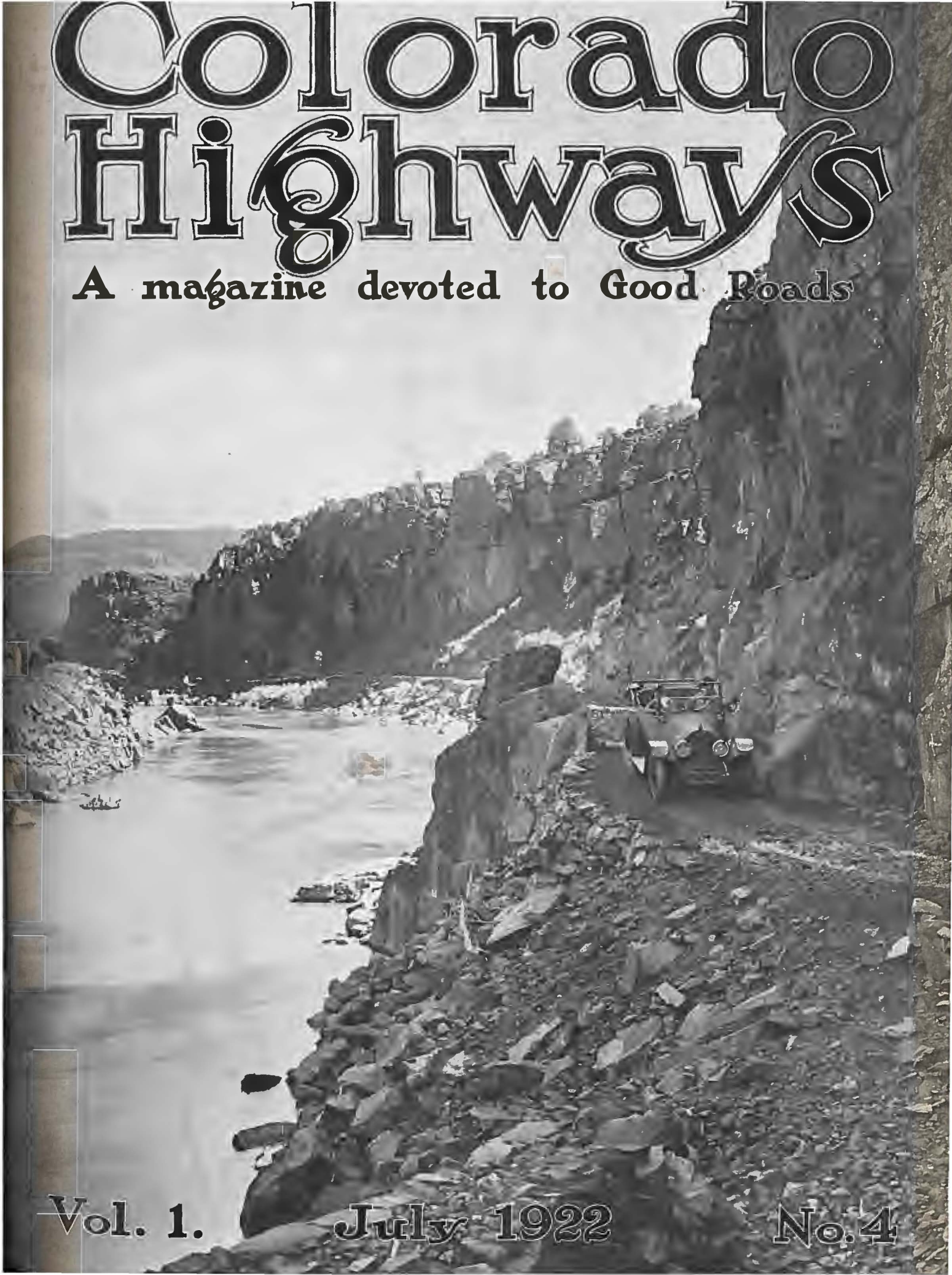
"Caterpillar" Tractors and Contractors' Equipment

DENVER, COLORADO

THE BRADFORD-ROBINSON PTG. CO., DENVER

Colorado Highways

A magazine devoted to Good Roads



Vol. 1. July 1922 No. 4

THE Kansas City Good Roads Association offered a cash prize for the best maintained dirt roads within a radius of one hundred miles of Kansas City. A very competent committee was appointed and inspected all principal highways. It was a big job. Finally there was a tie for first place between Richardson County, Nebraska, and Shawnee County, Kansas, both of which Counties use Duplex machines. SOME VICTORY.

The perfect balance, extremely high quality steel construction, and unparalleled performance, make this the best buy in the Maintainer field

H.W. MOORE & Co.

1751-61 WAZEE STREET DENVER, COLORADO

Manufacturers and Jobbers High-Grade Road Construction, Earth Handling, and Cement Handling Equipment

Colorado Highways
"BETTER ROADS"
VOLUME I. JULY, 1922. NUMBER 4.

Constitutional Amendment

$6,000,000 Bond Issue—Good Roads

BY RODNEY J. BARDWELL
President, Denver Motor Club.

SOME sixty years before the birth of Christ, Julius Caesar, military leader, historian and statesman, who stands out pre-eminently as the other greatest character in history, said of the Belgians that they were a very warlike and savage people because from lack of roads they were inaccessible to the mercatores or traders, and so lacked the civilization and refinements of the Gauls.

Caesar, among the ancients, was one of the foremost advocates of good and permanent roads, some of the stone block construction of his time still being extant.

Good roads will put a state or community in touch with the press, telephones, electric lights, rural deliveries of mails, the necessities of life, and of the refinements of advancing civilization. They open up the natural advantages of a country to exploitation and development, and make easily and cheaply accessible the markets for livestock, farm products and mineral wealth.

The federal government returns to the states, to be used in the construction of good roads, millions of dollars each year, always providing, however, that the state meet the federal appropriation by a like amount, excepting in the case of a few of the western states comprising large areas and paucity of population, where the government appropriation is on a basis of fifty-five cents to each forty-five cents furnished by the state. Colorado is one of these states so favored. If the State of Colorado should fail to meet this federal aid, the moneys appropriated for the construction of good roads in this State would then be divided amongst other states ready, willing and able to comply with such terms and conditions.

A very happy solution for raising this money to meet federal appropriation has been hit upon as follows:

The one-half of the motor vehicle license tax now paid into the State Highway Department (the remaining half going to the various counties in the State will not be disturbed), will, under the Constitutional amendment to Section 3, Article XI, which has been initiated by a sufficient number of petitioners and will appear upon the ballot at the November 7th election as No. 1 Amendment, comprise a fund which will retire the $6,000,000 of bonds to be issued, $1,500,000 each year for four successive years, under said amendment in the twenty-year period, and pay all interest thereon, without the taxpayer being called upon to advance one penny.

An intimate view of completed highway in Rio Grande county looking north from Monte Vista

It should perhaps be called to the attention of the citizen that the roads constructed with this money will not be new roads, but the old roads will be made more or less permanent, so that a great saving in the upkeep of these roads when so constructed, will enure to the taxpayers.

It is suggested further in the interest of good roads that a cigarette tax which now maintains in many of the other states at the rate of one mill per cigarette sold, be added to the revenues of the motor vehicle department. Those favoring this tax calculate that additional revenues for good roads in an amount approximating a million dollars a year could thus be obtained, and that such a tax would not be felt by the consumer, as it would undoubtedly be absorbed by the tobacco manufacturers.

It should not be overlooked that while great benefit from the construction of good roads will come to the people of the State generally, those who will be most benefited by having easy access for marketing crops and produce will be the farmers, and this without any added expense to the heavy burden of taxation which they are now bearing.

Picking a road up out of the mud with a dragline between Hooper and Mineral Springs.

Road Material Survey Started

Investigation Shows Colorado Has Wealth of Best Road Building Rock in West Being Used on Highways

BY JOHN S. MARSHALL,
Chief Draftsman
In Charge of Research Investigations
Colorado Highway Department

ONE of the important problems in highway constrnction is the availability of local road building materials. In planning a project, questions such as the following, present themselves:

Where can we get suitable gravel for surfacing?

How far from the work are acceptable coocrete aggregates?

Can we nse sand from a certain pit for pavement cushion or fine aggregate?

How much will it cost to get tbis material?

Realizing the need for specific information on gravel, saud, stone, and clay deposits, a plan has been worked out whereby it is possible to have this data for ready reference. A survey of road materials in Colorado is being conducted by the State Highway Department, assisted by the Coloradn Agricultural College.

In the spring of 1921 an agreement was entered into between the State Highway Department and the Colorado Agricultnral College for a co-operative survey of road materials in this State. By the terms of this agreement the Department has been in charge of the field work and has supplied transportation for the field party. The College bas furnished an assistant on the field party and has conducted all laboratory tests.

Since the party hegan operations, abont three hundred prospective sources of material bave heen examined. One hundred and forty-two of these, representing an estimated available quantity of 7,500,000 cubic yards have been sampled and reported. It has heen the policy to make investigations first for material which can be used for Federal Aid and State Projects provided for by budget. Then deposits are located along or available to all of the state highways. In this manner pits bave been examined from Denver to Cheyenne via both Fort Collins and Greeley, Greeley to Sterling, Denver to Pueblo, Pueblo to Canon City, Pueblo to Kansas line beyond Holly, Colorado Springs to Buena Vista, and Colorado Springs to Limon.

The methods employed in the field are, first, to prospect over a given area. If there are indications of gravel or rock, test holes are dug tn determine the nature of the deposit. Then, if the pit shows sufficient quantity, and if the material appears to be acceptable, samples characteristic of the pit are taken, and a plane-table sketch of the area is made. This sketch, drawn to scale of 1"-100 ft., shows the general extent of the pit. It shows test holes together with log of each, buildings, the more prominent topographical features, and any other features which will help one in locating the pit. Samples are taken and shipped in cement sacks to the Road Material Laboratory at Fort Collins. Also, reports of the pit are sent to the Testing Engineer and to the State Highway Department.

The report of a pit inclndes: Type of material; location; extent; quantity available; character and amount of stripping; haul to the nearest highway; haul to the nearest shipping point; average haul to project; record of previous use of material; proposed nse of material; owoer of material; initial cost; current hauliog cost; list and designations of saoiples taken; remarks covering any uousual details concerning deposits.

Front view of Army truck converted into "Gravel Prospector's Home."

Rear view of truck showing bunks folded down for night.

The samples submitted to the laboratory are tested by standard methods to determine their snitability for road building. The tests oo materials to he used for concrete aggregates consist of mechaoical analysis, elutriation, specific gravity, weight per cubit foot, per cent of voids, colorimetric test for organic matter, seven and twenty-eight-day cement briquettes 1:3, and compression streogth. For qnarry rock there is determined in addition, hardness, per cent of wear, French coefficient of wear, toughness, and water absorption. If elutriation shows silt greater than 3%, a part of the sample is washed and parallel tests are run. Surfacing material is subjected to the following tests: Mechanical analysis, specific gravity, weight per cubic fnot, per cent of voids, hardness, per cent of wear aod cementation value.

Upon completion of the tests, reports of same are submitted by the laboratory to the Department. Tbe test reports for each pit, report of the pit, and blue print of the sketch map are bound together and filed. The pits are numbered and filed consecntively. Before pit report is filed, however, the position of the deposit is indicated in red ink in a set of Colorado Military Maps. By consulting these maps one can obtain the number and position of any deposit whicb has been sampled. Also in order to obtain from these maps an idea concerning the general quality and quantity of material in a pit without analyzing the test reports, symbols to be placed under the pit designation have been adopted for use after the pit has been entirely reported npon. These symbols indicate qnantity available, material suitable or unsuitable for concrete, material suitable or unsuitable for surfacing, sand or coarse material in excess, and excessive oversize which can be crushed. If more detailed information is required, reference is made to the files.

A one-tnn Aviation truck, furnished with folding bnnks, writing desk and lockers, has been provided for the field party. With this equipment it has been possible to carry three men on the party, resulting in rapid progress of the work.

The party has encountered deposits of material which are very interesting and show a possibility of great development. In the search for materials near Canon City a deposit nf peculiar sandstone which is in effect a natural cement, has been investigated. This material has a high percentage of wear, is quite soft and may be readily cut with a knife. But it possesses a phenomenal cementing value. Tests for cementation have run 5,000 blows and over, per briquette witho

(Continued on page 10)

San Isabel Noted Beauty Spot

History of Forest Antedates Landing of Pilgrims—Early Pioneers Hunted for Gold and Paved Way for Later Day Civilization

BY H. N. WHEELER
Chief of Public Relations, U. S. Forest Service.

BEAUTIFUL San Isabel National Forest, traversed by the mighty Sangre de Cristo range containing the weird Spanish Peaks and the ever-changing Greenhorn mountains, lies west and south of Pueblo. To the west of the Sangre de Cristo lie the Great Sand Dunes, quiet and appealing in the morning sun, but repelling and forbidding when swept by the blustering winds sweeping across the broad plains of San Luis Valley.

Before the shadows of early dawn have gone or those of late evening begin to appear, the slanting rays of the bidden sun paint the snow-capped ridge with the most delicate tints of pink or with the deeper hues of purple and scarlet. Scarlet predominates and caused the name of Sangre de Cristo to be applied. No less interesting are the Spanish Peaks, standing far out from other mountains, they were first called the breasts of a woman. From the west peak radiate peculiar rock walls which give the peaks a weird and uncanny setting and yet with such an appeal that one feels impelled to explore their innermost recesses.

The perpetual snow fields, waterfalls, rushing streams, turquoise lakes, timbered slopes and towering cliffs urge a more intimate acquaintance.

De Weese Dam on Grape Creek in San Isabel National Forest, with Sangre de Cristo range in background.

Roads, trails and camping places have been built and improved so that the 94,050 visitors of 1921 found rest and enjoyment in this truly delightful playground. Fishing in lakes and streams added to the enjoyment.

The Spanish Peaks Mountain Playground Association and the San Isabel Public Recreation Association, purely public spirited, non-remunerative organizations, have done much to develop the camping spots and make it possible for the region to be enjoyed to the full. The many fireplaces, sanitaries and shelters constructed protect the forest from destruction and its visitors from disease.

The San Isabel Forest is replete in history antedating the landing of the Pilgrims. The early Spaniards wandered into its fastnesses in search of gold. The Indians hunted its game and enjoyed its delightful summer weather, just as the white man now takes pleasure in hunting, fishing and recreation. The early pioneers hunted for gold, trapped beaver and other fur-bearing animals, supplanted the red man and paved the way for the later day civilization.

Valleys between the mountains are farmed intensively. The productivity of the soil is materially enhanced by irrigation, the water coming from the forest where it is conserved and its flow regulated by the timbered mountain slopes. The forest furnishes grass for the stock and fire wood and lumber for the stock raiser and settler, and lends a charm to all who behold it.

Fire, that insatiable demon, in years past swept bare much of the San Isabel Forest, but a kindly nature is covering the scars with a new growth. The timber-covered hills are beautiful to see.

The great sand dunes near San Isabel Forest looking west across Medano Creek.

Since the Forest Service was created and placed under the Department of Agriculture in 1905, fires have been almost entirely eliminated.

The U. S. Forest Service is co-operating with the several counties in building roads to the isolated places. There are delightful camping places made convenient for the traveler, and upon completion of the North Hardscrabble-Squirrel Creek and Cucharas roads, now in procesa of construction, many new summer home areas and camping places will become accessible and travel over the forest greatly facilitated. All are welcome to this great pleasnre area with no restrictions other than to obey the State laws, put ont camping fires and clean up camp grounds.

BUTTES BRIDGE WORK UNDER FULL SWING.

Workmen have started pouring concrete on the south abutment of the new bridge over the Fountain river at Buttes. The old bridge at this point was destroyed by the flood of June 1921.

The new bridge will be of steel and will bave two 150 ft. spans. Rains and floods have delayed the work on this new structure, but the contractor reports work is now progressing nicely. It is expected that the new crossing will he open for traffic in the early fall.

Colorado Highways

BETTER ROADS

Published Monthly by
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Address all communications to State Highway Department, attention M. W. Bennett, Editor.

Owing to the necessarily limited edition of this publication, it will be impossible to distribute it free to any persons or institutions other than the state and county officials actually engaged in the planning or construction of highways, instructors in highway engineering, newspapers and periodicals, and civic associations. Others desiring to obtain Colorado Highways can do so by sending 10 cents for each number desired. Associations desiring to distribute the magazine can obtain it at cost in lots of from 500 copies up.

Subscription Price, $1.00 per year.

EDITORIAL COMMENT.

Good roads are time savers.

Time is money.

Time is the only thing in the world that is limited.

Time figures in everything that we do.

Our achievements are all measured and limited by time.

Modern business is governed by time. All along the line from producer to the consumer time is of great importanee.

That is where good roads play a great part.

Smooth highways have brought the farmer closer to his market. A decade ago a farmer living 20 miles from town was "out in the country"; today he is an urbanite.

Automobiles and good roads have made this possible.

There was a time when railroads were of prime inportanee. Today this is changed.

It used to be that roads were looked upon as feeders to the railroads. Not so now. It would hardly be exaggerating to say that we could get along better today without our railroads than our roads—but we need them both. Eaeh has its function to perform.

Our modern "good roads" have come to stay. We could no more get along without them than we could the railroads.

Therefore the importance of continued highway construction and good roads is self-apparent.

Every user of the roads should be a booster for better highways.

Good roads mean more prosperity to the farmer, the manufacturer and the consumer. Good roads inerease land values everyhere.

An improved highway serves the real property in the rural districts.

Last year there was expended on the highways in the United States the tidy sum of $600,000,000.

This is the maximum expenditure for any year.

But this will not satisfy the demand for improved roads. There is traffic already waiting for the roads to be built. The work of providing a roadbed for the rolling stock already in existenee will extend more than a deeade into the future.

Highway transport is an essential part of our social and economic life.

Roads are now aeeepted as a great economic instrument. We encourage the use of roads, because only by their use may the people get dividends from their highway investment.

But the regulation of the roads should be for the public interest. In the future much attention will be paid to regulation.

Vehicle laws already are on the statute books in most states. These laws mostly pertain to the regulation of speed and weights that may be transported over the highways.

In most states, as in Colorado, the number of tons that may be transported over the highways is limited. This is done in order to reduce to a mimimum, the damage from overloaded trucks.

Something new in highway finance will be submitted to the people of Colorado at the fall election.

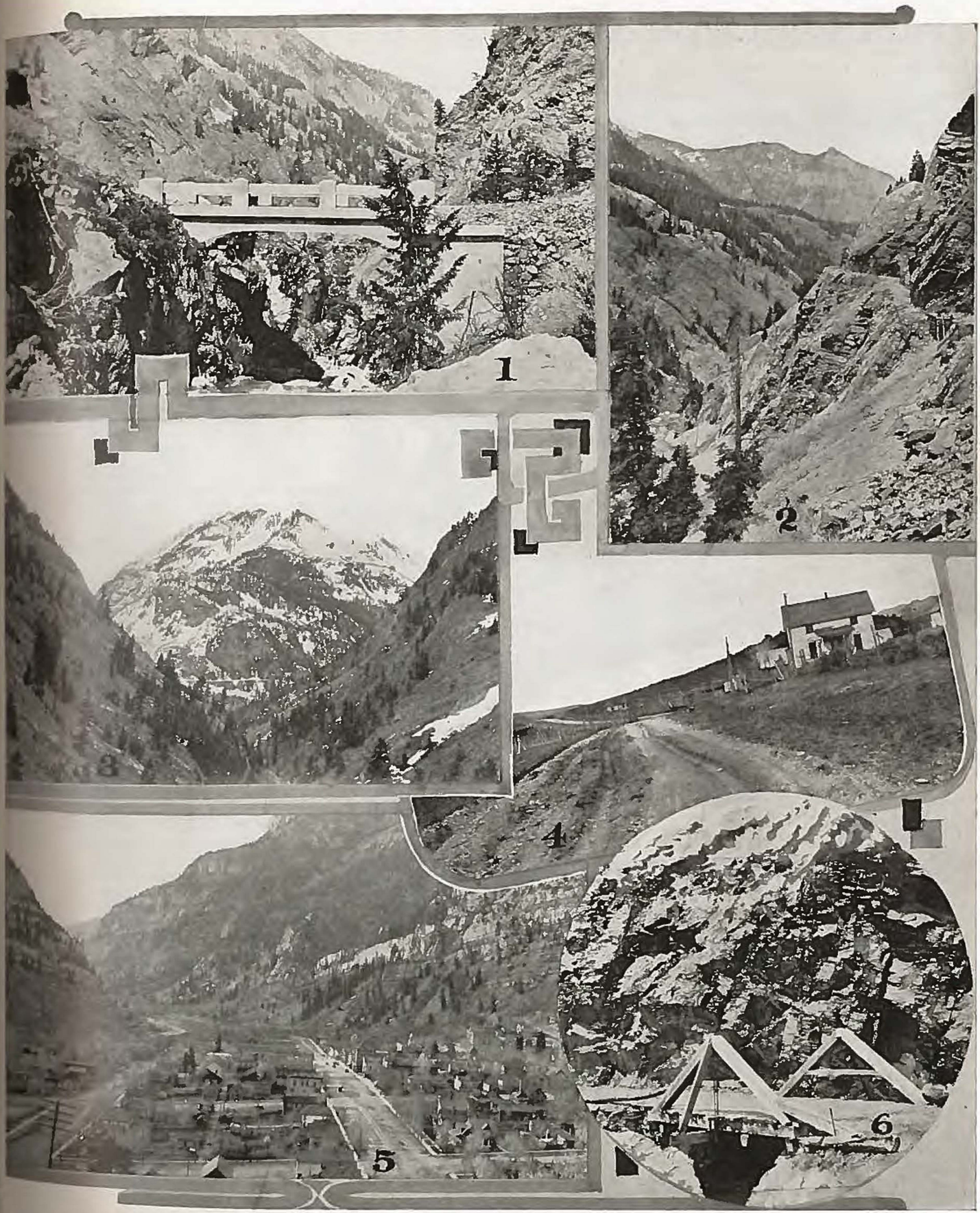
In the past, bond issues have meant more taxes for the owners of real property to pay.

But in this instance the users of the roads pay the bill. The farmers positively will not be taxed an additional sum.

By the terms of the proposed measure the state's share, or fifty per cent of the motor vehicle licenge collections will be used to pay interest and establish a sinking fund to pay off the bonds on maturity.

The money raised from the sale of the bonds will be used to meet Federal Aid appropriations, and will be expended on about 40 per cent of the Colorado road system.

Approval of the bonds by the people at the November election insures the continuation of those progressive policies instituted by the present highway administration.



1. State bridge over Uncompahgre River, near Ouray. 2. View of Red Mountain on the Ouray-Silverton highway. 3. Mt. Abrams, elevation about 13,000 feet. 4. Shale road at Rio Blanco, before maintenance was started. 5. View of the picturesque city of Ouray. 6. Bear Creek bridge on Ouray-Silverton road.

Full Description of the Arlington Paving Tests

Bituminous and Concrete Surfaces Tested by Government—Over 120 Road Sections —Special Abrasive Equipment Used

A COMPREHENSIVE program of road building research and investigation during the coming season at the Arlingtoo Experimental Station near Washington, D. C., is announced by the Bureau of Public Roads of the United States Department of Agriculture. Impact tests on pavements, subgrade stndies and other experiments, which last year aroused much interest among engineers, will be continued, as well as several other lines of work under way last year and new ones to be started.

Bituminous weariog surfaces are to be investigated to determine the reason for the formation of waves and irregularities and to settle mooted questions concerning the proper mixture and the proper mineral aggregates to he used in bituminous roads.

More than 30 sections of different types of bituminous construction will be built. These will incinde mixtures of different mechanical grading and with different percentages of bitumen of several degrees of hardness.

Sections are being constructed on a circular track about 600 feet in circumference, the roadway being 13 feet wide. On this roadway will be operated a 5-ton army truck eqnipped with solid tires. The truck will be operated in a varying path so as to cover practically tbe entire width of the roadway and will travel at a speed of from 12 to 15 miles an hour for five or six months, or until some results are obtained leading to the solution of the problems involved.

Resistance to Wear.

There is considerable discnssion as to what is the proper criterion to be used in selecting and jndging concrete aggregates that will offer the greatest amount of resistance to wear. At the present time judgment is based on wear tests made in the laboratory and npon the compressive strength of concrete, also upon the strnctural strength of concrete beams constructed and broken in the laboratory. The comparison of the wear of concrete in nctual nae on road surfaces with the indications obtained in laboratory experiments is not wbolly satisfactory.

To throw more light on this subject a wear test is to be made with the conditions approximating those actnally found on the road. This test will include about 65 sections of concrete wearing surface, each section being of a different qnality of concrete, the qnalities being varied by virtue of the different aggregates used, different proportions in the mixture and amouot of mixing water. Tbese sections are to be constructed oo a circular runway about 650 feet in circumference, the runway being 4 feet wide.

Showing grading work on Highway No. 30 in Lincoln county between Colorado Springs and Limon.

Special Test Equipment.

On this runway will be operated a specially constructed car with two truck wheels eqnipped with solid rnbber tires and loaded to represent a truck. The car will be guided by small railroad rails to hold it in position, the power being applied by means of an electric motor to the rear wheel. This apparatus will be operated around the circular runway at a speed of probably 20 miles an hour. The test will involve the nse of truck wheels eqnipped with different kinds of tires and will include the use of non-skid chains. A steel-tired wheel will probably also be used to get the effect of an accelerated wear test.

The object of this experiment is to determine the relative wear of the different coocrete sectioos when subjected to traffic equipped with differeot types of wheel, also to furnish a comparison between actual service conditions and laboratory tests. This test will be in operation continuously beginning some time in June.

Road Impacts Studied.

In a rather elaborate series of experiments, the bureau has studied impact of trucks on roads, and has determined approximately the magnitnde of impact force nnder different truck and road conditions. The effect of such impact on concrete pavements and several types of road on concrete base was studied and reported on last year. This series of experiments is to be continued and enlarged. Over 120 road sections or slabs have been constructed in dnplicate series. One series is on a carefully drained dry subgrade; tbe other series is on the same kind of snbgrade except tbat it is kept wet and as nearly saturated as possible by means of an underlying drain tile and side ditches filled with water.

The testing of these slabs began during the month of May, by means of a new impact machine now being constructed which stimulates the action of the rear wheel of a truck. On this machine may be mounted truck wheels of different sizes and weights carrying different kinds of truck tires. This apparatns may he so operated as to reproduce the different loading and equipment conditions of a large vnriety of trucks. The slabs will be hammered by means of this machine in the center, on the corners, and on the sides so as to obtain the relative strength nnder these different conditions.

The warping effect of temperature and moisture conditions on concrete pavements is also being investigated. Temperatures and movements are being recorded graphically on continuous charts In addition to these temperature and movement measurements the pressures on the sub-grade under the concrete slab are obtained by means of soil pressure cells. This investigation will give some definite information concerning the snpport offered by subgrades to rigid concrete roads. This investigation has been under way for some time and will continue probably for a year or more.

Concrete mixing crew at work on Santa Fe Trail west of La Junta in Otera county.

(Cont. on page 1

Cross-Road Sights

BY WARREN E. BOYER
Publicity Director, Denver Tourist Bureau

TAKE a Ute trail, or the course used by Coronado to find mythical Quivira, or the trail of the furhnnters, and you have the forerunners of highways in Colorado. Weaving the history, romance and delights of recreation into a compact recital creates an incentive for greater travel, which tourist bureaus throughout the state are encouraging this summer as never before.

If some one told you the Colorado Rockies were the first land to appear when the waters of creation divided, chances are you wonld scoff at the idea. If a stranger informed you, a citizen of Colorado, that Fifteenth street in Denver was once the beaten trail of furhunters hetween Fort Bent, near Canon City, Colorado, and Fort Laramie, Wyoming, it might he a bit humiliating. If you were supposed to know, but did not, that Colorado has 5,542 miles of main line railroad tracks and 48,000 miles of roads, of which 8,135 have been designated as state highways, it would prove a relief to refer to the "Travel Geography of Colorado," which has just been prepared by the Denver Tourist Bureau for free distribution.

It's the cross-road sights that count, meaning, that maoy of the really worthwhile things on or neor the highways are overlooked by travelers because they are unaware of their existence. It's like the cross-roads of the old days, when the directions on the finger-board were beaten off by storms, and the traveler, in confusioo, flipped a coin to see which way he would tnra to reach his destination. Tourists are less critical when their mind is occupied with expectant sights along the road. The ride doesn't seem near as tiresome, and the roadbed doesn't come up for discussion every few minutes.

Eight booklets have been issned, three of which are directly concerned in the welfare of the automobile traveler while in Colorado. The others, in addition to the "Travel Geography of Colorado", are "Motoring and Camping in the Colorado Rockies", and "Fishing, Hnnting and Sports in the Colorado Rockies".

The first question in the motoring booklet is: "Must I abandon the use of my car when I reach Colorado, because of difficulties to be enconntered in motoring?" The answer follows: "Certaintly not. Practically every section of the State is accessible to the touring motorist by reason of the development and improvement of roads in recent years."

Another qnestion reads: "Is it safe to deviate from main traveled highways in the mountains?" Answer: "Yes. There are many scenic drives over good roads not a part of Colorado's major highway system, bnt travelers should procure ronte maps beforehand and ascertain the condition of the roads. Overland highways in virtually every instance have also been designated as state highways."

In the fishing folder a page is devoted to "Driving in the Rockies", cautioning the visitor to the state that what seem like level stretches are in reality easy grades only when the common sense rules of the limitations of an antomobile are observed. Many of the state's best aod most popular highways follow the water courses. In the foreword is this statement: "Not the least of the benefits conferred by the State of Colorado on residents aod visitors is its work for the upkeep of its fish and game." The trout would be of little use if, nowadays, the roads to the streams were impassable.

Aside from the actual construction and maintenance of state roads, then, there is the added duty of seeing that the people get the most out of them. Travel and tourist information bureans throughout the state relieve the state of much of this seemingly trivial, yet immeasurably important, task of carefully ronting strangers over them in all seasons.

Poudre Lake at top of Milner Pass on Fall River road. Lake is fed by natural springs, and being located on Continental Divide, one outlet flows to the Pacific and the other to the Atlantic.

MONTROSE COUNTY SETS ROAD BUDGET.

In conjunction with District Engineer Vandemoer, the Montrose county commissioners have worked out the road budget for Montrose county for the year 1922, appropriations for the varions sections of the county heing as follows:

Maher, or Muddy district	$1,000.00
Graveling Olathe-Delta road	6,000.00
Cedar Creek bridge	5,000.00
Olathe to Menoken, drainage graveling	3,000.00
Horsefly bridge and approaches	2,000.00
Montrose to Menoken, regrading and graveling	10,000.00
San Miguel river road	7,500.00
Bedrock bridge repairs	1,000.00
Coke Ovens to Federal Aid	1,000.00
West canal to top Shavano	1,000.00
Grading and graveling No. 20 west from Tobin lane to Shavano hill	2,364.00

The connty commissioners approved the reqnest from the town of Olathe that the State Highway Commission he reqnested to make that part of the State Highway No. 12 passing through the town of Olathe part of the State Highway.

GUNBARREL ROAD BRIDGE OPEN TO TRAFFIC.

The state highway department opened a new bridge for traffic over the Rio Grande river near Monte Vista early in Jnne. The new structure forms a part of Colorado's famous Gunbarrel road, which runs for more than fifty miles on a straight line.

THE ROAD ON THE COVER.

The cover of this issue of COLORADO HIGHWAYS shows a rngged drive on the Blue Mesa Highway in Gunnison county. The pictnre was taken near Sapinero, on the Gnnnison river. Plans are now being prepared for further improvemeot of the road. When completed the motorist will have opportunity to enjoy the beauties of this particularly rugged country with the comfort of a smooth highway.

Weld county commissioners have announced intention of grading and graveling the road from Johnstown to Elweli, and work will start some time next week. This work will be done by the county road gang, under snpervision of Highway Engineer John H. Wortham, and is part of a plan for extensive road repair work in that part of Weld county.

How Highways are Located

SOMETIMES you hear it said by laymen that money spent for snrveys and the preparation of plans for roads is money wasted.

Perhaps the person who makes the assertion has good intentions and his statement is made in good faith, but we donbt if he is fully versed with all the facts.

In order to give the people of Colorado a better conception of the problems of modern road bnildiog, the location aod design and actual construction, these few pertinent facts are printed.

Modern practice is followed by the Colorado Highway Department in location and design.

A fine stretch of concrete paving east of Grand Junction in Mesa county.

Experience has shown that the cost of preliminary study is the best possible investment. In fact, thousands of dollars have been saved on projects through the proper preparation of plans.

Preliminary stndy resnlts in: a comprehensive system of highways; ecnnomical construction costs; best alignment; grades and drainage conditions, and a preknown construction estimate.

Without a preknown constrnction estimate, no system of financing on proposed fnture construction can be worked out. Under the Federal Aid Road Act the states are required to furnish detailed surveys, complete plans and specifications.

Briefly the task of locating Colorado's highway system may be divided into three classes:

(1) The selection, in a general way, of the various routes.

(2) The reconnaissance survey, by means of which the general location of the highway between two fixed points is determined.

(3) The location survey, by means of which the details of alignment and grade between points located on the reconnaissance survey are worked out.

Under the terms of the State Highway Act, power to define "state highways" is vested in the State Highway Advisory Board. In the selection of a state highway the members of the board take into consideration the centers of population, the number of people the road will serve, and the outstanding topographical features.

A typical selection of such a route follows:

"Begianing at Hooper on Road 10-s, and running north through the towns of Gibson, La Garita, Moffat, Mirage, Mioeral Hot Springs, connectiog with Road 36 south of Villa Grove in Saguache county."

In designating new roads the board generally makes a proviso that same shall be built by the most practicable aod available route.

As can be readily seen, there are many factors entering into the final determination of the most available and practical route. The above designation states that the road must rnn from Hooper to Villa Grove.

There mnst be a study of the economic values of the various possible routes between these two points. There is the question of the number of people to be served, the present valuation of the country traversed and the possibilities of futnre development.

The distances between control points mnst be taken into consideration. Also there is a qnestion of maximum grades. A study mnst be made of the elevations of summits to determine whether the road will be blocked by snow during the winter months.

These and many other factors are given serious consideration before the actual construction of the road is started. A decision is reached only after the fullest investigation has been made and every side of the question has been considered.

After the decision is made, the reconnaissance survey is begun. This survey consists of a general survey of the country through which the proposed road is to run. The main topographical features are gone over.

The selection of the route may be simple, or it may be a very difficnlt proceeding. This depends upon the topography of the conntry, particularly upon the location of rivers and snmmits.

If the proposed line follows a river the selection is comparatively easy. The engineer has only to decide which river bank to follow. This can be readily decided by weighing the probable costs. Of course there are other considerations, snch as snow conditions, property values, etc., which must be given due weight.

When the proposed route does not follow a riveor, the task of location is more difficult. This is especially true of the water-conrses are found to rnn nearly at right angles to the general direction of the road.

Investigation of all possible passes and summits mnst be made by the reconnaissance engineer. He must select the best stream crossings. Soil aod drainage conditions must be examined. Road building materials, such as rock, saod, gravel, and water in quantities must be located. Grades and curves also must be considered.

At the same time the reconnaissance engineer determines the best way to negotiate difficult topographical features and the best location to overcome snow difficulties.

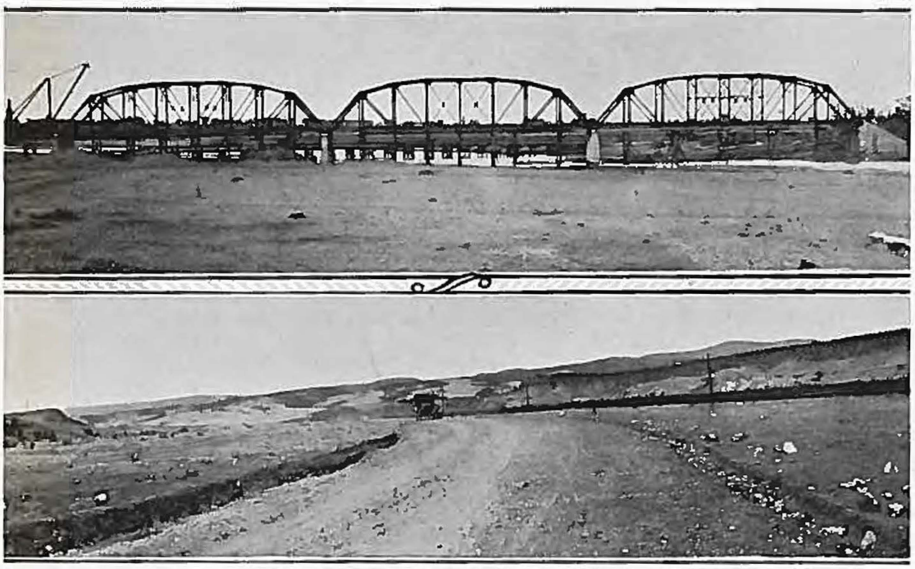
In this preliminary survey the engineer must consider probable maintenance costs. This is incinded in his recommendations to the highway engineer.

(*Continued on page 10*)

View of a highway tunnel near Ouray on the famous D-S-O highway. One of the costliest road projects in Colorado.

Improved Roads Help Farmers

"Nothing since the advent of the railroad," said Congressman Sydney Anderson, Chairman of the Joint Committee of Agricultural Inquiry, recently in giving advance notice of the report to be made to the Congress, "has had so marked an economic and sociological effect upon the production life of the country as the motor vehicle. The Commission will recommend that Congress continue to promote an adequate program of highway construction and maintenance, directed to the more effective correlation of highway transportation with rail and water transportation.



Top—View of steel truss bridge over the Arkansas river, near Las Animas. Below—Showing result of good maintenance in Saguache County.

"We believe that the program of highway construction and maintenance by states and counties should he continned under the direction of qualified experts, with particular reference to the coostruction and maintenance of farm-to-market roads; that adequate funds should be appropriated for research and regulation of traffic based upon the facts so ascertained.

"The several states should co-operate in effecting a uniform basis for taxing motor trucks and other motor vehicles, which shall fairly represent the proportion of expense of highway constructioo and maintenance chargeable to such vehicles.

"Previous to its appearance, the economic zone of transportation was sharply defined by the haulage range of the horse and the cost of such transportation. It will be shown in the report that in 1916 the estimated cost of hauling in wagons from farms to shipping point averaged about 30c per ton mile for wheat, 33c for corn and 48c for cotton. Hauling in motor trucks or by tractors the averages are 15c for wheat and corn and 18c for cotton. In the same year wagon hauling averaged 9 miles from farm to shipping point and motor truck hauls 11.3 miles; the motor truck averaged 3.4 round trips per day over its longer route, while wagons made 1.2 round trips per day.

"It thus appears," said the Congressman, "that the major results accomplished by this new form of transportation has been to extend and broaden the market of the farmer. Single reactions are to be found in the fact that the use of the motor vehicle has brought the farmer closer to the city and also has increased the desirability and comfort of farm life.

"Figures in the report will show that while the motor vehicle traffic has increased more than 1,900 per cent in the period 1910 to 1921, the actual expenditures for highway construction and maintenance, taking into coosideration the increase in cost of materials and labor during the war and the readjustment period, was only slightly over 200 per cent.

"In some sections the combination of inbonnd farm products and outbound supplies by motor truck has concentrated upon the motor truck service the majority of the traffic within 30, 40, and 50 miles, and the Commission believes that the effect upon rail carriers has been to redoce the amount of local way freight, and that ultimately it will reduce the number of local freight trains operated.

"Since the growth io the use of the motor vehicle has been very markedly in advance of highway construction and maintenance," Chairman Andersou said, "and since it has brought with it a new and heavier form of highway traffic, it becomes evident that large funds will have to be expended if the 2,500,000 miles of rural highways in the United States are brought up to the standard of efficiency comparable to the extended nse of the roadbeds.

"Another effect of improved highways, is to enable the farmer to hold his products on the farm for a longer time. Where highways are unimproved, the farmer must move his produce when the roads are good, which is generally at the season when the prices are lowest. Improved highways thns make not only for a broader market but for a more stabilized one.

"The Commission believes therc should be regulation of the nse of the highways, especially with respect to overloadiog and maximum loading to be based upon the facts so developed. It will also urge that since poor highways not only increase the cost of transportation of commodities from farm to market, but also affect the comfort of the farmer and prevent him and his family from a full enjoyment of communication with his neighbor, all highways wherever possible should be improved and adequately maintained.

"It is already clear," the Chairman said, "that there is a wide variation in principle and application of the various state and local regnlations affecting intrastate motor traffic. Stndies of local motor transportation should be extended as rapidly as possible to afford a definite and comprehensive basis for uniform regnlation of motor transportation in order that the inconvenience, expense and inefficiency of operation occasioned by a lack of uniformity in State and Federal legislation in the futnre may as far as possible he avoided."

The work of this Commission has extended over many months and their findings are heing received with mnch favorable comment by the entire Congress.

BOOSTER FOR HIGHWAYS AND NEW BOND ISSUE.

If more people had the enthusiasm of H. A. Edmonds relative to securing first class roads for the State of Colorado, the movement would not hang fire very long. Mr. Edmoods realizes what improved roads mean to the people, an investment that is a real asset, something of value to everyooe. With the highways improved the citizens of the state are benefited directly and theo good roads make an appeal to all others to come this way. The plan of a houd issue of $6,000,000 to match a similar amount offered by the Federal goverooment is an opportunity that should not be overlooked. And then Mr. Edmonds states that by the plan devised the bond issue will not increase general taxation, the finaocing heing carried on through revenues received by the state from auto licenses. The plan should be giveo careful consideration.—Ft. Collins Express.

UNION PACIFIC GRANTS ROAD LEASE.

Greeley, June 22.—William R. Kelly, county attorney, has received notice from President Carl Gray of the Union Pacific Railroad that a 50-year lease will be granted to Weld county for a road between Ione and LaSalle and between Greeley Junction and Carr. The right-of-way is to be on the west side of the tracks. This will make possihle the coustruction of a concrete highway from Riverside cemetery in Denver to the Wyoming line without a single mainline railroad crossing. Granting of the lease followed a conference between the county commissioners of Weld county and President Gray, at Omaha, on May 27.

$190,000,000 Authorization Aids Road Construction

Washington, D. C., June 20.—Federal aid for road constructioo will be continued as a result of the authorization of additional appropriations for this work amounting to $190,000,000 carried by the Post Office appropriation bill signed hy the President June 19. Fifty million dollars is authorized for the fiscal year beginning July 1, this year, and $65,000,000 and $75,000,000, respectively, are authorized for each of the two snccceding fiscal years. In addition, $6,500,000 is authorized for forest roads for each of the two fiscal years beginning July 1, 1923, and July 1, 1924. The funds will be administered by the Secretary of Agricnlture through the Bureau of Public Roads.

The apportionment to be made to the various states is approximately as follows:

Fiscal Year Ending 1923.

Alabama	$1,035,614
Arizona	702,188
Arkansas	836,095
California	1,641,399
Colorado	894,117
Connecticut	320,599
Delaware	243,750
Florida	591,217
Georgia	1,331,972
Idaho	625,691
Illinois	2,164,187
Indiana	1,305,904
Iowa	1,401,915
Kansas	1,401,521
Kentucky	944,786
Louisiana	664,660
Maine	463,440
Maryland	427,086
Massachusetts	730,784
Michigan	1,499,688
Minnesota	1,415,731
Mississippi	863,271
Missouri	1,632,086
Montana	1,031,257
Nebraska	1,054,126
Nevada	635,624
New Hampshire	243,750
New Jersey	628,581
New Mexico	793,216
New York	2,464,299
North Carolina	1,139,556
North Dakota	776,476
Ohio	1,882,003
Oklahoma	1,168,226
Oregon	788,443
Pennsylvania	2,265,969
Rhode Island	243,750
South Carolina	707,492
South Dakota	802,707
Tenaessee	1,098,461
Texas	2,950,115
Utah	566,278
Vermont	243,750
Virginia	971,219
Washington	735,806
West Virginia	534,906
Wisconsin	1,263,211
Wyoming	623,078
Total	$48,750,000

These funds must be matched by the states and will he administered subject to the general provisions already in force.

The new legislation reduces the maximum participation on the part of the Government from $20,000 to $16,250 per mile for roads constructed with the appropriation for the next fiscal year and $15,000 per mile thereafter. Bridges over 20 feet in span may he considered as separate projects to which this limitation does not apply. In states where more than five per ceot of the area is unappropriated public land, provision is made for an increase in the amount per mile. The act also provides for the extension of Federal aid to the coostruction of structures required for the elimination of railroad grade crossings.

Important provisions of previons acts under which large funds have been successfully administered are applicable to the new fnnds. States must maintain adequate highway departments. Funds to match Federal aid must he placed under the direct control of the State Highway Department. The type of surface constructed must be adequate for the traffic anticipated, with reasonsble grades, curves, and other featnres. States must obligate themselves to maintain all Federal-aid roads constructed, and in case this is not done, aoy Federal funds available for new projects may be withheld until they are put into satisfactory condition. All Federal-aid funds must be spent on a connected system of roads consisting of not more than 7 per cent of the total mileage in each state and divided into primary or interstate roads and secondary or intercounty roads.

Plans Received From All But Eight States.

Plans for the proposed system have been received by the Bureau of Public Roads from all but eight states, aad the state systems are beiog co-ordinsted so that when joined together they will serve the best ioterests of the whole country. In the meantime oaly projects certain to be on the proposed system are being approved.

The new appropriation comes at a time whea several states are nearing the limit of funds available. The authorization of funds for three years in advaoce will be of great benefit to all states in that it will permit them to lay their plaos for some time ahead. Uocertainty as to future Federal aid is removed and provision can be made at once for raising state funds to match it.

What the new funds will mesn to the country can be judged by the use that has been made of the $350,000,000 previously appropriated. On May 31, 17,000 miles of road had been completed, and, in addition nearly 14,500 miles were under construction. Federal-aid roads in all stages total nearly 38,700 miles, involving over $287,500,000 of Federal aid. To match this fund, the states have appropriated approximately $380,000,000, making a total of $667,500,000.

All types of rosd have been constrncted with Federal aid to meet the varying conditions in the United States. The average cost per mile has beeo $17,120, and Federal aid has amounted to 43 per cent of the total cost.

It is estimated that the $190,000,000 lately authorized will result in the construction of more than 25,000 miles, which added to the 46,000 miles that is expected to result from previous appropriations makes a total of 71,000 miles, or nearly 40 per cent of the estimated 180,000 miles of road in the system of Federal-aid roads now being outlined.

Road Material Survey Started

(*Continued from page 2*)

failure. In fact, one briquette stood 6,600 blows and was intact at the close of the test. (Fifty blows is the minimum requirement in the State Highway Department's specifications.) These cementation tests were made in the standard manner. Other briquettes prepared from the pure sandstone mixed with sufficient water so that the particles would adhere, also gave cementing values greater than 5,000. Because of the exceptional cementing value of this material, it is proposed to use it as a binder on gravel roads near Canon City.

Colorado possesses a wealth of the best road building rock, which should be developed and used. It is the work of this survey to get this material spotted and so recorded that interested parties can become quickly posted and make intelligent selection between one pit and another as to which will give the best results on the road. The results of this survey are being used in preparing estimates for projects. Contractors use it as a starting point in their search for materials for a certain project. We are steadily collecting together data on location and character of deposits, and this data is becoming more and more available in connection with planning highway projects.

How Highways Are Located

(*Continued from page 8*)

When he has completed his investigation, the reconnaissance engineer has generally selected two or more possible lines, all of which follow in a general way the main adopted route. Then there is made up preliminary estimates, based upon similar construction in similar country.

All of this data is carefully considered before the final selection is made. As a general thing, the selection of a specific line can be made on a basis of the reconnaissance engineer's report and a field study of the proposed lines.

It is sometimes necessary, however, on account of the equal desirability and cost of two or more lines, to stake out each of them and the final determination cannot then be made until the lines are finally located and complete plans and estimates prepared.

He who does the most building highways will do the most for the advancement of the material, moral and educational progress of the community and of the country.—U. S. Good Roads Bulletin.

The Paving Commission of Baltimore, Md., has available for new street paving in 1922, $2,500,000.

State Highway Bonds Bring Premium

FUNDS are now available to meet all needs of the State Highway Department for the year of 1922. Construction of state highways in the counties can be pushed to completion.

This has been made possible by the sale of $3,000,000 of state highway bonds to Sidlo, Simons, Fels and Company, heading a syndicate of Denver and eastern bond brokers.

State Treasurer Arthur M. Stong sold the bonds to the syndicate on June 4. the entire issue was taken by the syndicate. Seven brokerage houses were in the pool. They paid the handsome figure of $105.0415 for the bonds.

By the sale of the bonds to the syndicate, the State obtained a premium of approximately $151,257. Ten bids were received for the state securities, including one bid from United States Senator Phipps, who offered to purchase $50,000 worth of the highway bonds at 104.

The bonds were a part of the $5,000,000 issue authorized by the people of Colorado at the last general election. The entire amount will be covered by contracts for highway construction to be let this year. Half the sum is apportioned among the counties, to be expended on state highways. The state's share of the money is being used to meet federal aid appropriations.

"In view of the number of bidders and the splendid prices offered, I am prompted to say that business conditions have greatly improved over a year ago", said Mr. Stong.

"At that time there was only one bidder for the $2,000,000 worth of bonds offered. I believe I could have sold $20,000,000 worth of bonds, instead of $3,000,000, judging from the eagerness displayed by the bidders this time".

The bonds are now in the hands of the purchasers, who are said to have had no difficulty in placing them with Colorado and eastern investors.

Mr. Stong said that he believed that the $6,000,000 issue which the people of the state will be asked to authorize at the next general election, can be readily sold. This issue also would be used to meet Federal aid apportioned to Colorado by congress.

The new bonds would be issued at the rate of $1,500,000 per year for four years. An equal amount already has been allotted to Colorado by the Government, which would give $12,000,000 to be expended on Federal aid projects in this State during the next four years.

At the same time the State would continue giving aid to the counties for the building of roads which are not included in the Federal aid seven per cent system.

Also the State Highway Department would be enabled to continne the splendid maintenance work which is now being done in the counties throughout the State.

A fine example of concrete bridge construction in Chaffee county. Built with Federal Aid funds.

WAR TRACTORS FOR USE ON COUNTY ROADS.

Fourteen 10-ton Holt tractors, a part of surplus war materials apportioned to Colorado by the war department, were distributed through the State Highway Department in June to as many counties.

The tractors cost the government about $56,000, but the only charge to the counties was freight and handling charges, which was only a fraction of the original cost.

The machines are to be used in all kinds of heavy duty road work, where power and endurance is required. They are the first step to the complete motorization of the county highway road work. A large number of teams will be eliminated by each of the tractors put in use.

At present there are 36 of these tractors furnished by the war department in use in Colorado. County commissioners report that they have found the machines are record breakers for economy on heavy jobs.

The tractors are particularly adapted to pulling heavy scarifiers and blades. On graveling jobs they pull long trains of wagons, thus eliminating the use of teams.

The following counties received one each of the last allotment of tractors:

Archuleta, San Miguel, Huerfano, Alamosa, Rio Grande, Moffat, Routt, Adams, Arapahoe, Crowley, Kiowa, Jefferson, Prowers, Saguache.

FINANCING OUR FUTURE HIGHWAYS.

"Plan now the financing of highways for the future and place highway transportation, which has come to be an indispensable part of our national life, on a firm foundation." This is the advice given by Thomas H. MacDonald, chief of the Bureau of Public Roads, United States Department of Agriculture, for the consideration of every voter, tax payer, and legislator.

"We are starting out to construct a system of highways such as no nation ever constructed before. The nearest approach to it is found in France and Germany, and the area of neither is as large as Texas. This great undertaking is being entered into because highways are not a luxury but furnish a real service, have a real earning capacity, and have become a national necessity.

"For such an undertaking to be successful, financing to care for maintenance, reconstruction, and new construction should be planned for a long period of years in advance. Changes in methods of raising funds every few years, uncertainty as to whether funds will be provided, and periods in which funds are not provided all increase the final cost of highways. Such a policy would soon bring any private business to disaster.

"Development and increase in numbers of motor vehicles and the coincident need and demand for good roads have come so rapidly that methods of raising funds have often been expedients for the time being. Consideration has been given not so much to the just distribution of the cost as to how the funds can be raised with the least controversy and the utmost ease. Then, too, the use made of the highways and the service rendered by them has changed greatly within the last few years.

"All this leads to the conclusion that the whole situation should be gone over very carefully, traffic studies made, and the cost distributed in proportion to the service rendered.

"The Bureau of Public Roads estimates that of the $600,000,000 spent for highways last year, 33 per cent was Federal aid and motor-vehicle revenue. The remaining 67 per cent comes either directly or will eventually be paid from State and local taxes. It is believed that a very considerable readjustment of the source of revenues must be made so that a larger percentage will be paid by the road user and a lesser percentage from State or local taxes."

NEW ROAD TO DIXIE PARK PROPOSED.

Extension of the Turkey Creek road to Dixie Park will be made by the City of Denver this summer. This road connects Bear Creek with Turkey Creek, following Parmalee gulch from the road up the latter creek

By the construction of this new road, Dixie Park, which consists of 280 acres and is owned by Denver, will be made accessible to tourists.

An exceptionally fine view is obtained from the park. A short climb leads to the summit of Bear Mountain.

Steam Shovel Makes Dirt Fly on Wolf Creek Pass

WORK of improving the Wolf Creek Pass road was started the first week in June.

Over 20 miles of the difficult mountain road will be improved at a cost of $25,000. The work is being handled by the State Highway Department under the direction of the Maintenance Division.

Over fifteen miles of the work will consist of dirt removal. Many new turnouts will he provided, besides the road will be widened the entire distance on the eastern side of the pass.

Superintendent of Maintenance Higgins reported seven miles of the dirt-work completed at the time of going to press with this issue. A new Erie steam shovel recently purchased by the State Highway Department is being used in the removal of dirt and rock on the pass.

The Wolf Creek Pass road forms a link in the muchly traveled highway to the Mesa Verde National Park, which is the mecca of thonsands of tourists each snmmer. Ever since the advent of the automobile in Colorado, drivers have complained of the narrow width of the road over the pass. Some of the more timid drivers have refused to make the grade.

Following the removal of dirt in the widening process, rock corners will he blasted from the sharp tnrns, which will allow easy passage of cars over the entire distance of the pass.

Wolf Creek Pass is located about midway hetween South Fork and Pagosa Springs. It is a link in the shortest and quickest route from Denver to the Mesa Verde cliff dwellings.

J. D. Taylor, a well-known Colorado road builder, is in charge of the constrnction work.

The pass was opened to traffic on June 15. Since that time several hundred cars have passed over to the playgrounds in southwestern Colorado.

ROADS PAY BIG DIVIDENDS.

Colorado highways as an investment have paid big dividends to the citizens of the state, as the following figures will show:

In 1921 there was expended on highway construction in Colorado, the total sum of $7,466,243.74.

Of this sum, $3,902,725.08 was disbursed by the State and Federal Governments on about 10 per cent of the state's total road mileage. The balance, $3,563,518,66, was expended by the counties on roads not designated as state highways.

Last year there were 3,500,000 tourists registered in Colorado's scenic area.

Statistics show that 500,000 of these visitors stayed an average of seven days, and it is calculated that they spent a total of $35,000,000 in the State.

A snrvey made by the Denver Tourist Bureau also shows that 75 per cent of the tourists who came to Colorado last year traveled by automobile. It also has been found that these tourists ride over only 10 per cent of Colorado's highways.

From these statistics it will he found that Colorado's investment in highways in 1921 paid a return of about 25 per cent to the people of the state from tourist travel alone.

Of course, this does not take into account the sum of $2,000,000 which it is estimated by State Statisticians that the farmers and merchants of the State saved in reduced hauling costs during the same period.

Besides this actual cash return to the citizens of the State from their highway investment, the unemployment situation in Colorado has been considerably relieved through the expenditures made in road bnilding operations.

By the construction of smooth highways the State of Colorado has made accessible hundreds of points of great scenic interest.

Under the budget adopted for 1922 many more of these scenic wonders will he made easy of access to the people, most notable of which will be Mount Evans, one of the most beautiful peaks in the world, and unsurpassed anywhere from the standpoint of scenic attraction.

At the same time a comprehensive system of road maintenance will he carried out. Under this plan, 4,224 miles of state highways are to be kept in first-class condition. Employed in this work will be several hundred men, equipped with modern road machinery.

They will patrol the roads in the same manner as section crews maintain the rights-of-ways of railroads. A total of $1,300,000, the largest sum ever authorized in this State, is set aside for maintenance.

The budget of the State Highway Department for 1922 totals $11,245,935. Contracts covering this entire sum will be let during the year. It is expected that 335 miles of new rnads will he added to Colorado's already comprehensive highway system by the end of the year.

Colorado has 48,000 miles of roads. A total of 8,135 miles are designated as state highways. About 1,200 miles are now improved, 60 miles surfaced with concrete paving. Contracts for paving 45 more miles will be let this summer.

BLACK FOREST ROADS BEING IMPROVED.

The Black Forest is now the scene of extensive county road improvement operations. At the junction of the Templeton Gap road and the east-and-west road thru part of the forest which was recently built hy the county, a big road camp has been estahlished, several tents having been erected for the horses and the men, and a chuck wagon parked in the enclosure.

The Templeton Gap road is being widened to 30 feet. It is now but a single track. The ground is very hard and it takes two men ridiug on the heam of the plow to cnt the furrows at the sides, while four horses are required to pull the hig scrapers. Thomas Steers is the foreman in charge of the work.

This improvement work will make the Templeton Gap road one of the most attractive in the country and as the wooded hills of the Black Forest afford rare natural heauty it is expected that the road will become a favorite tourist drive.

Couuty Commissioner William Bartell has another road gang in the Black Forest at another point doing repair and improvement work, and there is a gang at work on the bridge on the road north of Mouument.

The construction of a new bridge at Templeton Gap, which is to replace the one washed out in the cloudburst of several days ago, has heeo found a big job.—Colorado Springs Telegraph.

PLANS FOR 1,170 MILES OF FOREST HIGHWAY APPROVED

A program of national forest highway constructiou involving an outlay of approximately $10,000,000 for 1,170 miles of road in 23 states has been approved by Secretary of Agricultnre Wallace. This program will be financed largely from the forest highway fund provided by the Federal Highway Act. Ahout $6,500,000 will come from this source, $1,000,000 from other national forest road appropriations, and the balance of $2,500,000 will be contributed by states and counties.

The work provided for is as follows:

State	Proposed Expenditure	Miles
Alahama	$ 3,953	15
Alaska	896,850	56
Arizona	1,011,500	133
Arkansas	142,796	23
Califoruia	1,246,197	50
Colorado	627,000	105
Florida	91,175	14
Idaho	1,269,600	137
Montana	566,421	75
Nebraska	9,958	22
Nevada	166,000	24
New Hampshire	29,288	5
New Mexico	452,000	64
Oklahoma	4,572	3
Oregon	2,270,000	210
South Carolina	2,173	5
South Dakota	61,000	7
Tennessee	15,000	3
Utah	292,100	56
Virginia	20,000	4
Washington	780,000	50
West Virginia	4,901	20
Wyoming	260,150	90
	$10,222,634	1,170

The funds and mileage are for forest roads of primary importance to states, counties, and communities. The program was recommended to the Secretary by the Forest Service and the Bureau of Public Roads, jointly, after conferences with State officials. The Bureau of Public Roads will supervise the construction work, aod it is expected that a large number of the projects will be completed this seasou.

Practically all the roads to be built are parts of the state or county highway systems and will therefore in most cases connect with and extend the system of Federal-aid highways covering the whole conntry. In some cases the new construction will provide roads through mountainous regions of the national forests hitherto penetrated only by pack trails.

In addition to the major road projects about $5,000,000 will be expended by the Forest Service on minor roads and trails required primarily for the protection and administration of the national forests.

Road Work and Builders the State Over

The sum of $6,000 has been appropriated by Conejos county commissioners for the construction of a bridge over the Rio Grande river on State Highway No. 32s, between San Luis and La Jara. The bridge will be constructed in co-operation with the State Highway Department. The county's share of the cost of the bridge will be paid from the gasoline taxes accruing to Conejos county for the year 1922.

By the construction of a new road the distance between Sterling and Estes Park has been reduced to 143 miles. The new route is directly west from Sterling to Briggsdale and Purcell, then four miles west to the Olive Branch school and church; thence south four miles and west to Fort Collins through Ault. The trip from that point is by way of the Fort Collins-Estes Park Highway.

George Toupain, assistant maintenance superintendent, reports the roads in the second highway district in exceptionally good condition. Tonpain makes his headquarters in Grand Junction.

Approximately 6,000 square yards of reinforced concrete paving will be put down by the town of Arvada this summer. Considerable paving already has been done along the main business street. Grading and surfacing of several streets also is in progress.

Upon the suggestion of Lloyd S. Dilley, connected with the highway force in Bent county, the business men of Las Animas are waging a strenuous campaign for the trade of ranchers on State Highway No. 101. This road is now in course of improvement and travel has shown a big increase. Business interests of Springfield, the other terminus of the road, also report a big increase of traffic in that direction.

Sixteen miles of roadway in Montrose and Routt counties will be started early in July. East of Naturita in Montrose county there will be ten and one-half miles graded and surfaced. Gravel surfacing will be laid on five and one-half miles between Hayden and Mount Harris in Routt county. The total cost of the two projects which will be constructed with Federal aid, is estimated at $133,000.

The new road through Vernon Canon which provides a short route to Idaho Springs and eliminates the long climb up Lookout Mountain from Denver, has been opened to traffic. This road connects with the Hog Back road between Golden and Morrison. Motorists report the road a great improvement. Contractor James Stryker constructed the lower part of the canon road. Last year Contractor Richard McQueary completed the upper stretch of the Vernon Highway.

Secretary of Agriculture Wallace has approved the authorization of $45,000 to be expended in constructing a road to the Arapahoe glacier in the Colorado national forest. A survey of the proposed road is now under way. Connecting with the road will be a "figure 8" trail system to include the Isabel, Fair and St. Vrain glaciers.

The Fall River scenic road in the Rocky Mountain National Park, was opened on June 15. For over a month Richard McQueary, who constructed this wonderful highway, was engaged with teams removing snow from the roadbed.

Gravel surfacing of the new Muddy Creek road north from Kremmling, a unit in the Victory Highway, will be started shortly. About $65,000 will be expended on the project. At a recent conference with Division Highway Engineers Cowden and Jenness, the Grand county commissioners agreed to also spend $10,000 on the Trough road, and $14,000 on the eastern slope of the Gore Range road.

Unprecedented tourist travel is reported over the Rainbow and Ocean-to-Ocean routes through Grand Junction. The road between Sapinero and Cimarron over the Blue Mesa division of the Rainbow was opened to traffic early in May. Archer Miller, road supervisor for Gunnison county, with a truck, followed by two tourist cars, was the first to get over this link of the highway following snow clearance.

Work is expected to start shortly on another link of the Independence Pass road between Twin Lakes and Aspen. There is to be 7.4 miles of mountain grading, located in Pitkin and Lake counties. The road over the pass has been under construction for five years.

H. L. Jenness, division engineer of the State Highway Department, reports good progress on the Hoosier Pass road near Breckenridge. An expenditure of $7,000 is being made in leveling the grade on the new Breckenridge road. When completed this road will cut the distance between Leadville and Denver to 110 miles.

Members of the Las Animas Commercial Club are urging the commissioners of Bent county to authorize the paving of the Santa Fe Trail from the new bridge over the Arkansas river to the city limits. The business men in a resolution unanimously endorsed the proposed paving project.

Messrs. P. C. Carson, G. S. Lawrence, Richard Bennett and Neil Kennedy of the State Highway Engineer force, are located in Steamboat Springs. They will make a survey of the new proposed road between Steamboat and Hayden. They also will do considerable work on State Highway No. 52, north of Steamboat.

William A. Whitney, engineer in charge of construction on the Battle Mountain road in the Leadville district, hopes to have this important highway open for traffic by early fall. Maintenance crews have been busy for a couple of weeks cleaning up rock slides on the west end of the project.

A road gang in charge of Commissioner W. D. White has been working for a month grading and surfacing that portion of the state highway in Fremont county between Florence and Wetmore. When completed the citizens of Wetmore will have a splendid outlet to Florence.

Work has been started on the Dolores end of the forest highway connecting Norwood and Dolores. Ranger W. I. Wilson will have charge of the work in the Montezuma National Forest.

Ten miles of sand-clay surfacing will be laid on the Colorado Springs-Limon road this summer. The cost will be about $72,000, of which 56.12% will be paid by the government and the State of Colorado standing the balance. This will be the last link of construction on this road. It is planned to extend the road next year to Brush, forming a junction with the O. L. D. Highway.

An ambitious road building campaign has been launched in Baca county, especially north and south of Springfield. This is the only county in the state without a railroad. Two new bridges are under way north of Springfield, and grading is planned between Springfield and Campo. County Commissioners George W. Elley, John M. Johnston and John M. Graft, accompanied by Engineer J. D. Bell and Maintenance Supervisor Lonis Swink, recently made an inspection tour of the county.

Five trucks have been busy hauling gravel on the Santa Fe Trail east of La Junta. It was necessary to do considerable grading, as the road was seriously damaged by the flood. At one point east of La Junta the county was compelled to station a tractor to pull trucks through the heavy sand. County Commissioner George Barr has proposed to the State Highway Department that the channel of the Arkansas river be straightened at this point to prevent future damage to the road.

R. E. Cowden, locating engineer of the State Highway Department, has started the preliminary survey for a proposed road from the mouth of Platean canon to De Beque along the Colorado river in Mesa county. The proposed road will shorten the distance between Grand Junction and De Beque and will give a scenic route along the Colorado river.

Grading for the new concrete paving project north of Colorado Springs will be completed this summer. This project will be five miles in length and will cost $270,000. It will be one of the largest projects in the state. The paving will be five miles long and will follow the Santa Fe railroad to Breed, connecting with the asphalt paving in Colorado Springs on Nevada avenue. The concrete will be laid early next spring, when the new grade will have been conditioned for the hard surfacing.

Two bad curves, a street car crossing and several bridges are eliminated by the route selected.

Olathe Roads Reported in Fine Shape

The traveling public is rejoicing over the great improvement that has recently been made in the state highway between the J. J. Ross place, a few miles south of Olathe, to the Delta county line. The road north of town which is now almost graded, will be graveled as soon as the necessary machinery can be brought to this end of the county.

The contract for the new bridge to cross the arroyo three miles north of town, has been let, the work to be completed within sixty days.

In addition to the appropriation already made for road work, $39,000 have been apportioned to Montrose county from the state bond issue for 1922.

County Commissioner H. P. Steel states that $6,000 will be used for further improvement of the highway between Delta county and Olathe, $3,000 between Olathe and Menoken, and $10,000 betweeo Menoken ond Montrose.—Olathe Criterion.

Contractor Starts Work on Mt. Evans Road

A force of fifty men started work on the Mount Evans road on June 21. Ed. Honnen, Colorado Springs contractor, has the contract for the project.

View of George Turner's "Idio City" in Turkey Creek Canon, near Morrison on State Road No. 95.

It is expected that the 4.4 miles of new road will be completed by October 1. This project connects with the completed highway at Echo Lake, and will take the Mount Evans drive to Lost or Hidden Lake. The altitude that will be reached by this stretch of road is approximately 12,200 feet.

The completioo of this project will leave a little more than ten miles to be constructed to the summit of Mt. Evans.

The most scenic part of the Mt. Evans drive comes between Echo and Summit lakes, and with the completion of this 4 miles, autoists will have opportunity to enjoy the real scenic grandeur of this area by early fall.

Records of the highway department show that this road is traveiable about five months in the year. The road was opened this year on June 10th. The last car into Echo lake in 1921 was just before Christmas.

As funds become available it is planned to extend the drive around the shoulder of Mount Evans and Mount Rosalie and down into Deer Park Creek, where it will join the present road on that creek. If this plan is carried out it will give motorists a 150 mile circle trip from Denver.

CONTRACTS AWARDED DURING MONTH OF JUNE

NUMBER	LOCATION	COUNTY	LENGTH	TYPE	CONTRACT PRICE	CONTRACTOR
F. A. P. 162	Manitou toward Colorado Springs	El Paso	1.378 mi.	Conc. Paving	$45,783.00	Colo. Contr. Co.
F. A. P. 7-C	Naturita-Norwood	Montrose	10.526 mi.	Grading	61,484.60	Girardet & Hotchkiss
F. A. P. 163	Over St. Charles River, E. of Pueblo	Pueblo	0.502 mi.	Br. & Surf. approaches	61,263.63	Rogers & Pickard
F. A. P. 171	Delta, Northwest	Delta	6.797 mi.	Gravel Surf.	49,692.66	Reeves & Cook
F. A. P. 189	Hayden, East	Routt	5.414 mi.	Gravel Surfacing	38,129.22	H. C. Lallier Engr. & Const. Co.
F. A. P. 228	Sterling-Merino	Logan	4.405 mi.	Conc. Paving	134,986.40	LaNier, Selander & White
St. Proj. 503 B	Independence Pass	Pitkin and Lake	App. 7.037 mi	Mountain Grading	30,575.00	W. A. Colt & Son
St. Proj. 639	North of Ordway	Crowley	100 ft. span	Timber Bridge	3,261.39	W. L. Robbins
St. Proj. 654	Bear Creek	Jefferson	0.298 mi.	Mountain Grad.	6,566.90	Colo. Br. & Const. Co.
St. Proj. 673	Sampson Creek near Melvin	Arapahoe	100 ft. span	Low Truss Bridge	15,341.95	Colo. Br. & Const. Co.
St. Proj. 674	Southeast of Englewood	Arapahoe	30 ft. span	Conc. Girder Bridge	6,165.92	Levy Const. Co.
St. Proj. 682	N. of Ft. Morgan, So. Platte River	Morgan	20-50 ft. span	Conc. Girder Bridge	88,052.61	Colo. Bridge & Const. Co.
Sand Cr. Br.	East of Denver	Adams	320 ft. span	Timber Trestle	9,914.26	W. L. Robbins

CONTRACTS BEING ADVERTISED

NUMBER	LOCATION	COUNTY	LENGTH	TYPE
F. A. P. 165	Canon City-Florence	Fremont	9.325 mi.	Gravel surfacing
F. A. P. 168-A	W. of Granada	Prowers	5.745 mi.	Gravel surfacing
F. A. P. 208-A	Grand Jct.-Palisade	Mesa	3.144 mi.	Gravel surfacing
F. A. P. 217	Pueblo, East	Pueblo	2.938 mi.	Concrete paving
F. A. P. 226-A	N. of Brighton	Weld	8.928 mi.	Concrete paving
St. Proj. 532	Calhan, E. & W.	El Paso	6.0 mi.	Sand-clay surfacing
St. Proj. 653	Nighthawk-Blackhawk	Gilpin		Culverts and bridges

PROJECTS ON WHICH PLANS HAVE BEEN SUBMITTED TO BUREAU OF PUBLIC ROADS BUT NOT YET ADVERTISED

NUMBER	LOCATION	COUNTY	LENGTH	TYPE
F. A. P. 71-B	S. W. Durango	La Plata	3.635 mi.	Gravel surfacing
F. A. P. 119-B	Cochetopa Pass	Saguache	7.477 mi.	Grading (surfacing part [illegible])
F. A. P. 209	Grand Jct. N. W.	Mesa	3.634 mi.	Gravel surfacing
F. A. P. 213-B	E. of Mancos	La Plata and Montezuma	5.302 mi.	Gravel surfacing
F. A. P. 221	Loveland, North	Larimer	4.04 mi.	Concrete paving

PROJECTS ON WHICH PLANS ARE BEING PREPARED

NUMBER	LOCATION	COUNTY	LENGTH	TYPE
F. A. P. 125	Saguache, W.	Gunnison	2.819 mi.	Grading and surfacing
F. A. P. 190	Dillon-Kremmling	Summit	1.017 mi.	Grading and bridge
F. A. P. 210	DeBeque-Grand Valley	Mesa & Garfield	13.0 mi.	Gravel surfacing
F. A. P. 215	E. of Pagosa Spgs.	Archuleta	0.1 mi.	Steel truss bridge
F. A. P. 216-B	E. of Granada	Prowers	7.8 mi.	Gravel surfacing
F. A. P. 218	Hasty-Lamar	Bent	11.82 mi.	Gravel surfacing
F. A. P. 224	Morrison-Bailey's	Park	5.621 mi.	Mountain grading
F. A. P. 225	E. of Aurora	Adams	1.0 mi.	Concrete paving
F. A. P. 226-C	Platteville-La Salle	Weld	13.0 mi.	Concrete paving

Sign Posts Along the National Highways

It is interesting to note the growth of highway construction and maintenance as an industry. That it is an industry may be realized from the fact that last year the expenditures in the United States for this work were over $600,000,000, and the programs of the various states and the Federal Government indicate that close to ten billion dollars will be expended in the decade 1920-30.

For the whole United States there were 3,513,000 motor vehicles in 1916, and in 1921 there were 9,750,000, the latter number representing an investment of $8,322,000,000.00. The growth of road constrnctinn is tied np with the development of the automotive industry. The two are inseparable parts of one whole.

Reckless and careless drivers of automobiles are to be known as "fiivver-boobs", according to the decision reached by the judges decidiug the American Automobile Association's contest to pick a name describing the reckless driver in the same manner that "jay-walker" describes the careless pedestrian. The name was suggested by F. B. Simpson, of Cedar Rapids, Ia., who will receive the $25 in gold offered as a prize by the A. A. A.

More than 10,000 names were submitted in this contest and the suggestions came from all parts of the United States. The contest attracted nation-wide attention and the answers were of many varieties, including some who declared that it would be impossible to describe a reckless and careless driver in language that would go through the mails. The prize has been forwarded to Mr. Simpson.

Sands unsuitable for concrete on account of the presence of loam or other organic matter, are to be investigated by the Bureau of Public Roads of the United States Department of Agriculture and methods of treatment devised to make them safe for use.

Until recent years it often happened that concrete made of good cement and well-graded and apparently good sand, would disintegrate and become worthless. In such cases the poor quality has been attributed to all the different things which go to make a poor concrete.

A few years ago laboratory workers discovered the effect of organic matter in sand and devised a simple test to determine its presence in harmful quantities. The bureau now hopes to find methods of treatment so that such sands can be used. Samples of sand from all parts of the country are desired and anyone is invited to send in a sample in which the presence of organic matter is suspected, addressed to the Bureau of Public Roads, Washington, D. C.

A number of the western states have taken up with the Bureau of Public Roads the question of non-surfaced Federal Aid Projects, and this subject is up for decision at this time. The states petitioning for this type of road are moved by a consideration of greater mileage, and due to the lighter traffic of the regions traversed. While a number of western states favor non-surfaced projects, the Bureau of Public Roads is requiring graveling where the earthwork amounts to less than 5,000 cubic yards per mile.

The California Highway Commission, jointly with the U. S. Bureau of Public Roads, also with the co-operation of the Columbia Steel Company, in the use of its property, resumed on June 1, the Pittsburg highway tests started last spring by the Columbia Steel Company to investigate the strength of different types of concrete highways, with particular reference to the effect of reinforcing steel, at Pittsburg, Calif. At the conclusion of the tests already instituted, the Commission and the Federal Bureau expect to start an entirely new series nf tests on the same ground, which has been offered for the purpose by the steel company.

The fact that expenditures for highways in the United States last year amounted to approximately $600,000,000, an amount which places road building among the big industries of the country, justifies a considerable expenditure for experiment to determine just how they should be built to meet the needs of the ever-increasing traffic.

A bill has been introduced in Congress by Representative Mills of New York which requires that every automobile be stamped with a federal registration number at a cost of $2 to the owner. The measure is designed to cut down the number of motor car thefts, not as a revenue getter, but it would produce approximately $26,000,000 the first year and $6,000,000 each succeeding year. At a hearing before the House Ways and Means Committee, prosecuting attorneys sponsored the bill and representatives of the state automobile associations appeared in opposition.

A force of about 275 persons is kept in the field by the Bureau of Public Roads to inventory and prepare for shipment to the various states the vast supply of surplus war material which is suitable for highway construction. The material is allotted to the states on the same basis as the monetary federal aid for road construction. Every effort is being exerted to make this material available early this season. Surplus war materials recently received for distribution and located at Schenectady, N. Y.; Watertown, Mass.; and Dover, N. J., include 200 carloads of brick, about half of which is suitable for highway paving; 5,000,000 pounds of nails, 1,000,000 pounds of staples, 1,000,000 square feet of concrete reinforcing mesh, 200,000 monkey wrenches and 133 carloads of picks and pick handles.

Confirmation of the predicted lower level of prices for road construction this year is found in the reports on bid prices of 256 miles of Federal Aid roads received by the Bureau of Public Roads during the week ending April 8.

The average cost per mile of some of the types of roadway, including the cost of grading and drainage, were: 78 miles of gravel at $9,150 a mile, 46 miles of concrete at $29,000 a mile, 47 miles of bituminous macadam at $25,000 a mile, and 23 miles of bituminous concrete at $25,000 a mile.

A recent change in the laws of Virginia provides that the entire proceeds of the automobile tax after Dec. 31, 1922, shall revert to the maintenance of the state highways. At the present time, one-third of the tax is available for constructinn. Motor vehicle fees in Virginia amount to approximately $2,000,000 annually.

"The automobiles owned in the United States have a power equal to that of more than 300,000,000 horses," says the Chicago Journal, "while the total number of real horses and mules in the country is less than one-tenth that amount."

Panama, Cent. Am.—Something over $1,000,000 has already been expended on hardsurface road construction in the Republic of Panama, and more than $3,500,000 is still available for continuation of the work, according to a recent report of the Chief Engineer of Roads. The work is proceeding under two contracts, at the rate of $235,000 per month; 68 kilometers have already been completed.

Amoy, China.—Considerable progress was made during the past year in road construction in the Amoy district. Although the roads are not of the best construction, they will lessen the time consumed in travel from a period of five or six hours to about two or three. There are over 30 motor cars going out of Changchow daily on several roads. The new road from Anhai to Chuanchowfu has eliminated the necessity of traveling by sea.

The State Highway Department of Montana is clearing away bill boards, high fences, and other obstructions at intersections of highways and railroads. This is done under a special act of the legislature, designed to promote safety by bringing grade crossings into full view of motorists.

Iowa spent $38,741,627 in 1921 on 104.082 miles of highway. This sum includes the cost nf bridges constructed. The primary road expenditures on 6,616 miles for road work only totaled $16,996,806. On the county road system of 10,681 miles the snm of $5,766,483 was expended and the township road expenditures equaled $6,672,985. Bridge expenditures totaled $9,305,352.

Production of Portland cement in the United States last year totaled 98,293,000 barrels, according to the federal geological survey. Stocks in the hands of manufacturers on January 1, 1922, were said to aggregate 11,938,000 barrels.

It is now possible to drive from Vancouver, B. C., to Tia Juana, Mexico, over 1,635 miles of improved roads.

ROAD BUILDING CAMPAIGN PROGRESSING SATISFACTORILY.

The work of grading and surfacing with gravel the road between Wray and Eckley is progressing nicely the past couple of weeks. The entire distance from Eckley to the gravel road west of Wray has practically all been graded and made ready for the surfacing. The work of surfacing is also being done. The road has been surfaced for a distance of some five or six miles leading toward Wray from Eckley. This portion of the road is in excellent condition, being little short of a boulevard. There are still some six or seven miles to surface in order to connect up with the 3½-mile gravel stretch west of towo. The three miles of dirt road lyiog betweeo Wray and the beginning of the gravel road at the Lawrence school house is being surveyed and will be graded and surfaced with gravel this summer. When this work is finished, an excellent gravel road will connect the towns of Wray and Ynma, a distance of 30 miles, passing through the town of Eckley. There is a short stretch of road between Yuma and the connty line on the west which has not as yet been surfaced, but may be before the summer is ended. In such case there will be a surfaced road all the way from Wray to Fort Morgan, a distance of oearly 100 miles. The road across Washington county has been surfaced with gravel all the way, and a goodly portion of the road in Morgan county has also been snrfaced. The nioe miles leading sonth from Brush, which frequently is a bad road, has been snrfaced with gravel this spring and is said to be a fine road oow. Eventually the people of eastern Colorado will be able to boast of having a graveled highway 175 miles in length leadiog to the capital of the state. Such a road means mnch to the people of this part of the state.—Wray Rattler.

PATROL CREWS MAKE GOOD PROGRESS

Over 150 patrol maintenance crews are now employed on Colorado state highways. Reports indicate that the highways thruout the state are in better condition than ever before, motorists are loud in their praise of the work that is being accomplished.

At preseot there are twenty patrol crewa constantly maintaining the main north and south highway from the Wyo ming to the New Mexico state lines. Teo patrol crews are busy on the Limon road east of Denver to the Kansas state line.

The cost of the maintenance program this year is $1,300,000. Team patrols maintain from 8 to 10 miles of roadway, while truck outfits drag and maintain from 20 to 25 miles. The most modern machinery is used in this work.

ROMAN ROADS NOT FOR MODERN MOTORS.

Few Americans motoring from Durham, England, to London, over 200 miles, realize that the road they follow was originally surfaced and constructed by the Romans.

It was called Watling Street and it ran north to that Roman wall along the Cheviot hills which kept out the invading Picts and Scots. Having a perfect foundation, the road was easily surfaced and maintained through all those centuries.

But the motor car made necessary its complete reconstruction. It was the aame with the more famous Appian Way out of Rome. The destructive suction of rubber tires demolished in ten years a monnment which had stood up under the wheel of traffic of 2,000 years.—American Motorist.

The Department of Agriculture estimates that 86,560,000 tons of major crops are hauled over the highways annually. Illinois is credited with the greatest tonnage, hauling 8,855,000 tons.

Abont $71,000 will he spent on improving the Cameron Pass road in Jackson county this summer. The road will be improved from the foot of Rabbit Ear Pass throngh North Fork to Fort Collins and Greeley.

Speeding? Yes, on the Boulder road. Was the driver killed? No, just shaken up a bit and badly frightened. Picture was snapped by John P. Donovan, division engineer, state highway department.

Full Description of the Arlington Paving Tests

(Continued from page 6)

A large number of prominent engineers and others interested in road work have visited the Arlington Experimental Station to witness the preparation and conduct of these experiments. It is intended to have all these projects in full operation by the middle of June. Visitors are always welcome and those in charge of the work are always glad to give any information desired about the experimeut.

RABBIT EAR PASS GIVES TOURISTS THRILL.

Reports received by the Highway Department indicate that Rabbit Ear Pass is in fine condition for auto travel. This road was constructed with the aid of the U. S. Forest Service and is said to be one of the finest examples of a forest road in the state.

The road is eighteen miles long. It forms a part of the Victory Highway into Steamboat Springs.

Leaving Kremmling on the Grand river, the beginning of the new road is encountered some thirty miles to the northward, near the crest of the divide between North and Middle parks. After a steady climb of four miles to the top of the pass, followed by a five-mile run through open, grassy country, the road descends the western slope on an even gradc for a distance of about eight miles, affording wonderful glimpses of wooded slopes and the fertile meadows and fields of typical Western ranches.

OURAY-SILVERTON FORMS BIG CIRCLE TRIP.

Rifle, Colo., June 27.—Announcement is made tbat work on the new $100,000 stretch of road between Ouray and Silverton will he started immediately. Contract for the work has been let and a contractor's outfit is being moved onto the project. Considerable work is already being done on this road by the State Highway Department.

At first glance, it may not appear of very much importance to our section of the state, but this piece of highway is but another link in the greatest circle highway iu Colorado extending from Denver through the Colorado National Park, the Grand Lake district, on to Wolcott and through Glenwood Canon to Glenwood Springs. From this city via Redstone over McClure Pass to Delta and Ouray, Silverton and south to the Mesa Verde Park and thence east and north to Denver.

With the completion of the Ouray-Silverton piece of this highway, it is generally helieved it will hasten the building of the McClure Pass project, work on which has already been started by the county commissioners of Gunnison county.

Local people are taking an active iuterest in the McClure road and are positive that another year will see it completed.—Rifle Telegram.

NEW ROAD WORK APPRECIATED.

Local men, recently making the trip over the state highway hetween Pagosa Springs and Durango, commend very highly the work of Contractors Shields and Kyle on the road work they are now doing between Pagosa and Dyke.

So efficiently and yet so differently is this piece of road work being done that it is noticeahle to those who have occasion to use it. The stretch of highway to be improved is not torn up in an impassable condition, hut on the other hand only a short piece at a time and then before another stretch is torn up, what is already started is completed with a graveled surface.

The contractors are using modern machinery and extra shifts of men to complete the improvements in the shortest time possible.—Durango Herald.

FINE WORK ON SOUTH ST. VRAIN ROAD TO ESTES PARK.

Says the Boulder News-Herald:

"Boulderites who have traveled the South St. Vrain road this spring have been struck by the nnprecedented good condition in which the upper portion has been placed. Otis Andrew recently appointed overseer for that portion of the highway has done more work in the last two months than is ordinarily done on the stretch in a year. From Raymonds to Peacefnl Valley the road is free from bnmps and ruts, and cars can travel it with comfort to the occupants. Jnst south of Copeland Lake lodge, work is going on of widening the road when it descends the hill into the North St. Vrain valley."

MOUNTAIN ROAD WORK SHOWN IN NEW FILM.

The most difficult road building in the United States—the construction of good highways through the National Forests of the West—is shown in a new United States Department of Agriculture motion picture, "Highroads and Skyroads". The pictnre, one reel in length, was made in the western tier of states under the supervision of higbway engineers of the Bureau of Public Roads, which is in charge of the Federal Government's road constrnction work.

"The old frontier has gone, oever to return," says the film at its opening, just preceding a scene showing the grave of Buffalo Bill on Lookout Mountain overlooking Denver. A contrast is drawn between the old prairie schooners and pack trains, of days gone by, and the motor cars of today. Surveying on high mountains and in narrow canyons, blasting, grading, and surfacing are pictured, and at the end some of the finished highways leading over the Continental Divide are thrown on the screen.

The picture is the first of a series dealing with the road building work in National Forests. It may be borrowed from the Department of Agriculture, or prints may be purchased at the manufacturing cost by authorized institntions.

HIGHWAY IMPROVEMENT.

One of the most far-reaching results in connection with Federal aid fa construction of public highways is the improvement in methods of work, qnality of construction and keeping of accounts, all of which makes for the saving of money and the permanency of highway construction. In 1915, prior to the Federal aid act, 70 per cent of public road work was done by agencies other than state highway departments. With the passage of the Federal aid act of 1916 and the insistence of the Federal Government upon the construction of Federal aid roads being carried on under the supervision of state highway departments, existing highway departments were reorganized and made more efficient and in 17 states highway departments were created. The result of their sopervision of pnblic highway construction insures taxpayers not only the work but it also insures them centralized responsibility for expenditure of funds, careful audit of accounts, wholesome competition in bids and rigid compliance with standards of construction.—Trinidad Chronicle.

PULLING OUT ON A 28 PER CENT LOOSE-MADE GRADE

The OSGOOD 18¾ cu. yd. Steam Shovel Was Chosen by the Pactolus Gold Dredging Company, Denver, for this Job on the River Bottoms

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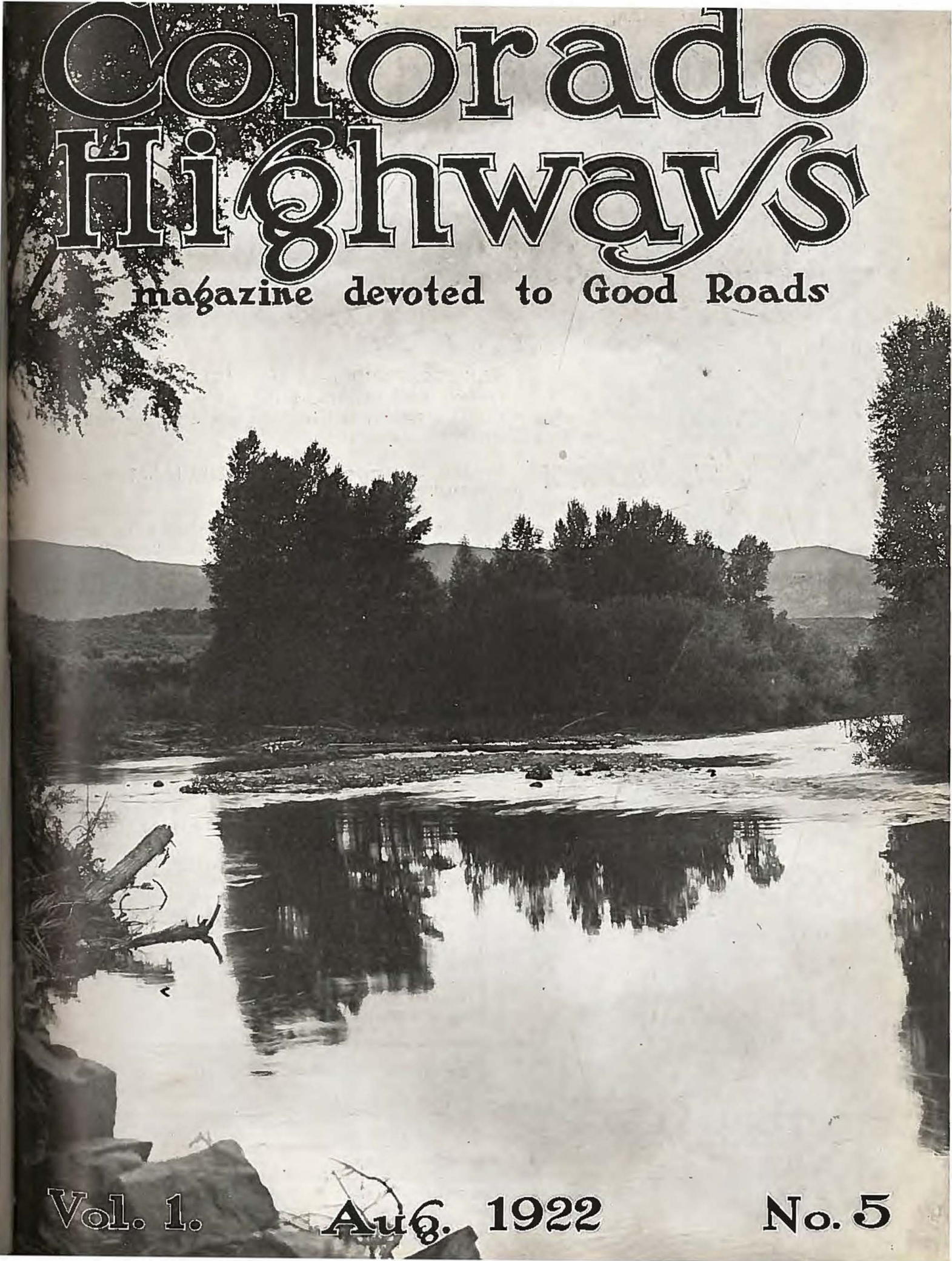
Colorado Highways

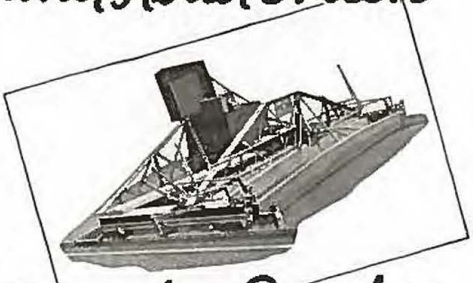
magazine devoted to Good Roads



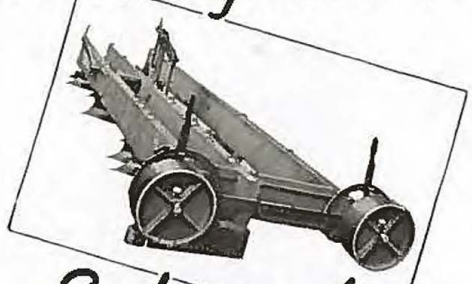
Vol. 1. Aug. 1922 No. 5

Batch Boxes, Cars and Road Track

Finishing Machines

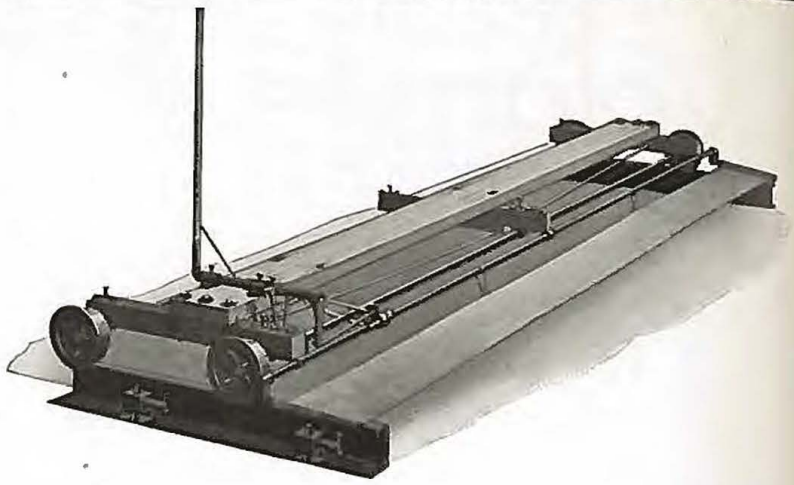


Subgraders



Paving Mixers

Clam Shells



THE FLOATBRIDGE—A new LAKEWOOD machine for Concrete Road Builders. Belt Float and Bridge combined. One man operates belt lever, machine advancing with each stroke.

The 16-ft. Floatbridge is $140, 18-ft. $150, 20-ft. $160, f. o. b. Cleveland. Extra Belt.

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Colorado Highways
"BETTER ROADS"
VOLUME I. AUGUST, 1922. NUMBER 5.

Drainage Aid to Better Roads

Miles of Roadway Saved Yearly From Destruction Thru Construction of Side Ditches and Run-Offs

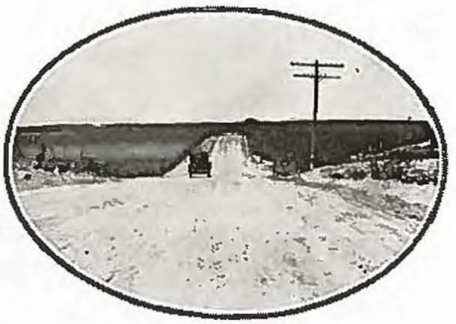
BY ROY J. RANDALL
Supervisor of Federal Aid Projects.

THE most important factors to be considered in the improvement of highways are foundation and drainage, and in rare cases can good foundation be obtained unless sufficient drainage is provided. So much has been written on the subject of drainage in connection with road building that little remains to be said. Highway bulletins and magazines constantly print articles dealing with this feature and textbooks dwell on its importance.

The effects of erosion are apparent wherever one views the landscape. The effects nf freezing and thawing may be found throughout the mountains and plains. Circulating ground waters gather up the precious metals in the rocks and deposit them in fissures, forming veins of ore. Water turns the massive machinery of our power plants and floats the giant ocean liners. In short, water is at once the most destructive and the most useful agent in the works of man.

The first item in road drainage is the side ditches which parallel the traveled way on either side. These must be dng deep enough to care for the storm water which falls on the road and is carried into them by the slope from the crown to the shoulder, also the ruu-off from adjacent fields. They must not be so deep as to be a menace to travel. They must be built so as to prevent wash and yet must bave sufficient grade as will avoid deposits iu the ditch so that it would eventually fill up. On steep grades where tbe road runs from cut to fill section, these side ditcbes should be extended far enough below the toe of slope of the fill to prevent undercutting. Where the grade of the side ditches is so steep as to cause scour, they should be paved with rubble stone. On side-hill work where the run-off might overflow the side ditch, an intercepting ditch should be built well above the road cut, to carry this run-off into the natural cross-drainage.

Bridges, culverts or sipbons are required at all points along the road where there is a natural cross-drainage, such as streams, swales, arroyas, etc., and at all sags in the profile, established drainages or irrigation ditches. On long grades, culverts should be placed at proper intervals to carry drainage across and away from the roadway and prevent overflow or wash in the side ditches. Omission of openings for drainage at proper places is detrimental to the highway, not only because of the inefficient drainage provided, but also that the drainage scheme of the highway becomes recognized in the development of the territory, and improvements are erected in conformity to tbis scheme. It often happens that additional openings are found to be necessary to properly drain well settled highways running through districts and this often results in annoyance and expense to property owners, which might have been avoided had these openings heen provided when tbe highway was first constructed.



Showing a portion of new road construction in Costilla County.

In designing a highway, careful consideration must be given to the size of openings of drainage structures. Many factors enter into the problem and each must he given proper weight in arriving at a solution. In the case of openings large enough to demand a bridge, the clear span aud height of a bridge in place should be measnred and available testimony of neighboring residents should be taken as to whether the structure is sufficient. This data, however, must not be overstressed, since enterprising bridge companies often succeed in selling county road authorities bridges unsuited to the particular location. The greatest economy will be had by leaving the selection of type and the design of these structures to men in the engineering profession, whose experience and educatiou have fitted them to handle this class of work.

Many types of culverts are on the market, eacb having its particular points of advantage. Cast iron, corrugated metal, reinforced concrete boxes and pipes, vitrified tile and wood-

(Cont. on pg. 12)

Showing method of "curing" concrete employed on paving project near Brighton. Water is pumped into dikes around each slab.

Roads East of the Rockies

Methods of Early Road-Building Periods Compared with Present-Day Construction and Maintenance Work

BY DR. F. L. BARTLETT.

ABOUT once in four years the writer takes a trip to the Atlantic coast by auto. Having just returned from his fifth trip through 18 states, totaling about 6,000 miles, he has had an opportunity to compare the road conditions of today with those of earlier periods. He has seen roads under construction at various times, has had a chance to compare their wearing qualities and cost of upkeep. While data enough has been collected to fill a good sized volume, only the high spots can be touched in this short article.

Greater progress has been made in the last five years than was made in the previous fifteen years. Once a state gets a good highway law and gets into the habit of building roads, it grows on them with astonishing rapidity. Illinois held back for years, until its roads became infamous for general badness and depth of mud. Today one can find more detours due to road construction than in any other state in the union—meaning that road construction is rampant all over the state. They are leading all other states in building concrete roads.

Kansas, Nebraska and Missouri still wallow in mud (when it rains), but are waking up to the fact that they must build bridges and roads and do it quickly. Watch out for a big road-building campaign in those three states during the next few years.

All other states east and both north and south are building water-proof roads. Better still, they are building trunk lines first. The more important through roads receive first attention. One can now get onto water-proof surfaced roads east of St. Louis or Omaha and keep on them clear to the entire Atlantic coast. All of the New England and Atlantic states now have a series of state roads that can be driven over at all times, rain or shine—well mapped, well posted, and fairly smooth.

Automobile and truck traffic is enormous on these main highways.

A sixteen-foot roadway is no longer adequate to carry the traffic. In many places roads have been widened to 24, 30 and even 40 feet. There is a continuous flow of passenger and truck transportation over these roads, carrying everything in the way of farm and garden products, manufactured goods, building material, and even livestock and hogs. The smell of burned oil and gasoline reaches the high heavens.

Naturally this constant pounding of the main roads means maintenance in capital letters, and patrol systems have been organized on practically all the main highways. Even on dirt and gravel roads the patrols will be found looking after five or ten miles of road. Piles of gravel, crushed stone, barrels of tar compounds, tool houses for equipment are as much in evidence as section gangs on railways.

Remarkable results have been obtained on most gravel roads and on some dirt roads by use of the patrol system. Constant dragging, leveling and patching soon form an almost dustless surface and one that withstands anything except a soaking rain.

On the bituminous surfaced roads, which constitute the greater mileage, the patrol system also works to perfection. Every little abrasion or crack is filled at once.

The results are good, the system very economical as compared with the old plan of periodical repairs.

The patrol system has come to stay.

Detours.

This word becomes a bugbear and is detested by all users of the roads. Strenuous efforts are being made to avoid detouring as much as possible.

Building one-half the road first, keeping the other half open, is in common use. In building bituminous gravel roads and in many places bituminous macadam, short stretches are built at a time and travel is allowed to go through. Where long concrete projects are being put in, some very bad detours will be found.

Some states are very careful to select good detours, keep them in shape and well signed, others are extremely slack in this regard.

Any highway commission which takes the trouble to look after this matter and assist the tourist in every way, is bound to receive his most hearty thanks.

The writer has seen long strings of autos held up for hours at the whim of some contractor.

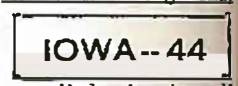
All in all, detouring is the toughest proposition and the most disagreeable one encountered by the tourist today.

Practically all the middle and eastern states have adopted the State Highway signs, either by numbers or markers. In the east, markers are used. Each through road is named—as for instance, the "Boston Post Route"—a red band with narrow white stripes top and bottom. One can pick up this route in New York City and never miss a turn until he arrives in the city of Boston. Each turn is marked with a large L or R for right and left, as the case may be.

These markers are put on telephone poles, fence posts, bridges and in some cases, on specially erected posts. They are put up on all state roads and maintained by the state.

There are 98 of these posted state highways in New York State.

In Iowa, Illinois, Nebraska and other states the state routes are numbered and stencilled in black on a while background, as for instance: or some other color combination.



State maps are supplied, showing all the roads and marked routes. These are given away by the Highway Commission, auto clubs, hotels and garages. With this system, no strip maps or guide books are needed, and no time is lost on the way hunting roads. These signs are carried through all towns and cities. In the larger cities will be found in the public squares and all prominent places, a big bank of signs giving the direction and distance to all the larger towns and cities. A few of the states have mile-stones giving the distance to each town.

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A splendid stretch of concrete between Littleton and Denver, built for heavy traffic in 1919.

U. S. 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 appropriated money to be spent in building roads and trails in the forests. Since 1907, by Act of Congress, 25% 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% of all the gross receipts of the forests 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, Mt. Evans and Monarch Pass roads, besides many smaller ones, were begun with this fund.

View of completed forest road on Rabbit Ear Pass in Grand County.

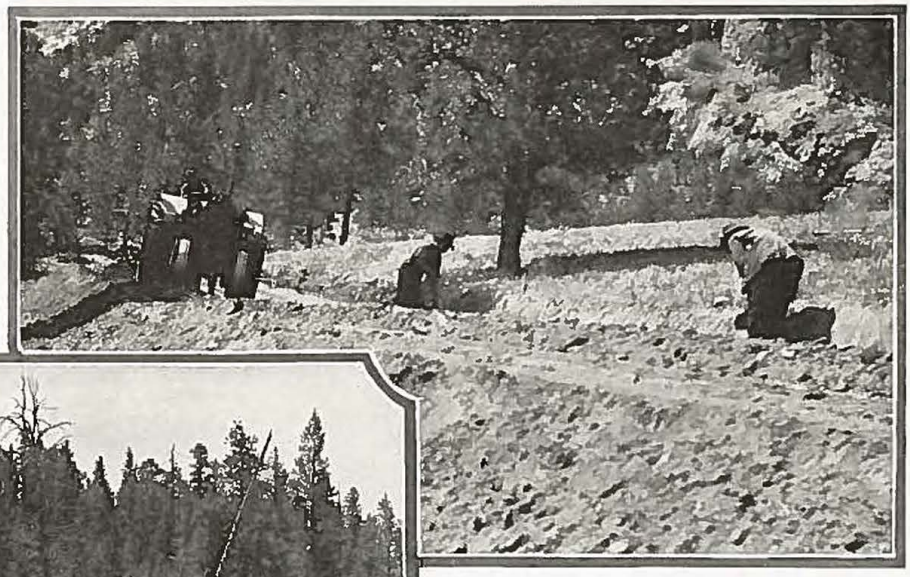
On November 9, 1921, $15,000,000—$9,500,000 for large projects, chiefly for public use, and $5,500,000 for small development roads—was appropriated by Congress. Colorado realizes $717,000 for the large projects and $330,000 for small roads and trails from this fund. Some of the roads upon which this money is being spent are Cameron Pass, Arapahoe Glacier and Berthoud Pass from Empire to the east foot of the 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. The money to be 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 developed 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 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.



Showing section of road under construction on Bennett Creek in Colorado National Forest.

Forest Service roads and trails are all built on easy grade, 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 1921 the fifteen National Forests in the State entertained 1,200,000 visitors. The newly built roads and trails are taking people more and more into these wonderful spots. The Durango-Silverton road 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, make this one of the most attractive regions in the State. Berthond 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 highways on easy grade, make it possible to reach the Western Slope in

(Continued on page 12)

Colorado Highways
"BETTER ROADS"

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Owing to the necessarily limited edition of this publication, it will be impossible to distribute it free to any persons or institutions other than the state and county officials actually engaged in the planning or construction of highways, instructors in highway engineering, newspapers and periodicals, and civic associations. Others desiring to obtain Colorado Highways can do so by sending 10 cents for each number desired. Associations desiring to distribute the magazine can obtain it at cost in lots of from 500 copies up.

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EDITORIAL COMMENT.

Thorough drainage is a primary essential to successful road construction.

This is more especially true in the building of gravel highways.

Of late years road builders in Colorado have seen this light and today we find hundreds of miles of well drained roads on the state highways and in the counties.

But there is still room for improvement. It appears that we still have a few road overseers who have neglected this important phase of road work.

Any effort expended in perfecting drainage is money well spent. In the level sections, as a rule, drainage conditions are naturally poor.

Sometimes it is necessary to lay more than a mile of tile to clear up low, soggy places. A well laid culvert oftentimes will drain in short order a stretch of road that has been a source of great inconvenience and discomfort to the traveling public.

A fine example of good drainage may be found on the Denver-Burlington route.

For years travelers were bothered with mudholes on this road. One of these mudholes located east of Deer Trail, where the road dips through a series of long, low swells in the prairie, proved a particular bugaboo to motorists.

Here was a perennial mud hole formed by seepage. It bordered almost on the "impassable."

Then one fine day a maintenance superintendent got busy. He "cured" up the seepage in no time by the installation of a culvert and proper borrow ditches.

This work he did in the winter months when seepage was at a minimum. When spring came along and the time for the old mud hole to appear, travelers were surprised to find a good road, which has lasted for three years. And it's still going strong.

Proper drainage and adequate maintenance saves rebuilding miles of new roadways, with a resultant saving of thousands of dollars to Colorado taxpayers.

The use of the motor vehicle has increased tenfold in the last few years. As a result there is being built up a transportation system that is bound to bring additional prosperity and economical development in the several states.

This is especially true in the less densely settled communities. Good roads increase land values. They also reduce haulage costs all the way down the line.

Eventually the highway system is destined to far surpass the railroads in mileage. Already highway transport and motor vehicle traffic has so revolutionized the transportation condition of Colorado that it can hardly be realized what it will mean to the state in the future.

Each year finds more miles of road constructed. But the number of automobiles put in use also is increasing constantly, so that the new construction work always finds ready users.

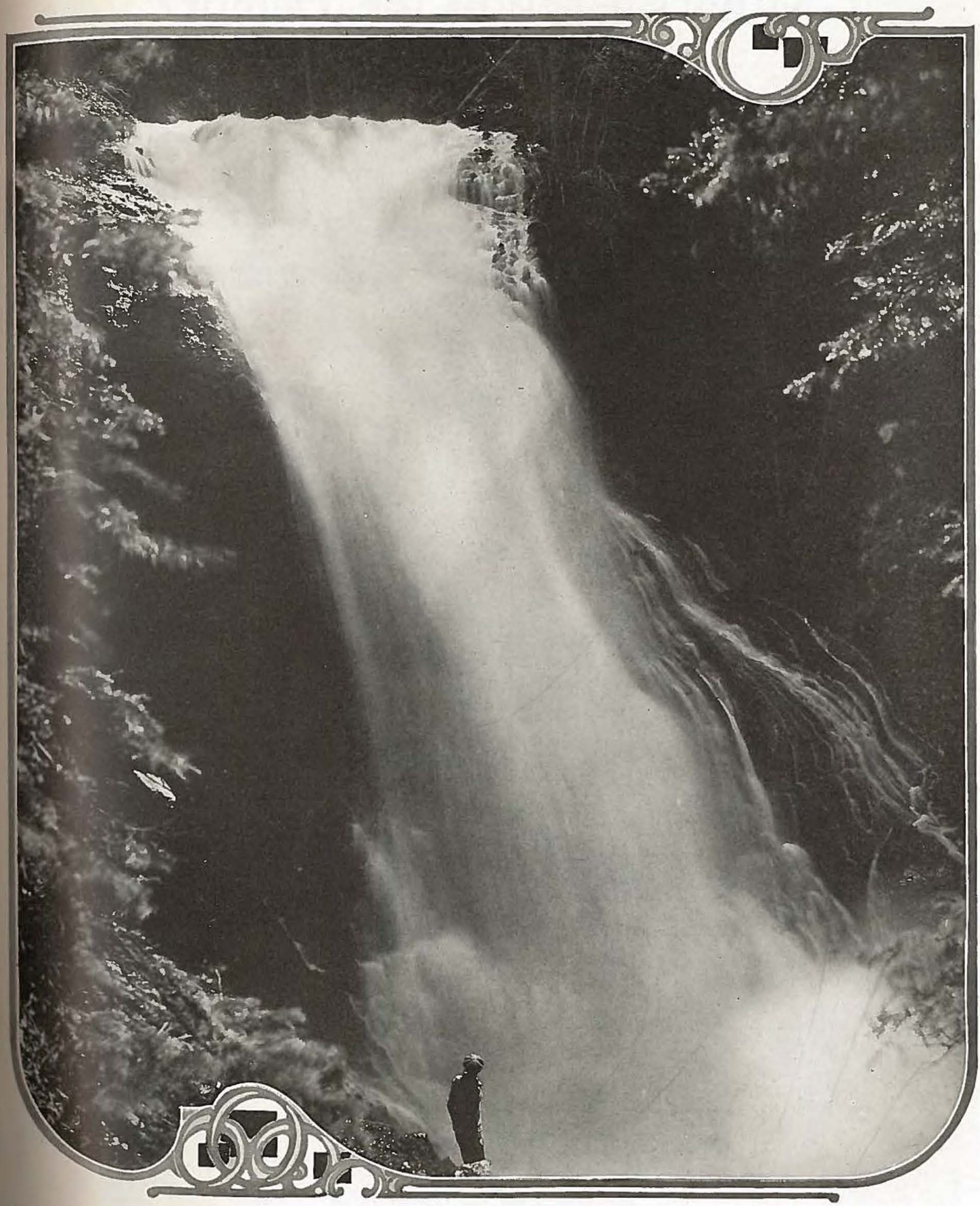
Hardly a day passes that this department does not receive complaint about the lack of proper highway guide posts in this state. If we are to believe those who complain, our roads are in a deplorable condition from the standpoint of markers.

We will concede there is much ground for the complaint, yet there are some things that cannot be done in a day. Colorado is an infant in road construction. We have been too busy the past few years building roads to stop long enough to mark them.

But the marking will come in time, and we venture to say not far in the distant future. In fact, steps have already been taken by the Highway Department looking to the adequate marking of our highways.

And before long we feel confident that a standard marker will be designed and the task of providing "eyes" for our highway system started.

It is estimated that close to $10,000,000 will be spent in road building in Colorado in 1922.



One of the many waterfalls which mark the road over Wolf Creek pass between Del Norte and Pagosa Springs in Rio Grande and Mineral counties.

What's Back of the Detour?

HAVE you noticed the new official detour signs of the State Highway Department?

Motorists have found them a source of great convenience. The signs were designed by the engineering force or the Highway Department.

Gradually the signs are beginning to make their appearance all over the state where construction wnrk is in progress. They are so attractive, say motorists, that they take some of the sting out of the necessary, but sometimes rough, detours.

The signs are placed at both ends of detours and accurately mark the temporary road the driver should take to again strike the road he is following.

In speaking of detours, we sometimes wonder if the driver who gets all "hetnp" about having to turn off the main highway to get around some construction work, ever stops to consider that this construction work is for his benefit.

The motorists want better roads and there is only ooe way to get them—to stop nsing them while they're being fixed.

As one writer recently expressed it:

"It's one more link in a natinn-wide system of highways—a modern road nf magic that will take you, with speea and in safety, to 'Where-Yon-Will'. The hard-surfaced highway and the modern motors are the Twentieth Century 'forty-league boots'—they will take yoa where you want to go as fast as the fabled foot-gear, the story of which thrilled us all when we were kids."

It might also help the hurrying motorist to cool off—to jnst get out of his car and walk np the "closed" road and take a slant at the wnrk that is going on.

There he will find a section of our great national highway system in course of building. Here he will see one of the greatest things which this age is going to leave to the generations that are comiog.

Back of this work is an orgaoization known as your State Highway Department, one of the most highly organized and efficent bodies engaged in public service. This department is continuously engaged in research and experimental work in order that every dollar spent on the highways may give you maximnm road valne.

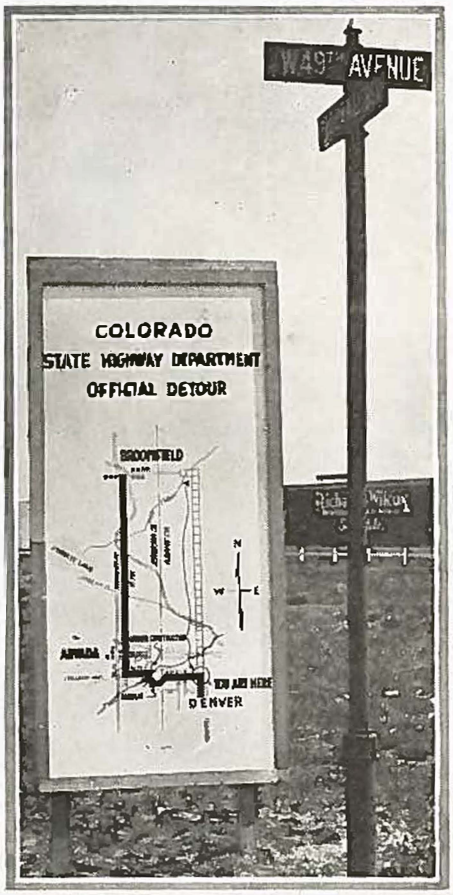
Besides this department has an ideal—"more miles of roads per dollar"—better roads if you please, and a better service than has ever before been known in the road-building game.

And, after considering all of these things when you run into one of these road barricades, we believe it will help you to cool nff!

TRACTIVE RESISTANCE OF ROADS STUDIED.

Initial results secured from an investigation of the tractive resistance of roads indicate that information will be secured of great value to the highway engineer and the user of motor transport. The investigations are being carried on under the auspices of the Advisory Board on Highway Research of the National Research Council with which the Bureau of Public Roads, United States Department of Agriculture, and the Quartermaster Corps, United States Army, are cooperating.

One phase of the investigation shows that there is a great difference in the power required of the engine when a truck is traveling over different types nf surfacing, the amount being more than twice as great on some of the lower types when compared with that on higher types. It is alsn shown that the power required to overcome the road resistance is not proportional to the speed of the vehicle and after a certain speed is reached, increases very rapidly.



Tourists find these new official detour signs a source of great convenience.

The investigation when complete will cover tests with varions types of motor vehicles, with the load, tire, and spring equipment varied on different types of surfacing and at varying speeds. The data will include gasoline consumption, internal engine resistance, wiod resistance, and road-surface resistance.

When carefully analyzed it will aid the highway engineer in determining under a given set of conditions what type of surface should be built for a given volume of traffic to result in the least total cost for road and vehicle nperation. The same sort of study will he made as to expenditures for grade reduction to reduce operating costs.

The truck operator will he given valuable informatinn on tbe effect of tire and spriug equipmeut, lubrication, size of load and speed of vehicle on fuel consumption which should aid him in producing cheaper transportatinn.

Where the Red Gods Call

BY GEORGE SANFORD HOLMES,
(Associate Editor The Denver Times.)

The Red Gods call from Tyrian-tinted hills,
The open road lnres to a thousand thrills;
The fleshpots slip from ken, as 'neath the wheels
The streaming highway, ribbonlike, unreels
While motor-melody hums on the breeze;
In all the world, where else such joys as these—
A day in June—a car—and Colorado!

God's fingertips upnn the great outdoors
Upraised these battlements, deep-carved the jaws
Of mnrmuring canons sealed in sapphire mist,
And sculped the purple parapets, age-kissed
By rival snn and clond and vestal snow—
A Titan's playground bnilt for those who know
A day in Jnne—a car—and Colorado!

To scale the heights that three-score years ago
Saw but the Ute and fleet Arapahoe:
To breast the untamed wind at timberline
And monot creation's rim, and view supine
The world outstretched in God's wide-open palm—
This is to taste with thirsty soul the charm
Of glowing June—a car—and Colorado!

Here, on this canvas where the sun laughs down,
A topaz brilliant in a turquoise crown,
All nature flares in primal color mood
And God yet lingers where His work is good;
Low-bending that He may His marvels tell
To all who yield unto the siren-spell—
Of gorgeons June—a car—and Colorado!

FROM CHARIOT TO FLIVVER.

Traffic-on-wheels originated in China and Egypt, where carts were first in vented.

Those first carts moved on wheels and axles carved out of one solid piece of stone. It took centuries for man to conceive of the axle being separate from the wheels.

The old Romans, master road builders, had 29 paved highways out of Rome. Over pavements of brick and mioeral cement they drove their lumbering chariots with iron-rimmed wheels.

Joy-riders of those days lonnged in reed-work baskets mounted on solid wheels about a foot thick. .

Think of that when riding in a flivver seems humpy.

Unit Prices During 1921-1922

BY JOHN S. MEANS,
Office Engineer.

An analysis of the Unit Prices bid on the work of the State Highway Department during the eighteen months' period from January 1, 1921, to July 1, 1922, is quite interesting. During that time the Department has advertised and awarded some fifty Federal Aid and State Projects in 1921, and nearly as many more during the first six months of 1922. These projects represent only the largest pieces of construction and do not include the numerous small State and bond projects which are carried on directly by the counties or by force account.

During the latter part of 1920 and the first half of 1921, as most people know, labor and materials were scarce and as a result, contractors in bidding on work, felt called upon to place their prices sufficiently high to cover the probability of these shortages with consequent increase in costs.

With the tendency toward normalcy, which began to be manifest early in 1922, prices began to drop and competition became more keen. Lettings became better attended, and where a year or so ago it was often doubtful if more than one or two bids would be received on a piece of work, today this doubt is replaced with an assurance that on all average projects from six to fifteen responsible contractors will be interested to the extent of bidding. On bridge projects especially, contractors not only from Colorado, but also several other bordering states, commonly participate.

There are items too numerous to mention, upon which prices are asked, but the trend will be shown by the tabulation shown below which gives a comparison of unit prices of a few of the principal items, during the period under discussion:

Average Unit Prices

Unit	1st Six Mo's. 1921.	Last Six Mo's. 1921	1st Six Mo's. 1922
Excavation, Com., cu. yd.	.68	.58	.55
Excavation, Solid Rock, cu. yd.	1.82	1.44	1.38
Borrow Fill, cu. yd.	.65	.56	.50
Gravel Surfacing, cu. yd.	2.58	2.01	1.92
Concrete, Class "A," cu. yd.	28.36	24.30	21.49
Concrete, Class "B," cu. yd.	26.80	23.10	20.62
Cement Concrete Pavement, sq. yd.	2.74	2.64	2.46
Reinforcements, lbs.	.10	.08	.06
Structural Steels, lbs.	.107	.075	.067
Corrugated Metal Pipe (15"), lin. ft	2.54	1.99	1.88
Timber, Untreated, ft. B. M.	80.00	62.44	62.43
Piling, Untreated, lin. ft.	1.45	1.31	.93

It must be understood that the above are average unit prices and that the prices of the successful bidder were often considerably lower. For the purpose of comparison, however, the average is the only fair basis, since it is comman for bids on a single item to vary several hundred to a thousand per cent due to the unbalanced condition of many of the proposals presented.

Considering only the above items which are representative, and the ones which appear in most projects, our unit prices show a reduction of 25.8% between the first six months of 1921 and the same period of 1922, which in view of the quantity of work contracted dnring the last six months period represents a saving to the taxpayers of approximately three hundred and forty thousand dollars ($340,000.00).

Prices are still shnwing a slight decline as indicated on proposals received since July 1st, but as a whole they are hecoming more stable and little further reduction is looked for in the immediate future. The strikes of coal miners and railroad employes tend to set up some uncertainty in the minds of the contractors, and on account of a probable car shortage which is imminent, and which is anticipated thru the renewal of coal shipments due to the settlement of the strikes, prices may for a time show a slight increase nr at least remain at their present level for a time thus interrupting the otherwise steady return to normal.

No state in the Union can equal Colorado in the variety of its trout streams. Whipping the Grand River, near Hot Sulphur Springs, for speckled beauties.

The Cache la Poudre Canon

BY MR. J. W. RAINEY,
Secretary, Fort Collins Chamber of Commerce.

STARTING from this most prosperous and up-to-date city in northern Colorado, let me take you on what is truly a "wonder ride"—the Cache la Poudre scenic highway—the newest and most beautiful monntain drive in Colorado—sixty-five miles of unexcelled mountain scenery through the rnggedness of the Rockies. But now to start from Fort Collins.

Leaving the splendid pavements of the city we shall speed along graveled highways to the northwest, through the picturesque village of Laporte and then on a double-tracked road we are admitted to the mouth of the canon. On one side the beantiful mountain stream crashes down between sheer cliffs and on into the valley, which is one of the most profitable areas of irrigated land in the West. A few miles farther we come to the overflow dam which diverts some of the clear waters of the stream to be used in a town sixty miles down the valley. From here on, with the exception of the smooth highway, we forget for the instant that others than ourselves have ever penetrated the canon.

The walls on either side of us grow higher, the nature-colored rocks are indescribable, the glistening leaping stream, the delicate hues of the columbine and the flare of the paint-brush in shady nooks invite our fancy, the clear mountain sky, with here and there a silken cloud floating lazily, high above the snow-capped peaks; everything grows more beautiful, more wonderful! Several more miles up the perfect road and we come upon a lone fisherman, casting his rod and matching his wits against the it is easy to see that he has been victorious in more than one fascinating engagement. Another mile! The canon widens, and in the grassy meadows some campers. But look at those rustic cabins tucked away in the rocks a hundred feet or more above tbe road. Several minutes more and we enter the tnnnel which has been cut through solid rock for eighty feet in order to make the road safe from the river's mighty freshets in early speckled beauties of the stream. As he stands, his back to us with his creel open, spring. And, indeed, we find it hard to picture a scene comparable to the one framed by the passage. Then before we are aware of it, we find ourselves two hundred feet above the river, looking down into the Little Narrows, through which the Cache la Poudre tears its way.

In the shadow of a huge rock formation in Colorado National Forest.

(Top) An inviting scene along the Cache La Poudre Highway west of Fort Collins. (Oval) A close-up of the tunnel on Cache La Poudre scenic route.

A few miles farther and we have come to one of the picturesque monntain resorts. But let us go on to the Palisades—great columns of rock which rise from both sides to sheer heights. Then to the Big Narrows where the highway engineer haa conquered the power of the stream and has forced it to occupy half of its original position. The terrific roar of the water echoes in deep resonance in the chasm and we are held spellbound by its power as it churns and tears its way down the canon.

And here we are at the new Fort Collins Mountain Park, just thirty-six miles from the city. It is truly a pretty spot, with its double pine-spotted terraces and the rolling monntain meadows on which there will soon he community bouses, golf links, tennis courts, and a baseball diamond. We are on top of the world! Let us linger here for lunch.

Up and up the canon. One beauty being eclipsed by another in a never-ending stream. Here and there rustic dwellings are being opened by tbeir owners preparatory to a cool and delightfnl snmmer. Here and there have been established systems of cabins which are rented to tourists during the summer months. On up we go, the pure rarified air seemingly giving us that elixir of youth which cost Ponce de Leon his life and fortuue.

But we have gone far enough for one day and we yet have sixty-five miles to go before we are home. And now I have a real treat in store for you—the return through the Cache la Poudre by moonlight.

By the way, there is an interesting little story connected with the naming of the canon. As you probably have already realized by the names of the towns in this section of the couotry, its early settlers were French-Canadiaos. A small party of them was attacked by a large band of Indians near the present site of Bellvue. They had, however, a large quantity of powder and other supplies. Seeing that they were overpowered, they hid all tbeir powder in a large hole so that the escaping members of the party might come back aod continue their journey. Those who were able to evade the Indians later returned and found the supplies—from that instant came the name of the Cacbe la Poudre river, "Hide the Powder."

HIGHWAY PROBLEMS.

Not nntil the truck operator shall contribute his due proportion to the cost of highway construction and maiotenance, can his right to use the highway be considered equal to that of the ordinary taxpayer. This is the conclusion of the Public Utilities Commission of Colorado in a decision rendered March 8, 1922.

The Colorado Commission held that through abuse of the highways by inadequately taxed buses and trucks, "the 137,336 passenger car owners of the state are grievously wronged" and "the farmer and tbe city home owner pay the bills".

In a similar decision, June 14, 1921, the Public Service Commission of Pennsylvaoia declared, "public interest would immeasureably suffer" if auto lines were permitted to engage in destructive competition with railroads that were providing reasonably adequate service to their territories.

The Pennsylvania Commission in a decisioo March 16, 1921, refusing to permit an anto line to parallel an electric railway, pointed out that the proposed competition would mean either increased rates or impaired service for the patrons of the electric line.

Theae decisions are important because they ennnciate first principles relating to regulation and taxation of highway carriers and have vital bearing on conditions in every western state today.—Grand Valley News.

Scenes on new Government, State and City road being built from Denver to Mt. Evans. 1. Lodge Pole Pines near end of City's part of the road. 2. Where U. S. Forestry crews took up the work. 3. A cut through the mountain side. 4. Old road over Soda Pass to Idaho Springs, near Squaw Mountain. 5. Romantic, rocky and 9,000 feet.

War Materials Available For Road Building

The following supplies are available for transfer to counties and municipalities in the State of Colorado for use in construction and maintenance of public roads.

Arrangements may also be made to rent equipment to contractors eogaged in construction of Federal Aid and State Projects.

Requisitions should be mailed to State Highway Departmeot, care of H. Roe, Denver, Colorado.

Description.	Price Each
Adze	$ .75
Anvils, 34-lb.	2.00
Asphalt, barrels	cwt. 2.00
Axe beads	.35
Axe handles	.45
Axe handles, short	.35
Axe, Fire	.45
Bars, wrecking, 18-io	.30
Bars, wrecking, 24-in	.50
Bars, wrecking, 36-in	.75
Bars, pinch, 60-in	1.00
Bars, digging, 8-ft	1.50
Belting rub, 2-in	ft. .20
Belting rub, 2½-in	ft. .20
Blox, Double Tack, 3-in	1.50
Blox, Double Steel, 8-in	3.50
Blox, Single Snatch, 4-io	1.50
Blox, Single Snatch, 6-in	1.75
Blox, Single Snatch, 10-in	3.50
Blox, Single Snatch, 14-in	7.50
Braces, Ratchet, 8-in	1.00
Brooms, Stable	1.00
Cbain, Skid, ⅜x20¾-in	.21
Cbain, Spoke Clamps	.17
Chain, Eyes Disc Wheels	.14
Caps, Blasting	per 100 .50
Cutters, Cold	.25
Chisel, Sq. Poiot	.20
Cabel, Steel, ⅝-in	ft. .06
Cable, Steel, ¾-in	ft. .08
Carts, Concrete, 2-wheel	12.00
Carbide, ½-lb. cans	.05
Chests, Tool, Steel	7.50
Drills, Rock, 30-io	1.00
Drills, Rock, 44-in	1.50
Exploders, Hand Fuse	18.00
Fuse	Per M 5.00
Forges, portable	12.00
Globes, Lantern	.08
Hatchets, Claw	.35
Hammers, Claw	.25
Hammers, Rivet, ¾-lb.	.35
Hammers, Jack, BCR, 430	75.00
Hammers, Sledge 10-lb. no handle.	.80
Hammers, Spike	.75
Hammers, Cross Pein, 3½-lb	.45
Hammers, Cross Pein, 4-lb	.45
Hammers, Cross Pein, light	.35
Hammers, Stone	.35
Hammers, Ball Pein, 2½-lb	.45
Handles, Hatchet	.10
Handles, Mach. Hammer, 10-in	.10
Handles, Mach. Hammer, 14-in	.10
Handles, Mach. Hammer, 16-in	.10
Handles, Mach. Hammer, 18-in	.10
Hammers, Farriers	.25
Handles, Pick	.15
Handle, D Handle Shovel	.15
Handles, Long, Shovel	.15
Hardies, B. S	.20
Harness, Wheel	set 15.00
Harness, Cart	12.00
Hose, Disch, 2-in., 25-ft. lengths	ft. .15
Beams, I, 3¼-in. x 6 in. x 15 ft.	lb. 02¼
Lanterns	.50
Lanterns, Folding	.50
Mattox, Treoch	$ .25
Mattox, Pick	.45
Nails, 10d	keg. 3.50
Nails, 12d	3.50
Nails, 16d	3.50
Nails, 20d	3.50
Nails, 30d	3.50
Nails, 40d	3.50
Nails, 50d	3.50
Nails, 60d	3.50
Nippers, Farriers	.30
Oil, Leather	gal. .50
Oil, Neatsfoot (100-pt. case)	pt. .10
Oil, Spica	pt. .05
Paper, Roofing	roll 1.50
Pipe, Iron, 1¼-in	.07
Pipe, Iron, 2½-in	.18
Pipe, Iron, 3-in	.20
Pipe, Iroo, 4-in	.25
Post Hole Diggers	1.50
Points, Pick	.45
Pumps, Gould Rotary	10.00
Pumps, Blackmere Hand	6.00
Pumps, Hand Piston	4.50
Engioe & Pump Novo Gas	125.00
Engioe, Hill Centrifugal	850.00
Posts, Fence, Angle Iron	.25
Ranges, Field, 4- bole	10.00
Ranges, Field, 2-hole	7.00
Spring Auto Repair Kits	1.25
Rope, ½-in.	lb. .08
Rope, ⅝-io.	.08
Rope, ¾-in.	.08
Saws, Hand, 26-in., Cross Cnt, 7 pt.	.50
Saws, Hand, 26-in., Cross Cut, 8 pt.	.50
Saws, 6-ft. Cross Cut	1.50
Shovels, S. H., Rd. Point	.45
Shovels, L. H., Rd. Point	.45
Spades, S. H	.45
Spades, L. H	.45
Shovels, Iron Handle, Rd. Pt	.45
Shovels, D. H., Sq. Pt	.45
Spikes, Wire, 7-in., kegs	3.50
Spikes, Wire, 8-in., kegs	3.50
Spikes, Wire, 9-in., kegs	3.50
Staples, Assorted	3.50
Steel Rd. Chrome 1⅛-in	lb. .03½
Tongs, B. S. Clincher	.30
Tongs, B. S. Clincher, 14-in	.30
Tongs, B. S. Clincher, 16-in	.35
Tarpanlins, 6x6	2.00
Tarpaulins, Escort Wagon	5.00
Tents, 16 ft. x 16ft. x 36 in	12.00
Tents, 20x24x6, with poles	25.00
Tongs, B. S., Bolt 22-io	.35
Tongs, B. S., Assorted	.35
Tires, Solid, 38x5	28.00
Tires, Solid, 40x10	55.00
Tools, Cement Finishers	2.00
Casings, Motorcycle, 28x3	3.50
Tubes, Inner, Motorcycle, 28x3	.75
Vises, Bench, 4-in	4.50
Vises, Bench, 4¼-in	4.50
Vises, B. S., Small A	4.50
Vises, B. S. 5-in	5.50
Vises, Pipe	5.00
Wire, Barbed, 40-rod	spool 1.40
Wheelbarrows	4.00
Wrench, Monkey, 10-in	.30
Wheels, Front, Escort Wagon	1.50
Wheels, Rear, Escort Wagon	1.50
Saw Outfits, Portable	150.00
Tires, Q. D., 34x3½	16.00
Tires, Q. D., 34x4	16.00
Tires, Q. D., 34x6	22.50
Tires, Q. D., 36x5	25.00
Tires, Q. D., 36x6	27.50
Tires, Q. D., 36x7	32.00
Tires, Q. D., 37x3½	18.00
Tires, Q. D., 37-6	$ 28.00
Tires, Q. D., 39x5	30.00
Tires, Q. D., 34x4½, U. S. Cord	10.00

AS TO GOOD ROADS.

The Herald in past years has had many complaints to make as to the condition of the roads, and we believe that they were justified. Immense amounts of mooey were wasted in building roads and going away and forgettiog them. The idea used to prevail amoog road men that the roads should not be dragged until they were wet. Roads were crowned until a fly could not stay on them and there were many other foolish notions regarding roads.

Bnt many of these things have been changed and The Herald waots to be one of the first to say a good word for our highways aod the men who have them in charge.

This year the roads are in better shape than they have ever been. We believe the system of road patrols is largely responsible for this condition. Graders have been run regardless of wet or dry weather and the bigbways show the effect.

While the valley roads have beeo in excellent condition, we wish to speak of the work being done in the mountaios. As an example of high class mountain road building, the Denver Mouotaio Park Highways have loog stood at the head, but a trip over Berthoud Pass shows that the State road men are on the job.

The writer made his first trip over the pass some years ago, another later and the last one last Sunday. While work is still progressing on the west side, the east side is completed aod is an example of perfect mountain road building. There is a wide double track all tbe way, with a very easy grade. The drainage is perfect. Ditches are laid out on the side next the hill and at short distances are stone and concrete basins for catching the water, which is carried under tbe road in steel pipes. No matter how heavy a raio there may be, the flood water will ruo off in a very few minntes.

We also drove over the Fall River road. This highway is new and represents a large expense and expenditnre of labor. The work has beeo well done and, when a little snrfacing is done, the road will he one of the most popular drives in the state.

In various parts of the state concrete is being laid and in a few years most of the main roads shonld be completed.

The Herald is heartily io favor of the proposed $6,000,000 highway bond issue and would willingly go stronger and make it $50,000,000 and do the job up right away. Good roads will pay for themselves in a short time. We want to make Colorado the playgronnd of the nation and fine highways will bring in the people.—Eaton Herald.

Work on the paving north of Brighton on the Greeley road is beiog rushed to completion. Plans call for connecting this paving with the concrete south of Platteville this summer. The present project which is being constructed by Johnson & White, contractors, will run into Fort Lupton.

Annual Meeting of County Commissioners of Fifth District

Fairplay!

Good roads; wooderful scenery and scads of hospitality.

It was the scene of the annual meeting of the County Commissioners nf the Fifth District on July 15.

And such a meeting! Business from the word go, to the election of officers to handle the affairs of the Association during the ensuing year.

A bounteous fish-fry—mountain trout—for the banquet 'en everything, with a perfect deluge of oratorical thunder. It was remarked that quite a few of the commissiouers have develnped into real wonders in oratory since the Association was organized one year ago.

For president of the Association the Commissioners selected G. W. Hnntley of Flagler, representing Kit Carson County. He succeeds William Bartel of Colorado Springs, who bas so ably directed the affairs of the Fifth District Association during the first year nf its existence.

J. W. Shy of Cheyenne Wells was elected vice-president, and Charles W. Abbott of Burlingtnn, secretary-treasurer. The latter snceeeds E. A. Jackson of Colorado Springs.

Nearly every phase of road building was discussed by the commissioners. The question of a new highway bond issne was taken up and almost withont exception was endorsed by the members after the details of the proposal had been explained by the members nf the State Highway Department staff.

The visiting commissioners expressed loud praise for tbe splendid conditiou of the roads over which they traveled in order to reach Fairplay. Road Overseer C. W. Lewis of Park county was particularly complimented for the excellent work he has done in pntting the roads of his district in condition for easy travel.

One commissioner from an eastern county expressed himself thus: "Your roads are eqnal to some of the city boulevards and could hardly be improved on."

A resolution recnmmending an "increase in the license fee paid by commercial passenger cars commensurate with their use of the public highways" was passed by the delegates. Tbe resolution will be referred to the legislative committee of the State Association for action at tbe annual meeting to be held in Colorado Springs nn October 16.

It was the opininn of a majority of the commissioners that it was unfair that private owners of antomobiles shonld pay the same license fee as is now charged the commercial passenger car owners.

John M. Bnyle county attorney welcomed the visitors on behalf of Park county and Fairplay. He reminded the gathering of the fact that Fairplay was the scene of the first placer mining in Park county and told how a gronp of gold prospectors had founded the town in July, 1859, after becoming dissatisfied with the reception they had received at Tarryall in the same district.

The visiting commissioners were privileged to inspect a modern gold dredge now operating at Fairplay, contrasting with the primitive methods employed by the early gold seekers who first settled that part of Colorado.

Other speakers were: J. A. Phelps, Pueblo county attorney; Oliver T. Reedy, seuior assistant engineer of the State Highway Department; William Rees, chairman, Pueblo county commissinners; E. T. Evans, of Elizabeth; J. W. Shy, of Cheyenne Wells; T. J. Ehrhart, former State Highway engineer; Dr. Paul B. Godsmao, of Burlington; William Bartell, of Coloradn Springs; Richard Quinn, of Divide; and J. F. Rhodes, of Fairplay; Harold W. Moore and H. P. Wilson, of Denver; Robert H. Higgins, and Harry Roe, of the State Highway Department.

The next meeting of tbe Associatinn will be held at Burlington on September 2nd.

Arkansas Valley Commissioners Meet

Walsenburg!

On July 29 this progressive soutbern Colorado city was the scene of the bimonthly meeting of the Arkansas Valley Association of County Commissioners.

In two spirited sessions the members discnssed highways and connty affairs. Eight counties were represented at the meeting. Among the subjects discussed were several measures which the commissioners propose to present for passage at the next session of the legislature.

All the speakers praised the present administration of the State Highway Department, and splendid progress in rnad work was reported in all the counties represented.

William L. Rees of Pueblo, president of the association, presided.

Among those who addressed the gathering were: State Senator John L. East of Walseubnrg; V. H. Johnson, Cheyenne Wells; Mayor J. W. Sears of Walsenburg; A. G. Hamel, superintendent of the San Isabel Forest; Joseph Ray of Las Animas connty; George Barr of Otero connty; J. E. Downey of Crowley county; H. F. Decker of Prnwers county, and Lewis Swink, assistant superintendent of maintenance, State Highway Department.

It was announced by Mr. Decker that a contract had been let in Prowers connty for the construction of sixten miles of roadway between Lamar and Springfield, running to the Baca connty line. Wben completed this road will form a direct link of highway into the only county in the state without a railroad.

He also said that three patrol crews are now giving good service on maintenance work in the county.

George W. Elley of Baca county said that his sectinn welcomed the news from Lamar. In turn he said that his county was constructing ten new bridges on state highways and had 300 miles of graded roads under maintenance.

The commissioners and their friends were the guests of the Spanish Peaks Playground Association at a barbecue served in the rest house near Blue Lake in the San Isabel Forest on the following day.

Mayor Sears, C. E. Furphy, F. C. Farguson and W. H. Hamilton were members of the committee on entertainment.

About 500 citizens and visitors attended.

The Blue Lakes country is ranked as the most beautiful in the San Isabel Forest, which embraces 651,200 acres, 75,000 acres of which is located in the Las Animas district.

In the forest are 650 miles of completed roads. Present plans call for 715 miles of forest roads. About twenty beautiful mountain lakes are located in the Las Animas district, all above an altitude of 9,600 feet. They are reached hy a fine fnrest road cut thru miles of virgin aspen.

Roads East of the Rockies

(*Continued from page 2*)

While concrete roads are the standard and are built where traffic is heavy, they are too expensive for crnss-country roads, where traffic is lighter.

Our Highway Commission would do well to experiment with bituminnus gravel roads such as are now being built in practically all states east of Colorado. These roads are cheap, require no special foundation, can be built rapidly and do not impede traffic while being built. There is an art in building these roads and a novice would only make a mess of it.

The Highway Commission can improve conditions materially in taking better care of detour roads. Most states have adopted standard detour signs which are used at every turn on the detonr road.

In the matter of road posting, Colorado is far behind other states. Every important road in the state should have uniform signs pnt up and maintained by the Highway Commission. Every city and town of any size should be required to erect sign boards in all public squares and all throngh roads should have signs on the shortest and best route throngh the city.

No city in the United States ueeds road signs so much as Denver.

The patrol system has been adopted to some extent in Colorado. Nothing in the road bnilding line does so mnch to smooth out, strengthen and consolidate a road as constant work. No road can wear out or become bad under a proper patrol system.

In many states trncks are pnt nnder severe restrictions in the use of roads. Something of the kind is going to be necessary in Colorado very shortly.

On the Cover Page

The picture over the cover of this month's issne of COLORADO HIGHWAYS is a scene of almost indescribable charm near Meeker, Colo., on the White River in Rio Blanco county.

Here the motorist finds a splendid road following a meandering stream which offers a luxury of shifting splendor.

Drainage Aid to Better Roads

(*Continued from page 1*)

en boxes are the common ones. The cast iron culvert is nsnally the standard of excellence by which others are compared, but is seldom nsed becanse of its excessive weight and cost.

In placing culverts, care must be exercised that they are placed low enough to allow all the water to enter and yet they must not be so low as to become filled with sediment. They must be given sufficient grade to insure a good current through them and the lower ends must be so placed as to prevent undercutting or scour on the fill slopes. They must have sufficient cover to prevent road traffic from breaking them and injury by road maintenance machinery. All culverts should be provided with headwalls at the ends, to hold the earth fill in place and that they may be better seen.

Seepage and ground water must be cared for by some method of sub-surface drainage, which is usually done by placing porus drain tile in the trenches and back-filling the trench with coarse gravel or boulders. French drain is constructed in mucb the same manner, except that no tile is used. The grade used mnst be sufficient to prevent sedimentation, and breaks in grade should be avoided as far as possible. Considerable judgment must be used in selecting the size and all available data should be gathered as to the elevation of ground water and the source aud amouut expected. Tbe nature of the soil and dips of strata also effect the design of this type of drainage.

Open ditches are sometimes used for drainage of swamp ground and swales. This is at best somewhat temporary, since tbey are liable to be filled in hy material heing washed and caved in; also cat-tails, water cress and other marsh grasses growing in the bottom of the ditch, impede the flow and diminish their usefulness. The chief value of open ditch drainage lies in the fact that the amount of flow can be more accurately determined and a more adequate and permanent system of drainage may then be installed with economy.

It will he seen that the suhject of drainage is of the utmost importance in highway design and one which taxes to the utmost the skill and ingenuity of the road builders. Surfacing may be improved by the addition of greater thickness and higher types and repairs to the work that has heen doue, hut the improvement of structures demands that they be entirely rebuilt and therefore tbe best economy lies in using the most permanent structure at the first installation. The design should be liberal in allowance for waterway and increase in loads, and the greatest economy lies in the correct selection of type.

U. S. Forest Roads

(*Continued from page 9*)

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 mouey becomes available and projects are completed, the forests can be handled much more efficiently and easily, the fire menace will he materially lessened and Colorado's mountain land will have become a veritable playground.

THE CASH VALUE OF ROADS.

The Congressional Commission which has been investigating agricultural prob. lems has issued some illnminating statistics showing the cash value of good roads to the farmer. From farm to shipping point, in 1918, the cost of wagon hauling was approximately 30 cents per ton mile for wheat, 33 cents for corn, and 48 cents for cotton. Over the same route uow, but on hard-surfaced roads and by means of motor trucks, the cost is 15 cents per ton mile for wheat and corn, and 18 cents for cotton.

That represents a direct saving of more than 50 per cent to the farmer. A farmer who hauled 100 tons of wheat and corn over hard roads ten miles to his shipping point by truck last year did so at a saving of approximately $150 compared with his expense in takiug the same crop to market with a wagon over dirt roads in 1918. That is the cash value of the good road to tbe farmer, not considering the daily or weekly trips to town, the saving in delivery of his purchases, and the closer contact he has with the outside world.

Tbe city gets its profit in its receipt of fresh farm products, in the more regular and more frequent shopping trips of the farmer and his family, and in the added ease with which city dwellers can find their way into the country for a change of air and scene. Paying such dividends, good roads are a good investment at almost any price.—Chicago Tribune.

STATE HIGHWAY DEPARTMENT

Cash Statements of the State Highway and Bond Funds for the Month of June, and Totals of the First Six Months of the Fiscal Year 1921 - 1922

STATE HIGHWAY FUND

	Total 1st 6 Months Fiscal Year 1921-1922	JUNE	TOTAL	
RECEIPTS				
U. S. Government	$542,838.71	$ 72,441.45	$615,280.16	
One Mill Levy	820,615.43	26,128.71	846,744.14	
Motor Vehicle Tax	346,443.93	25,000.00	371,443.93	
Internal Improvement	66,800.00	6,000.00	72,800.00	
Gasoline Tax	132,736.11	30,000.00	162,736 11	
Counties—Federal Aid	380,980.83	53,746.64	434,727.47	
Counties—Merchandise	84,015.62	15,062.08	99,077.70	
Cement Sacks	10,042.23		10,042.23	
Miscellaneous	4,149.89	950.72	5,100.61	
Cancelled Vouchers	1.40		1.40	$2,617,953.75
DISBURSEMENTS				
Overdrafts 11-30-21			$438,209.57	
VOUCHERS ISSUED				
Administration	$32,205.35	$4,739.59	$36,944.94	
Administration Roads	81,747.31	13,206.07	94,953.38	
Construction	802,382.72	331,168.68	1,133,551.40	
Maintenance	201,217.12	79,301.24	280,518.36	
Property and Equipment	91,788.76	16,636.74	108 425.50	
BALANCE			525,350.60	$2,617,953.75

BOND FUND

RECEIPTS	$650,000.00	$621,000.00	$1,271,000.00	$1,271,000.00
DISBURSEMENTS				
Overdraft 11-30-21			$29,615.94	
VOUCHERS ISSUED				
Federal Aid	$202,237.33	$76,721.18	$278,958.51	
Counties	249,758.40	102,035.56	351,793.96	
Balance Federal Aid			328,270.31	
Balance Counties			282,361.28	$1,271,000.00

Road Work and Builders the State Over

Shale surfacing is being laid on five miles of the Greenhorn-Rye which will connect Pueblo with the San Isabel Forest. When finished, travel over the road will be certain in all kinds of weather. Expense of the project is to be borne jointly by the U. S. Forest Service and Pueblo County. S. Simms, construction superintendent of the forest service, and A. G. Hamel, Pueblo county supervisor, recently completed a survey of the road. Simms also is in charge of the work now in progress on the Squirrel Creek Road.

Work of resurfacing nearly six miles of the state highway between Delta and Grand Junction has been started by Reeves & Cook, contractors of Ogden, Utah. Gravel will be used on the project, the cost of which is defrayed partly by the state and partly by Federal Aid. The contract price was $49,692.66.

A survey of the proposed cut-off on the Victory Highway west of Steamboat Springs is nearly completed by H. L. Spahr, resident engineer of the State Highway Department. It is proposed to make this stretch of new road a part of the main highway west from Steamboat to the Moffat county line. It will join with the present road near the mouth of Elk river.

A party of engineers nnder the direction of George Davis, locating engineer of the State Highway Department has started a survey of the abandoned roadbed of the Colorado Midland railroad between Divide and Hartsel.

This survey will determine whether the right-of-way is suitable for a highway. The right-of-way was a gift of A. E. Carleton and associates to the State of Colorado.

A complete snrvey will be made of the roadbed from Divide, by way of Lake George, thru Eleven Mile canon to Idlewild, then to Howbert, and Hartsel. A preliminary report on the right-of-way made early this year showed that the grade thru Eleven Mile canon did not exceed 2.2 per cent, while that on other strstches was at a maximum of 3.2 per cent.

The present highway from Divide traverses several steep grades, in some places, particularly on Wilkerson Pass, exceeding 14 per cent.

Upon the report of the survey and the estimate of costs of converting the roadbed intn a highway will depend whether the highway department will abandon the present road in favor of the Midland right-of-way.

A total of 6,365 cubic yards of gravel will be laid on nearly four miles of road beginning four miles east of Grand Junction, extending easterly toward Palisades. F. L. Hoffman, Denver contractor, was awarded the contract for the project which is to be completed with the least possible delay. His bid for the job was $30,586.55. It is known as Federal Aid Project No. 208-A. The graveling begins at the end of the paving east of Grand Junction.

The Silverton-Ouray scenic highway will be kept open to auto travel until August 15, according to announcement sent out by the Silverton Chamber of Commerce. After that date the road will be closed for construction work. The road is one of the scenic rontes to the Mesa Verde national park.

The town of Lyons has leased from the Burlington railroad the plot of ground called Meadow Park. It will be converted into a tonrists' picnic gronnds. The lease was entered into by Mayor F. E. Dodge, Dr. W. R. Kincaid and President M. W. Tnrner of the Lyons Commercial Association, and Agent W. P. Sweeney of the Burlington road.

Work on ten miles of gravel surfacing between Canon City and Florence will start at an early date. On July 21 bids for the project were opened hy the State Highway Department, and the contract was awarded to G. A. Allen of Morrison, Colo., on his low bid of $63,342.95. The project which comes under Federal Aid provisions, calls for 52,700 cubic yards of common excavation, and 98,480 square yards of gravel surfacing. The project extends from the city limits of Canon City through Florence, Colo.

George Tonpain, division superintendent of maintenance, with headqnarters at Grand Junction, reports Kebler Pass, between Somerset and Crested Butte, in excellent condition and is the preferable road between Grand Junction and Gunnison.

Plans are being made to make the famous Tenderfoot Trail out of Salida the main route into Sonth Park and to Denver. The Tenderfoot Trail was constrncted by volunteer workers. I. M. Sidenstriker, F. J. Doveton and J. H. Julien recently made a preliminary survey of the proposed new road. They are of the opinion that a road can be located on high ground throngh to Midway. If the plan materializes, it will give the merchants of Salida an opportunity to trade with the South Park ranchmen.

Highway Engineers are now busy with a snrvey on State Highway No. 65, near Cedaredge, in Delta county, preparatory to the elimination of several switchbacks on the Lake road.

L. W. Sowards, of Manassa, has been appointed county road supervisor in Conejos county. He succeeds Lem Pemberton, who held the position several years.

John J. Holliday of Montrose has been awarded a contract for the improvement of the Kelly Trail between Ridgway and Colona. His contract with the Ouray county commissioners reqnire that the work must he started at once. The price was $3,870.30.

Rapid progress is being made in sontheastern Colorado with the installation of markers on the Albert Pike Highway, which runs from Hot Springs, Ark., to Colorado Springs. The Albert Pike Highway, which is the main artery for tourists from Oklahoma, enters Colorado at Holly, and from that point uses the Santa Fe Trail into the Springs. The markers are of metal and are monnted on galvanized posts set in concrete.

Ed. O'Neil has been awarded the contract for $84,000 of work on Cumbres Pass, which will open up a new all-year route to the Mesa Verde National Park. Work will be started immediately. The State Highway Department will bnild an 8-mile section of the road near La Manga.

Plans are being drawn for the construction of a road to the saddle of Arapahoe Peak in Boulder county the equal of the famous Berthond Pass Highway. The snm of $45,000 has been appropriated by the U. S. Forest Service for the building of the road. By taking the road to the saddle of the peak, it will be an easy hike down onto the glacier.

It has been decided by the State Highway Department not to build a temporary bridge over the Big Thompson south of Loveland. This will make it necessary for motorists to detour arnod the construction work nntil the new steel and concrete bridge over the river is completed. It is expected that the new structure will be ready for traffic early in August.

Paving on Federal Boulevard north of Denver will be completed about November 1, according to present progress of the work. When completed there will be a continuous stretch of concrete to Broomfield. The proposed project through the Zang farm, which will eliminate two grade crossings over the Denver & Interurban railroad, has been approved by the State Highway Department.

A fine stretch of roadway is being completed between Ordway and Sugar City. The road is being snrfaced with sand.

Four miles of the new road sonth from Rangeley which will connect with the Douglas Creek Pass road to Frnita, has been completed according to a report made by Engineer Frank Merriel, who is in charge of the work. The engineering work of the project is now 60 per cent complete. The work is being handled as a state project. One crew of workmen is now employed and the road already completed is in excellent condition. It is hoped to have the road ready for traffic early in the fall.

The heavy gale which swept over Pueblo on July 8th blew over a crane used to hoist the steel beams in place on the Salt Creek bridge east of Pueblo. The job was delayed several days.

Commissioner S. D. Bnster of Boulder connty expects the work on the Sonth St. Vrain canon road to be completed to the foot of Stanley Hill by October 1. A heavy steam shovel is being used on the project.

La Junta Paved Road Open to Traffic

La Junta.—The two miles of concrete road on the Santa Fe Trail, just west of La Junta, has been opened to travel. Traffic will still have to make a detonr in goiug to Swink, but the distaoce is shortened somewhat over the route going via the Fairmount road. In going west, traffic must tnrn to the left about a quarter of a mile west of the arroya and then turn west past the Berry place. The new pavement is said to be in most excellent condition. This road has been closed for more than a year, on account of the paving work.

Work on the paving contract for the remaining three miles of road to Swiok is now being commenced. Mr. Madison, the contractor, of Denver, has been in this vicinity for the last few weeks arranging for material, etc. Actual work will he started soon. The contract states that this work mnst be completed by October 31st.

WHEN SPENDING IS ECONOMY.

Should the "Good Roads Bill" which has passed the House also get through the Senate, as seems very probable, and receive the approval of the President, as appears certain, it will be another example of spending money that is economy. The bill carries an appropriation of $65,000,000 for this year and $75,000,000 for next year for the constrnction of good roads throughout the conntry.

It is noteworthy that this bill carries a greater amount than the nsual waterways bill, and with reason. While the improvement of onr waterways is essential to the proper development of transportation, yet the land transportation is infinitely more important. The auto has made the good road a necessity, as transportation of freight and passengers by auto is becoming so general that it is having an effect ou the railroad situation.

There is another notahle thing about this bill—there has been oo charge or suggestion of "pork" about it. The river and harbor bill has been a stench for many years. It has beeo the last resort of the "pork huoters", and it has been drafted and passed by log-rolling methods that savor of other days, rather than the tweotieth centnry. But the good roads legislation has been free from this charge because the provisions are different. The river and harbor bill may carry an item of $100,000 for the improvement of Squeedunk creek, near Podunkville, and that gives the congressman from that district a few plums to distrihnte, as well as showing the home folks that he is on the job. In the matter of good roads, government appropriations are only available when the states do their share, and the states in turn pass the bill along to the communities henefited. This puts the matter on a fair and business-like basis.

Good roads can do more for a community than anything else. Without good roads it is impossible for a town to progress. The visitor of today looks at the streets and the roads and if he finds them in bad condition, he passes the town by. Good roads mean hrioging goods to market at less expense, reduce the cost of living, increase the profits of the farmers, bring the rural population to towo more often—pnt the town on the map. Money expended for good roads is not an expense, but a very profitable investment. It is real saving, and while there is a very general demand for economy in government expenditures, it is very certain that the appropriation of this bill will meet hearty approval and that the states will not be slow to take advantage of the opportunity offered to secure aid to better highways.—Trenton (Missouri) Times.

Z. E. Stevison, Wyoming State Highway Engineer, finds that materials used in road bnilding in that state are at the lowest level since pre-war days. He also finds that labor is reasonably priced and "in general the attitude is toward giving a full day's work for a full day's pay". At ooe letting involving nearly three-quarters of a million dollars it was estimated Wyomiog saved upwards of $100,000 which, with Federal Aid added, permits the state of doing nearly $300,000 worth of additional work.

WORK STARTS ON BIG ELK PARK ROAD.

A crew of fifteeo men noder F. M. Vickery started work today on the Big Elk Park road west of Lyons. Eight miles of the road will be improved. The road will open the way to anto travel in the park. Expense of the work is to he paid by Larimer county and residents of the park on a "fifty-fifty" basis.

Mr. Vickery expects to complete the work this summer. The Big Elk is a fine scenic section and a rich stock raising country. Several hig saw mills also are located in the park region.

Monrovia, capital of Liberia, has three antomobiles.

CONTRACTS AWARDED DURING JULY

NO.	LOCATION	COUNTY	LENGTH MI.	TYPE	CONTRACT PRICE	CONTRACTOR
F. A. P. 165	Canon City-Florence	Fremont	9.325	Gravel Surf.	$63,342.95	G. A. Allen
F. A. P. 168A	W. of Granada	Prowers	5.745	Gravel Surf.	36,573.23	Stand. Engr. Co.
F. A. P. 208A	Grand Jct.-Palisade	Mesa	3.144	Gravel Surf.	30,398.85	F. L. Hoffman
F. A. P. 217	Pueblo, East	Pueblo	2.938	Conc. Paving	85,004.65	Ed Lindsay
F. A. P. 226A	N. of Brighton	Weld	8.228	Conc. Paving	219,212.90	White & Johnson
St. Pr. 532	Calhan, E. & W.	El Paso	6.0	Sand-clay Surf.	15,738.50	Ed Lindsay
St. Pr. 663	Nighthawk & Blackhawk	Gilpin	....	Culverts and Bridges	8,256.00	Acme Bridge Co.
.....	Lincoln County	Lincoln	....	11 Timber Bridges	37,737.73	A. R. Mackey

CONTRACTS BEING ADVERTISED

NO.	LOCATION	COUNTY	LENGTH MI.	TYPE	BIDS TO BE OPENED
F. A. P. 119B	N. W. of Saguache	Saguache	7.474	Grading and Drainage	August 8, 1922.
F. A. P. 209	Grant Jct. N. W.	Mesa	3.634	Gravel Surf.	August 8, 1922.
F. A. P. 218A	Hasty toward Lamar	Bent	8.341	Gravel Surf.	August 8, 1922.
F. A. P. 221	Loveland, North	Larimer	4.049	Concrete Paving	August 8, 1922.
St. Pr. 630	Las Animas, North	Bent	0.433	Concrete Paving	August 8, 1922.

PROJECTS ON WHICH PLANS HAVE BEEN SUBMITTED TO BUREAU OF PUBLIC ROADS BUT NOT YET ADVERTISED

NO.	LOCATION	COUNTY	LENGTH MI.	TYPE
F. A. P. 71B	S. W. of Durango	La Plata	3.635	Gravel Surfacing
F. A. P. 190	Dillon-Kremmling	Summit	1.643	Grading and Bridge
F. A. P. 213B	E. of Mancos	La Plata and Montezuma	5.302	Gravel Surfacing
F. A. P. 226C	Platteville-LaSalle	Weld	10.0	Concrete Paving

PROJECTS ON WHICH PLANS ARE BEING PREPARED

NO.	LOCATION	COUNTY	LENGTH MI.	TYPE
F. A. P. 125	Sapinero, West	Gunnison	2.819	Grading and Surfacing
F. A. P. 157	Buena Vista, N.	Chaffee	14.1	Grading
F. A. P. 173	Over St. Charles River	Pueblo	.095	Steel Truss Bridge
F. A. P. 210	DeBeque-Grand Valley	Mesa & Garfield	13.0	Gravel Surfacing
F. A. P. 215	E. of Pagosa Springs	Archuleta	0.1	Steel Truss Bridge
F. A. P. 216B	E. of Granada	Prowers	7.8	Gravel Surfacing
F. A. P. 224	Morrison-Baileys	Park	5.021	Mountain Grading
F. A. P. 225	E. of Aurora	Adams	1.0	Concrete Paving

Sign Posts Along the National Highways

Paving of more than 200 miles of the Columbia River Highway from the Pacific Ocean to The Dalles, Ore., was completed July 1. The last batch of asphaltic concrete was placed near Rowena. Simon Benson, former president of the Oregon Highway Commission, raked in the last load of asphalt. Also among the ceremonial party were: Rupert Hanser, president of the Hauser Construction Company; K. P. Kumpe, superintendent of construction, and J. E. Peck, resident State Highway engineer.

Items totaling $3,423,332 are contained in the annnal budget for Los Angeles County. It provides for road and bridge construction and maintenance in Los Angeles for the fiscal year ending June 30, 1923.

It is estimated tbat $65,000,000 will be required for tbe maintenance and reconstruction of California highways during the five years, 1923 to 1927, says a recent announcement made by the California Highway Commission.

The hnge sum is divided as follows:

General maintenance of from 3,500 miles in 1923 to .5,000 miles in 1927 of highway including minor slide removal on mountain roads, renewing gravel surfacing, repairs to equipment, pnrchase of small tools, five years at $2,500,000 a year —$12,500,000.

Purchase of maintenance equipment and maintenance yards, five years at $100,000—$500,000.

Reconstruction and major repairs to old pavement base prior to widening and thickening and other major specific repairs, ma or slide removal, 5 years at $1,000,000 a year—$5,000,000.

Improvement on more than 900 miles of special act roads not included in bond issues and for which no special fund is available, five years at $200,000 a year—$1,000,000.

Reconstruction of old macadam roads taken over or to he taken over from counties, as well as reconstruction of old bridges, 270 miles—$8,000,000.

Widsning and thickening all main line roads to a minimnm width of 20 feet, with the construction of cement concrete shoulders and asphaltic concrete or cement concrete surface, 1,400 miles—$33,000,000.

Separation of grade crossings—$5,000,000.

Referendum petitions are now being circulated among the citizens of Arizona to bring before the voters in November a proposed $2,500,000 bond issue to be nsed in the construction of a direct hard-surfaced highway connecting Phoenix and Central Arizona with Los Angeles.

The petition recites that the moneys to be secured shall be expended by the Arizona highway engineer in surveylog and locating a permanent, psved, hard-surfaced roadway from the Hassayampe River, 50 miles west of Phoenix, by the shortest fessible route to a point east of Blythe, California.

The National Park-to-Park Highway Association held its annual convention in Sacramento, Calif., on June 17. Scott Leavitt, of Great Falls, Mont., was re-elected president, and L. L. Newton, Cody, Wyo., was re-elected secretary. Portland, Ore., was chosen as the site of the 1923 convention.

An order for 130 Redflex danger signals has been placed by the county commissioners of Oakland county, Mich. The signals will be placed on signs of special construction and design. Agitation by the Pontiac Automobile Club prompted the placing of the order. Many of these new signals are beginning to make their appearance in Colorado. The devices work antomatically and are a sure-cure for the excuse, "I didn't see it."

On Jnne 15th the Highway Commission nf North Carolina had let contracts for 546 miles of road construction at an estimated cost of 10,076,795. Of this, $6,634,051 is for 226 miles of hard-snrfaced roads, and $3,115,056 for 320 miles of lower type roads, and $328,000 for bridge work.

At the request of Secretary of Agriculture Wallace, Associate Forester E. A. Sherman of the Forest Service has left Washington for a two-months' trip through Alaska to make a field study of departmental problems. This will be Mr. Sherman's third inspection trip to the Territory.

Mr. Sberman will be joined at Juneau by C. A. Flory, district forester in charge of the 20,000,000 acres of National Forests in Alaska. They will go from Juneau to Valdez and travel by automobile to Fairbanks, where they will inspect the agricultural experiment station located nearby, and also the one at Matannska. From Fairbanks they will travel over the new government railroad to Seward, and thence by steamer to Cordova, the headquarters of the Chugach National Forest. From there side trips will be made to the Prince William Sound reginn and to Katalla. An inspection trip will also be made from Ketchikan over the Tongass National Forest in southeastern Alaska.

Mr. Sherman will make a special study of the program of road construction in the National Forests of Alaska, for which Congress has appropriated $1,000,000, the possibilities of organized forest protection for the unreserved timberlands of interior Alaska, which have suffered severely from uncontrolled fires, and the relation ship of the National Forests to the general industrial development of the Territory.

State Highway Commissioner Frank S. Rogers has caused to be made for general information the following comprehensive condensed compilation of the mileage of various types of roads in Michigan and the amounts of money involved:

Michigan has approximately 300 miles of paved trunk lines; approximately 8,985 miles of macadam and gravel roads; approximately 3,550 miles of primary roads; approximately 6,195 miles of secondary roads; total mileage of all classes of roads, about 71,500; $10,210,817.95 Federal Aid proportioned this state from 1916 to 1921, including November, 1921, appropriation; $5,250,000 of Federal Aid funds expended or under contract to December 31, 1921; $3,248,300 under contract, advertised or approved to May 15, 1922, for 1922; $59,675,000 expended by Michigan for highway construction January 1, 1916, to December 31, 1921; $10,000,000 appropriated by State for 1922, making the total of $30,000,000 thus far drawn on the $50,000,000 bond issue antborized four years ago.

A total of 318 miles of roads of all kinds are under construction in Texas. Tbe cost as per contracts is $4,196,098.40. Ten contracts were let by tbe highway department during June for a total of 107.70 miles of new construction.

Work is under full swing on the North and South Highway tbrough central Idaho. An expenditure of almost $500,000 is to be made on the road. The road rnns from Boise to Grangeville. It is one of the most difficnlt and important pieces of road construction undertaken by the Idaho Department of Public Works. The first appropriation made for the road was in 1894 when $25,000 was set aside as state aid. This was snpplemented by connty fnnds.

Country highways are the farmer's first and principal transportation means of marketing his products. They are the arteries of the economic and social system of the country. On their condition rests the amount of the transportation charge that must be added to the gross cost of farm products and the more fully they are developed, tbe less that weather conditions and soil are allowed to clog the flow of traffic, the greater will be the health of the body politic and the added profusion of enjoyments and privileges to the common people.

The loss from bad roads should be reduced to a minimum, not only to enlarge the farmer's market, but to shorten the time and reduce the spread of price between the farmer and the consumer.

The farmer ought to be able to haul to market twice as much twice as often as he has been able to do in the past. If the farmer is to be put in a position to help infinence the price of his prodncts by not dnmping them on the market for fear of unseasonable weather, he must control the condition of the roads to his markets. Without proper road conditions "orderly marketing" can never be accomplished. Rapid growth of traffic over the highways has been so greatly intensified during the past few years tbat this method of transportation needs earnest and careful consideration.—Resolution passed at the National Agricultural Conference at Washington, D. C.

A German type of cycle car costs $22 at the present rate of exchange.

The price range for American-made cars is all the way from $319 to $10,000.

COUNTY BOARD MEMBERS FAIL TO AGREE ON BOND ISSUE.

Sterling.—Contending that it was evident that the proposed $6,000,000 highway bond issue meant an additional tax burden, county commissioners of Weld county succeeded in blocking a movement to endorse the proposal at the meeting of commissioners of the Seventh Highway District held here on July 12.

Commissioner Straight of Weld led the opposition forces. He declared that the citizens of his county did not approve of camouflaging the matter of highway expenditures. Others made similar speeches.

Robert H. Higgins, superintendent of state highway maintenance, explained the details of the proposed bond issue. He said that the bonds would be issued at the rate of $1,500,000 per year for four years. The bonds will run serially, and will be retired in about 19 years.

Under the terms of the initiated measure the interest and retirement of the bonds will be paid from the State Highway Department's one-half of the motor vehicle licenses. The counties will receive their one-half, which amounts to about $500,000 yearly as heretofore.

Also under the terms of the amendment, the counties will receive one-half of the proceeds of the bond issue. Mr. Higgins was unable to see wherein the bond issue would increase taxation, as some of the commissioners contended.

A resolution was passed asking the State Highway Department to use care to get responsible contractors for highway jobs. It was said that in several instances projects had been let to irresponsible contractors, with a result that state work has been subjected to long delays.

It was voted by the commissioners to call the association "The Platte Valley Commissioners District." The organization includes the boards of county commissioners of nine northeastern counties.

The site of the next meeting will be Colorado Springs at the time of the state commissioners' convention.

JACKSON HOLE OPEN TO TOURISTS.

Through the efforts of the United States Forest Service the famous Jackson Hole country of Wyoming has been made accessible to tourists.

This primeval wilderness is now a main traveled road to the southern boundary of Yellowstone Park and is connected with Lander by the opening of the Rocky Mountain Highway over Two-Gwo-Tee Pass.

The Jackson Hole region is one of the greatest hunting and fishing grounds in the country—an almost unspoiled wilderness. Only recently the Forest Service began to exploit the region.

For many years the Jackson Hole country was far-famed as the refuge of the renegade and horse-thief. It was first discovered by a deserter from the Lewis and Clark Expedition more than a hundred years ago. This same deserter discovered the region which later became Yellowstone Park.

The Jackson Hole country lies in a broad valley, covered with a heavy growth of yellow pine. Here scores of lakes teeming with wary mountain trout are to be found. Jackson lake is the largest of these sparkling bodies of water. It is thirteen miles long. Leigh and Jenny lakes lie south of Jackson lake.

A thirty-four-pound trout, the largest ever caught in Wyoming, was hooked in one of these lakes recently.

The Teton mountains flank the Jackson Hole region on the west. They rise to a maximum of 13,500 feet from the chain of lakes. Unlike most of the other ranges in the Rocky Mountain territory, the Teton mountains are without foothills.

It is said that the outline of these mountains is more rugged than any other range in the country. The highest of the peaks are Grand Teton and Mount Moran, named by early French trappers.

The people of northwestern Wyoming herald the route over Two-Gwo-Tee Pass, which rises to an altitude of 9,356 feet at the summit, as one of the most picturesque highways in the Rocky Mountain region.

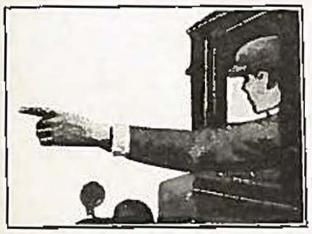
Recently the Bureau of Public Roads completed a forty-mile stretch of road west of the Pass. Plans are now under way to construct another forty-mile stretch east to Du Bois.

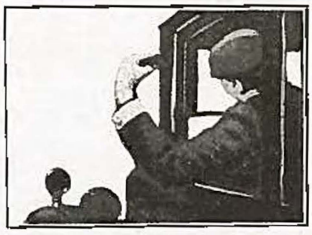
A register provided by the Forest Service on the Pass shows that hundreds of motorists this year have taken the new route to Yellowstone Park.

Does the Driver Behind Understand Your Signals?

Left Turn

To signal your intention to turn to the left, extend the arm and point finger to the left

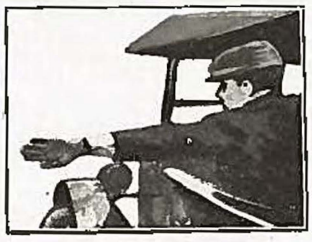




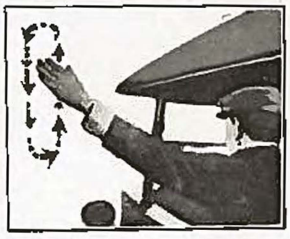
Right Turn

To signal intention to turn to right. Rest left arm upward at elbow and point first finger to right

Stop—To signal your intention to stop, extend arm straight out with back of hand to rear of car



Back Up—First look back to see the way is clear. Then extend arm with palm of hand to rear and motion backward



Turn Around—To signal your intention to turn completely around, circle arm and hand three times backward

For years there bas been an insistent demand for a uniform system of traffic signals—signs that the driver behind will understand.

Quite often signals of the driver ahead are misunderstood by the man coming up from the rear, with the result that accidents frequently occur.

Dr. John A. Harriss, special deputy police commissioner of New York City, in charge of traffic, has devised a simple set of driving signals, which has been adopted by a number of large cities throughout the country.

These signals are designed to relieve driving of the nervous strain, and to prevent accidents in crowded streets.

In order to further the cause of safety, we reproduce above the "Harriss-Collier's" set of signals, which motorists all over the country are using with decided success.

CONNECTING LINK ON ECHO LAKE TRIP NOW COMPLETED.

The citizens of Idaho Springs wanted a road to connect with the Mt. Evans highway at Echo Lake.

At the State Highway Department they were informed that no funds were available for the building of the connecting link this year.

But the Idaho Springs delegation insisted that they must have a return route to Denver from Echo Lake this year. And with that in mind they went back home and raised a fund of their own for the construction of the road.

They were sure that the average tourist likes a constant change in scenery, so they have provided a one-way road from Echo Lake down along the forks of Chicago Creek and into Idaho Springs.

By this ronte the autoist can then return to Denver over the Victory Highway to Bergen Park, where he can turn to the road leading back to Denver by way of Bear Creek and , Morrison, making the complete circuit without a repetition of scenery.

A crew of workmen under George Kimball, county road builder, was engaged for two weeks blasting rocks away on the old wagon trail from Echo Lake to Idaho Springs.

The road is not wide enough to permit traffic both ways, so the road will be open to autos from Echo Lake only. A big picnic in which volunteer workers of Idaho Springs participated, was held on the road the middle of July.

The old wagon road has been made passable until next year, when it is planned to build a new highway, with easier grades.

Contract News

DENVER—Protests against paving of West 44th Avenue overruled and bids for construction will be advertised for as planned.

Notice published of proposition to create Alley Paving Dist. No. 86. Provides for concrete paving at estimate cost of $27,409.36, subject to protests till September 14th.

GOLDEN, COLO.—Ord. No. 76 passed and bids will be asked at once for paving in Dist. No. One. Plans of Engineer Glen Izett call for a 22-foot paving at estimate cost of $3.50 per front foot.

TRINIDAD, COLO.—Petitions are filed asking for brick paving on San Pedro street and as result Paving Dist. No. 16 is created by the city council.

LAMAR, COLO.—Petitions are filed with city asking for the paving of South Main, Olive and Elm streets.

BOULDER, COLO.—August 22nd probable date of election in Boulder to vote a $100,000 bond issue for construction of a 8,000,000-gallon water reservoir.

WALSENBURG, COLO. — Ordinance passed authorizing a $50,000 bond issue to extend the water works system and issue is sold at once to Benwell-Phillips & Co., a Denver bond house.

CASPER WYO.—Petitions filed asking the creation of a paving district to cover C-Y, Fourteenth and Willow streets. Another petition in circulation asking paving of west Casper street.

SHERIDAN, WYO.—Contract for paving Griffith avenue awarded to the Warren Construction Co. at low bid of $8,137.50.

LARAMIE, WYO.—City to pass emergency measure to provide for the construction of a 3,000,000 gallon reservoir at Soldier Springs. Will be of cement construction.

OGDEN, UTAH — The Taylor-Child Construction Co. of Ogden submits low bid of $28,635 for bitulithic paving of the subway approach to Ogden canyon.

PROVO, UTAH—Chamber of Commerce calls meeting to discuss plans for creation of a district to reclaim about 30,000 acres from Utah Lake.

LIVINGSTON, MONT.—Resolution No. 764 passed creating sanitary sewer Dist. No. 104, estimate cost $11,440, subject to protests August 7th. Harry M. Shelver, City Clerk.

GREAT FALLS, MONT.—Sewer Dist. No. 410 created and cost is estimated at $13,000.

HELENA, MONT.—Petitions in circulation asking the creation of a second paving district on the west side to cover portions of Harrison, Madison, Dearborn, Benton and Power streets.

ANACONDA, MONT.—Resolution No. 341 creates curb, gutter and paving district to cover Locust street. Cost of asphalt paving estimated at $19,500. Protests August 7th.

AMERICAN FALLS, IDAHO — The state utilities commission has ordered the American Falls Water Company to install a chlorinator and to otherwise improve its local plant.

NAMPA, IDAHO—Resolution before city council provides for creation of new district to lay two miles of concrete sidewalks at estimate cost of $11,000.

ALBUQUERQUE, N. M.—Angnst 22nd city will sell the following bond issues to finance proposed improvements: $100,000 for storm sewers; $50,000 water reservoir; $115,000 sewer disposal plant; $25,000 water mains, and $50,000 sanitary sewer.

PORTALES, N. M.—Mass meeting held and petitions will now be circulated asking street paving improvements for Portales.

SANTA FE, N. M.—Ordinance passed providing for laying of storm sewers and water mains before construction of street paving is started.

BUCKEYE, ARIZ.—Contractor Charles K. Fox is here from Los Angeles to make surveys and plan construction of a new dam and reservoir for the Buckeye Irrigation Company.

COLUMBUS, NEBR.—At last week's election, Columbus voted in favor of $30,000 bond issue for water works improvements and $5,000 for storm sewer extension.

MESQUITE, TEXAS—E. L. Dalton retained as engineer, and city election will be called in August to vote a $37,000 bond issue for water works improvements and $23,000 for sewers.

The highways of this nation total more miles than nearly all the rest of the world's put together—2,500,000.

Alaska now has many gasoline sleighs in place of dog sleds, its chief transportation medium for centuries.

"Do You Know That" The Sommers Oil Co.

Is Now Operating the Service Dept. With the Filling Station at

15th and Cleveland

We Have the Service up to

100% Perfect

"Do You Know That"

We will doll up your car so fine that you will not recognize the old boat by allowing us to wash, polish, clean the motor, and vacuum clean it.

CRANK CASES DRAINED FREE
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We Have an Up-to-Date Tire Department
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When in Denver stop in to see us and let us assist you with your construction problems.

We are pleased to announce a few new lines; all selected on merits of their Construction and Efficiency.

(1) The Buckeye Traction Ditcher Co. Finlay, Ohio.
Excavating and Trenching Machinery.

(2) Metal Forms Corporation, Milwaukee, Wis.
Concrete Road Paving Forms.

(3) Taylor Portable Steel Derrick Co. Chicago.
General Service and Gondola Type Derricks.

(4) C. H. & E. Mfg. Co., Milwaukee, Wisconsin.
Portable Pumps, Saw Rigs, Small Hoists, Truck Tractors, and Motor-Mixers.

(5) Milwaukee Locomotive Mfg. Co., Milwaukee, Wis.
Gasoline Locomotives.

(6) J. S. Mundy Hoisting Engine Co., Newark, N. J.
Large Steam, Gas and Electric Hoists.

(7) Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Concrete Hand Carts and Wheelbarrows.

(8) Lourie Mfg. Co., Springfield, Ill.
Power Trench Tampers.

(9) Boettcher Co. Inc., Chicago, Ill.
Portable Electric Floor-Sanding Machines.

(10) Ransome Concrete Mfg. Co., Dunnellen, N. J.
Concrete Tower Placing and Chuting Equipment.

(11) Gasoline and Kerosene Engines, Standard Makes. Sizes 1½ H. P. to 25 H. P., Inclusive.

We will be pleased, at your request, to furnish full information regarding any of the above equipment.

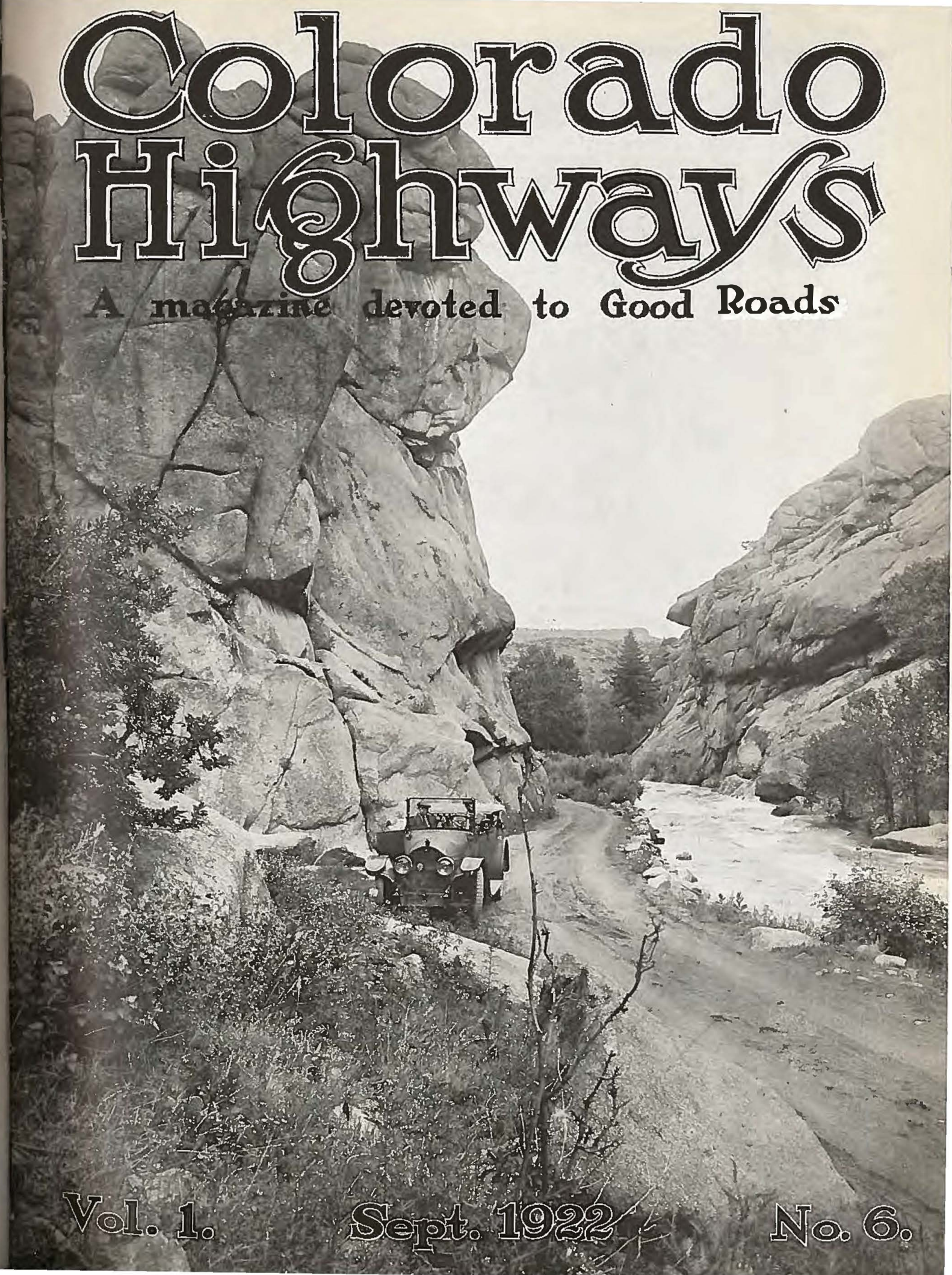
H. P. WILSON and COMPANY

Seventeenth and Blake Streets
DENVER, COLORADO

THE BRADFORD-ROBINSON PTG. CO., DENVER

Colorado Highways

A magazine devoted to Good Roads



Vol. 1. Sept. 1922 No. 6.

FOR the economical handling, screening, and loading of gravel, the Galion Portable Gravel Screening Plant has demonstrated its superiority in FORTY-SEVEN instances on this territory.

Its first cost is on the basis of big value for the money, and its maintenance and upkeep is so low as to be negligible.

The new force-feeding device insures full buckets constantly and maximum production.

Special bulletin on request

H.W. MOORE & Co

EIGHTEENTH AND WAZEE STREETS

DENVER

Colorado Highways
"BETTER ROADS"
VOLUME I. SEPTEMBER, 1922. NUMBER 6.

What Does the $6,000,000 Highway Bond Issue Mean?

It Means $12,000,000 Available for Building State Highways During the next Four Years.

WHAT does the highway bond issue which the taxpayers will vote on at the November election mean to the people of Colorado?

The answer is simple. It means the capitalizing of $500,000 annual revenue into $6,000,000 ready cash at the rate of $1,500,000 annually, and thereby securing an additional $6,000,000 from the National Treasury.

It means the spending of $12,000,000 on the highways of Colorado during the next four years **without one penny of additional taxation.**

Here's the way it works out.

By taking the State Highway Department's one-half of annual motor vehicle license collections, a fund sufficient to pay the interest and retire $6,000,000 will be created.

The auto license collections total nearly a million dollars this year. One-half of this money is distributed to the counties in which it is collected. The other half of the license money is turned over to the State Highway Department to be used for road building and maintenance purposes.

The terms of the proposed bond measure do not include touching a single dollar of the counties' share of the motor vehicle license money, and this will be distributed to the counties just as it has been heretofore.

The bonds will be issued at a rate not to exceed $1,500,000 per annum.

Congress has already appropriated the sum of $75,000,000 to be apportioned among the states for road building purposes during the next three years.

Colorado will be compelled to pay her share of this sum into the Federal Treasury, regardless of whether the $6,000,000 bond issue carries or not. Laws already have been enacted for its collection and distribution.

The only way that the citizens of this state can possibly benefit from the payment of these Federal taxes is from Federal Aid road funds applied in this state. And this means the passage of the $6,000,000 bond amendment.

Otherwise Colorado's share of the Government Aid will go back into the Federal Treasury to be apportioned among the other states that will eagerly grasp the opportunity to match it on a "fifty-fifty" basis.

By matching Federal Aid, Colorado not only keeps at home money which otherwise would go to other states, but it will be possible to continue the present road building program which has met with high favor all over the state during the last two years.

It will provide employment for an average of 5,000 men on the roads of Colorado during the next four years, to say nothing of the wealth that will accrue to the people of the state through increased land values made possible by road improvements.

Since the circulation of the electoral petition relative to the New Bond Issue, several pertinent questions have arisen which this article will answer.

Question 1. We voted $5,000,000 of Highway Bonds in 1918. Why do we need another Bond Issue?

Answer. Some time in 1923, the $5,000,000 will have been used up. One half of this amount went to the counties, and is now being spent on "Bond Issue" projects. The other half is being used on Federal Aid projects. It will require approximately $6,000,000 to meet Federal Aid already obligated together with that offered to us during the next four years.

Question 2. Should Colorado refuse Federal Aid through failure to raise funds to meet it?

Answer. Let us review briefly the history of the Federal Aid program. It has been a settled fact for years that the highways of America were far behind those of the older civilized nations, and that they had become inadequate for our commercial and social needs—that is to say, they could not carry the tremendously increasing business and pleasure traffic. There was a universal demand for more, better, smoother, passable roads,

Modern machinery used in making better roads in the San Luis Valley. Picture taken below town of Adler in Saguache County.

A giant steam roller in action on the lower course of gravel project being constructed with Federal Aid funds on the Durango-Mancos Highway.

and a determination to "get out of the wheel ruts". But the great impetus towards better highways came as a consequence of the World War.

(1) We learned dnring the war the value of a system of transcontinental highways, as an adjunct to our overburdened rail systems.

(2) After the war, we had thousands of unemployed men, that could not immediately be absorbed by the industries, since the entire nation was going through the process of demobilization to a peace basis.

These two factors contributed most weightily to bring about the legislatiou in favor of increased Federal appropriations for road improvement. We found during war time that we lacked a system of good roads, from coast to coast, on which to move men and munitions in a hurry. In the summer of 1920 came the peak of post war prosperity, and the true conditions became more apparent. Unemployment was acute, the public quit buying, prices slumped, exports began to fall off and a period of general depression set in. Since that time, the country has been gradually climbing back np to a condition of normal employment and production. The cash disbursements, resulting from the Federal Aid road program, and the road activities in general were of wonderful assistance during this trying period. Most of us know that for the past few years road work has been a lifesaver to the population in many communities, and the road betterments accomplished were necessary, timely, and jnstifiable.

The Federal Aid program is broad and purposeful. It aims at a continuous, connected system of standard highways—hence the so-called "7 per cent system". It believes in concentrating upon certain roads in each state until they are com plete, standardized, so as to form a link in that great transcontinental highway system which we found lacking in war time.

Now the Federal Government under the authority of Article 1, Section 8, Clause 1 of the Constitution, levies uniformly throughout the states internal revenne known as excise taxes, duties and corporation taxes—which the great mass of the popnlation pay indirectly. Also, under the 16th Amendment it levies a direct tax on incomes—the big fellows pay this, not the little fellows, nor the struggling farmers, whose incomes have been cut by reason of crop failure or low prices—and this is the source of Federal Aid which pours into the treasury in the form of taxes, and is appropriated to the different executive departments of the Government.

The Federal Government offers to Colorado its proportion of the total Road Appropriation, conditional upon our putting up approximately the same amount, all to be used in road improvement. If we do not accept aud put up our share, **we lose the money which the State has already paid in as taxes to the Federal Government**—and it goes back into the kitty, that is, the Bureau of Public Roads appropriation, and is eventually divided among the states that WILL accept it.

In answer to the question then, common sense, or good business judgment demands **that we accept Federal Aid just as long as it is available**—it will not last forever.

Question 3. Will the $6,000,000 bond issue create additinnal taxes?

Answer. No, the bond issue resolution calls for no levying of taxes—we shall see why not, presently.

The Motor Vehicle License Tax yields annually nearly $1,000,000. One-half goes to the State Highway Fund, the other half is distributed among the counties, and nnder the present law, it always will be. Let this be well understood, since this question has ofteo been raised—the counties' proportion will in no way be disturbed.

The State Highway proportion, one-half, is, let us say, $500,000 annually. Remember that the number of motor vehicles in this State is always increasing—125 carloads of autnmobiles rolled into Denver over the Union Pacific Railroad **in one day**, in a train of several sections—this was only one brand of car, and they were not Fords, either. In a recent interview, Mr. Ford stated that there were 10,000,000 cars in use, that the point of saturation was not even in sight, and that we could expect 30,000,000 cars and trucks would be in use a few years hence. His prediction is borne out by the fignres showing the growth in numbers nf motor vehicles dnring the past five or ten years. Then again, the natural increase in population will increase the nse of cars and trncks. The State of Colorado will get its share and of course our revenue of $500,000 annually from the licenses will increase each year. Assuming $500,000 annually, however, it is proposed to use $125,000 in 1924 to pay off the interest on $1,500,000 bonds which will have already run one year, at 5%, and retire $50,000 of bonds; this will leave $375,000 from this fund available for projects other than Federal Aid.

The following year, 1925, again $125,000 will be nsed up in payment of principal and interest, the amount of interest decreasing each year, leaving a larger amount available for retiring the bonds. In this year also there will be due $125,000 principal and interest on the second or 1924 issue of $1,500,000; the two issnes will require together, $250,000 out of our $500,000, leaving $250,000 from this fund for direct expenditure on roads. In 1925 there will be three issnes of bonds in effect for which interest and retirement mnst be provided, which will consnme $375,000, leaving $125,000 free for road work, and in 1926 all the four issues will be in effect and the full $500,000 will be needed for interest and retirement.

Final details of the four issnes totaling $6,000,000 will be worked out between the present time and Jnne 1, 1923. The following table is submitted as an example showing how payments of bond interest and bond principal would work out, using $125,000 per annum to retire bonds and meet interest payments at 5%, on each issne of $1,500,000.

Notice that the eotire amount of $500,000 per annnm will not he applied to bond retirements, nntil four years after the first issne is floated, and that during these fonr years we may expect a decided increase in revenue from this source—motor vehicle licenses.

Question. Will the oew hood issues be divided among the counties?

Answer. No, they will not, because as their principal object is to meet Federal Aid, the proceeds must be spent under State and Federal supervision.

In conclusion, it seems apparent that every citizen of Colorado can vote favorably on this bond question with perfect assurance that he is securing for his State dollar for dollar, and that he is not adding by his action, any further to the bnrden of taxation, and that he is putting into circulation $3,000,000 annually for four years—leaving entirely out of the question the benefits accruing hy reason of continued emplnyment for road builders, direct betterment of our road system, the increased value to real property, and the all round development of this State.

TABLE

Annual income from motor vehicle licenses	$1,000,000
One-half goes to State Highway Fund	500,000
Annual amount necessary tn finance $1,500,000 bonds	125,000
Annual amount uecessary to finance $6,000,000 bonds	500,000

No. of Years		Bonds Ontstanding	Bonds Retired	Interest Payment	Used
	1923	$1,500,000	.....	.....	.....
1	1924	1,450,000	$50,000	$75,000	$125,000
2	1925	1,397,500	52,500	72,500	125,000
3	1926	1,342,500	55,000	69,875	124,875
4	1927	1,285,000	57,500	67,125	124,625
5	1928	1,225,000	60,000	64,250	124,250
6	1929	1,162,000	63,000	61,250	124,250
7	1930	1,094,000	68,000	58,100	126,100
8	1931	1,023,000	71,000	54,700	125,700
9	1932	949,000	74,000	51,150	125,150
10	1933	872,000	77,000	47,450	124,450
11	1934	790,000	82,000	43,600	125,600
12	1935	705,000	85,000	39,500	124,500
13	1936	615,000	90,000	35,250	125,250
14	1937	521,000	94,000	30,750	124,750
15	1938	423,000	98,000	26,050	124,050
16	1939	318,000	105,000	21,150	126,150
17	1940	209,000	109,000	15,900	124,900
18	1941	95,000	114,000	10,450	124,450
19			95,000	4,750	99,750

Colorado's Tented Cities

BY WARREN E. BOYER.

THERE are 100 more cities in Colorado in summer than in winter. They are canvas-roofed, springing up ofteatimes like mushrooms and retaining their "popnlation" by the coming and the going of automobile travelers from everywhere. In the United States there are 1,200 such cities, and the censns-taker will have a harder task to locate America's indoors turned ontdoors, as the summers go hy. In truth, they are cosmopolitan cities within cities, many of them having a rotating "mayor" from among the changing campers.

These camps, most of which are municipally owned, have come to stay, and will be enlarged and increased in number as the highways leading to them are improved. This fact was forcibly illustrated recently in the official opening of Overland Park Camp Grounds, in Denver, by the city, and the designation of All-States Avenue. Overland has been open for two years, but Mayor Dewey C. Bailey said the 160-acre tract had to be gone over and improved, at an expense of $250,000, before it was ready to be turned over to the people of the United States. Today there's a "mile of tourist teots", many rows deep.

The dedication, carried out by impressive scenes that have been perpetuated in moving pictures, was made by the occasion of Denver's first All-States Day, suggested by the Denver Tourist Bureau and carried to fulfillment by city officials and officials of the Deover Civic and Commercial Association, including President Roblin H. Davis. Virtually every state was represented among the 5,000 campers, one of whom, Donald E. Leslie, of Washiogton, D. C., a temporary resident with his family, accepted the "key to Overland" on behalf ot the nation's travelers. Thousands of Denverites shook hands with the campers and asked them to come again.

Denver, already looking ahead to the 1923 season, not only for itself but for the other ninety-nine camps in the state, is arranging to have the scenic travelogues on Colorado travel sent broadcast for showing this winter in the East and South through the See Colorado First Film Tours Corporation. Other cities and towns in the state are beginning to measure the yardstick of travel to the "goods on their scenic shelves", which, stop to think of it, is just as fresh and new the followiog year, and the year thereafter.

In Graod Junction, for example, 1,500 campers had used the municipal grounds to Angust 1, filling the available space, and insuring the early success of its installation. The daily roll call in the Fort Collins camp grounds has averaged seventy-five, and the city council is considering the necessity of enlarging the grounds in City Park. Las Aoimas reached the high point in attendance late in July when oinety-seven travelers "bedded down" in the inviting camp grounds.

June travel started off with a rush for Boulder, and 261 autos containing 876 persons, were listed at the auto camp grounds. Each succeeding month the at-

(*Continued on page 13*)

Upper right—Club house in Overland Park Tourist Camp Grounds.

Upper left—"Breakfast for three"—A typical morning scene in tourist camp.

Center — Showing group of prominent city and state officials who attended ceremonies at opening of All-States Avenue, Overland Park, when Mayor Dewey C. Bailey presented key of city to Donald E. Leslie of Washington, D. C.

A general view of the Denver Free Camp Grounds at Overland Park.

Colorado Highways
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Owing to the necessarily limited edition of this publication, it will be impossible to distribute it free to any persons or institutions other than the state and county officials actually engaged in the planning or construction of highways, instructors in highway engineering, newspapers and periodicals, and civic associations. Others desiring to obtain Colorado Highways can do so by sending 10 cents for each number desired. Associations desiring to distribute the magazine can obtain it at cost in lots of from 500 copies up.

Subscription Price, $1.00 per year.

EDITORIAL COMMENT.

A lot of people wonder why they are compelled to travel for so long a time over detours while new roads are being built.

There's nothing to get red around the collar about.

Just stop a moment and consider the new road that is being constructed for the comfort and convenience of the traveling public.

Assurance is given by the State Highway Department that every effort is being made to complete every construction project as quickly as possible.

It is the aim of the Department to inconvenience the public just as little as is consistent with good construction work.

Another thing that many wonder at. Why are so many miles of roads torn up at one time? Wouldn't it be just as well to tear up one mile at a time? we are asked.

Sometimes such a thing is possible. But in a majority of instances it has been found that economies result in doing the whole piece of work at one time i. e., grading first and gravel surfacing after.

Weather conditions play an important part in road work.

Nearly every rain delays a project several days. Take for instance the heavy rains that have fallen in the Denver district for the last three weeks.

The paving project at Wolhurst, near Littleton has been held back nearly twenty days because of these rains. Under favorable weather conditions this job would have been completed on August 19.

Now the contractor hopes to have it open for traffic early in September.

This project is typical of a score of others all over the state.

And yet, remarkable strides have been made in the construction program this year. It is expected that nearly 1,200 miles of roads of all types will be completed before snow flies.

In several sections of the state there is an abundance of limestone rock available for road surfacing.

With rock crushers this material can be made suitable for road building purposes at a minimum cost.

There is nothing better for road surfacing than limestone.

The finest dirt roads in the state are made of this material.

Up near Laporte there is a road ten miles long that is constructed of limestone. It has been in for over ten years and the expense of upkeep has been practically nothing.

In Pueblo county we find several long stretches of limestone roads. All are like boulevards. They are easily maintained.

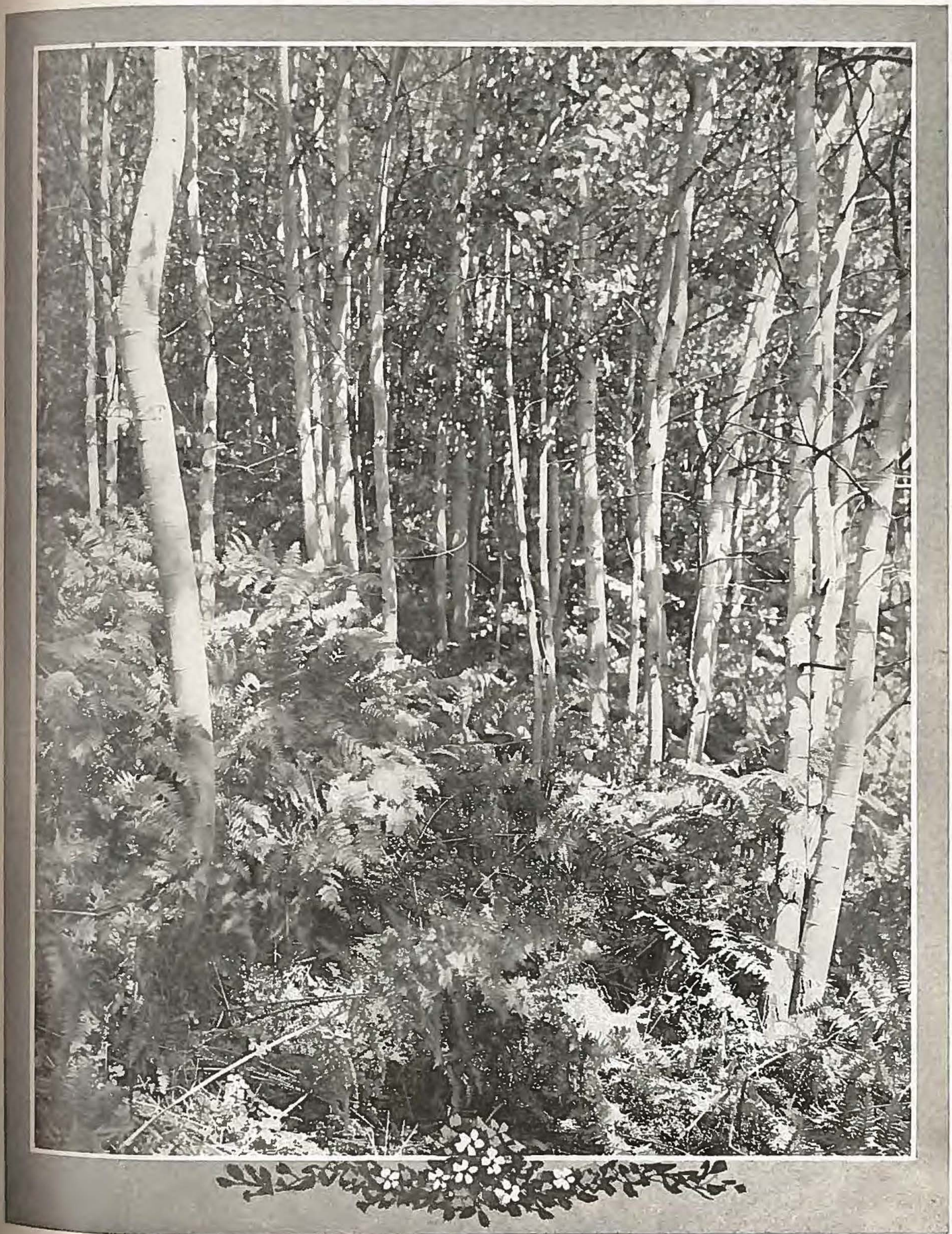
The roads from Pueblo to Florence and to the Huerfano county line are particularly fine. Other counties are using limestone with splendid results.

Just why some road builders will persist in hauling gravel out of creek beds, when a better and more lasting road can be constructed at practically the same cost, is puzzling to some of our road experts.

One trip over these limestone roads will convince the most dyed-in-the-wool gravel advocate.

Limestone acts as a perfect binder and with each rain packs solid. It does not blow away under automobile traffic. This material is the nearest thing to cement that has yet been found.

A COLORADO SUMMER BEAUTY SPOT



Ferns and Quaken Aspen Furnish Delightful Scenery on Rabbit Ear Pass, Just Off Main Transcontinental Road.

Road Construction of Different Types During Recent Years

BY JOHN S. MEANS,
Office Engineer, State Highway Dept.

FROM time to time articles have appeared in this magazine and in the press of the State referring in dollars and cents to the quantity of work being handled by the Highway Department. The sums of money thus mentioned may mean much to those who are versed in the cost of the various types of roads and structures—bnt to those who form the majority, whose duties do not bring them into contact with prices and costs, the actual mileage obtained is more tangible and of greater interest.

Between December 1, 1921, and Angust 15, 1922, which period iucludes bnt a pnrtion of the actual working season, there have heen constructed ten miles of cement pavement, 297 miles of sand clay surfaced road, 231 miles of gravel surfaced road, and 300 miles of grading and drainage work. This makes a tntal of 838 miles of improvements in seven mouths.

A dozen years ago the total amount which the department had to expend in a whole year would not pay for a mile of paving as cnnstructed today. During the three years, 1910, 1911, and 1912, the department had the munificent sum of $77,119.60 to expend on all the road work, salaries and eqnipment. Consequently, when we state that to date 891 miles of road have been graded and drained, 447 miles of sand clay surfaced road coostructed, 411 miles of gravel surfacing placed, and 71 miles of concrete pavement laid, it will he understood that all of this activity has taken place in the last few years. This has necessitated the expeuditure of over ten million dollars since 1919.

There are at present under contract:

48 miles of grading and drainage.
112.3 miles of gravel surfacing.
2.7 miles of sand clay surfacing.
50.5 miles of concrete pavement.

The above are divided among thirty-five projects, upon all of which the State is receiving Federal Aid.

In addition to these Federal Aid Projects, the department has under construction in the form of State Projects, 390 miles of grading and 150 miles of surfacing, or a total for bnth State and Federal Aid of 753.5 miles.

It is contemplated, with the completion of the 18 miles of pavement and other work carried over from last fall, that the end of 1922 construction season will see a total of 1,731 miles of graded work, 542 miles of sand clay surfacing, 626 miles of gravel surfacing, and 121 miles of paving, finished and opened to traffic.

A clearer idea of the work under way at this time may he had by glancing at the accompanying map upon which has heeu indicated the type, and amount of money involved, on all Federal Aid work under coustruction, together with the amount of money going into road work through State and Bond Funds.

It must he understood that the Federal Aid work, which is indicated by a narrow black line parallel tn the road, has in some cases been under construction for several years, and the sum shown in connection with it will accordingly indicate the total amount expended over the full period. An example of what is meant is the road from the north line of Huerfano couuty south through Trinidad to the New Mexico State line, where the $700,000 shown has been spread over a period of several years.

The amount shown nnder each county name represeuts the money being expended through State and Connty bond projects as covered by the 1922 Budget of the State Highway Department.

So far only road work has been mentioued. The department also has supervision over some 37 bridges, construction on which is under way at the present time. These structures vary in length from a few feet up to a thnusand feet, and include numerous types of steel, concrete, and timber. The nggregate cost of these bridges will be clnse to $558,000.

An interesting side light on this bridge construction is that the prices hid on these particular structures indicate a unit cost per lineal foot of $116.59 for concrete, $214.68 for steel, and $27.01 for timber. Foundations, clear water way and other features which enter into the design make it undesirable, or uneconomical always to select the cheapest type.

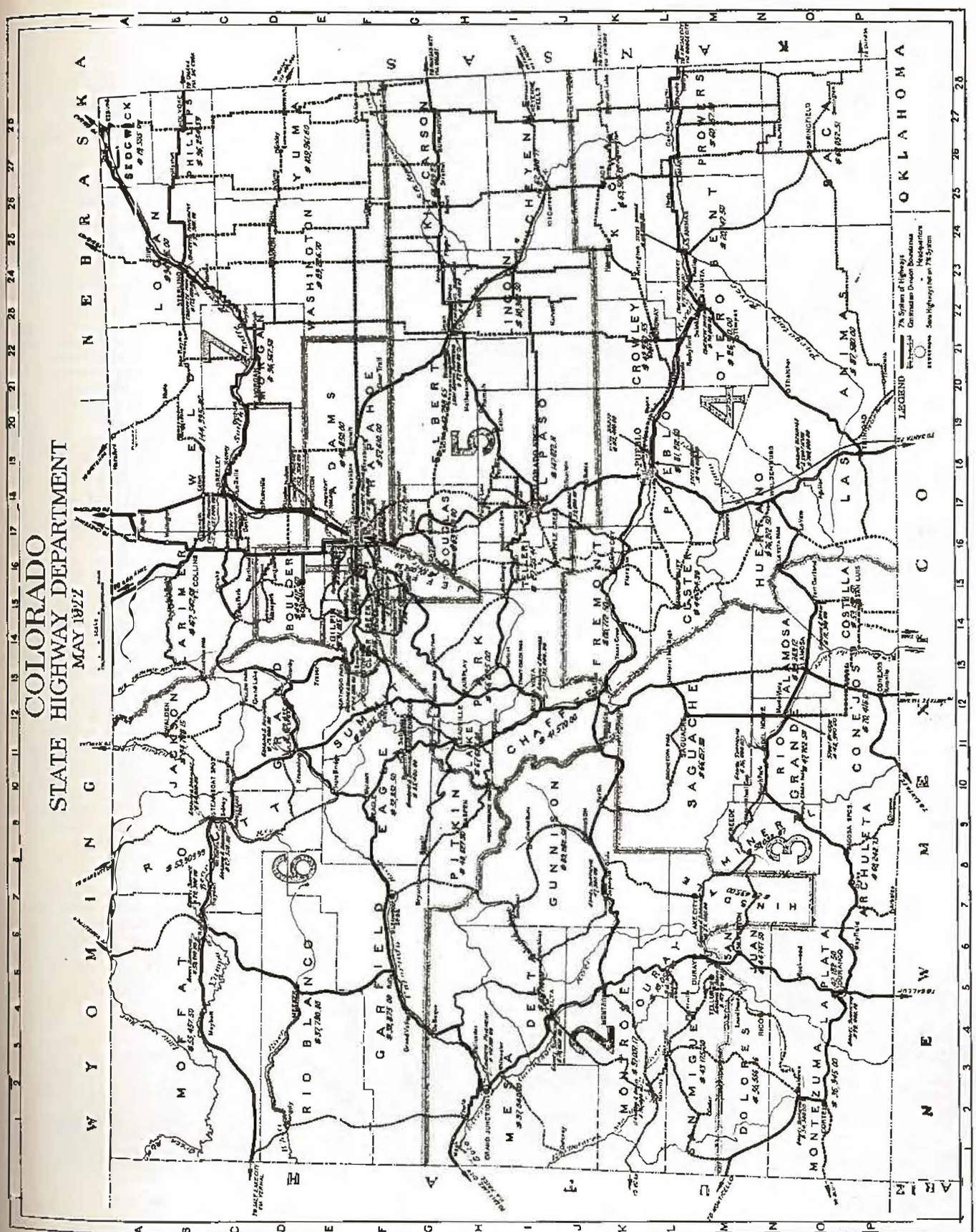
Investigations are at present under way

(*Continued on page 13*)

HIGHWAY CONSTRUCTION FOR 1919-1922 INCLUSIVE.

	1919 Miles	1920 Miles	1921 Miles	1922 Miles	Total Miles
Concrete Pavement	5	17	35	48	105
Gravel, Sand-Clay, Crushed Rnck, or Shale Surfacing	59	74	147	305	585
Grading and Drainage	140	210	190	790	1330
TOTAL	204	301	372	1143	2020

Showing the handsome steel and concrete bridge recently opened to traffic over the Rio Grande River near Monte Vista. It is 150 feet long and replaces an old structure with two 75 ft. spans. The new bridge was constructed with Federal Aid funds.



Map showing State Highway System of Colorado and the total amount of money appropriated for road construction purposes in each of the counties in 1922. Small figures are for Federal Aid projects now under construction.

Officials Discuss Road Plans

BY OLIVER T. REEDY,
Senior Assistant Engineer State Highway Department.

EARLY in July, Mr. Thos. H. MacDonald, Director of the Bureau of Public Roads, Washington, D. C., requested each of the eleveo states comprising what is known as the Western Region, to appoint representatives to meet with him and other Bureau Officials, at the Regional Office in San Francisco, Calif., on Jnly 24th, 25th, and 26th. The meeting was for the purpose of discussiug problems in connection with the relation between State and Federal road building agencies.

The Federal Government has aided in the construction of state highways since 1916. On July 11th, of that year, the Bankhead Act became a law. This bill appropriated $75,000,000 to he distributed among the states, extending over a period of five years, and this distribution is generally known as the "five year program". This Federal Aid was limited to $10,000 per mile and could be used on post roads only.

Early in 1919 this Act was amended, increasing the appropriation to $200,000,000 and raisiug the limit for Federal Aid participation to $20,000 per mile. The term "Post Roads" was defined by this amendment to be "any road that might be used as a post road".

The next and latest amendment to the Highway Law was signed Nov. 9, 1921, and is koown as the Phipps-Bell-Townsend Act. The new law recognizes the importance and desirability of using the Federal funds on a national system of highways, which shall include the state highways that are important not only tn the state itself but in their relation to the highways of adjnining states, and from that standpoint, of national importance. To inangurate such a system, the State Highway Departments are required to submit to the Bureau of Public Roads a system comprising seven per cent of the public roads of the state, selected from the standpoint just mentioned. Colorado has approximately 48,000 miles of public roads, which gives the state 3,360 miles in her seven per cent system. When the Bureau has received all these proposed systems from the states, they are studied from the standpoint of their relatiou to each other, and wheu approved by the Secretary of Agriculture, constitute the official roads of the state upon which Federal aid can he expended.

Another feature of the new law is the increasing of the percentage of Federal Aid in those states which have unallotted public lands. This increase depends on the ratio of such unallotted public lands tn the total area of the state, and results in Colorado receiving Government aid to the amount of 56.12% of the cost of approved Federal Aid projects, in place of only 50% as formerly.

Among the Bureau officials present at the conference were Director MacDonald, and Mr. F. W. Allen, Chief of the Division of Control, both from Washington, D. C.; Dr. L. I. Hewes and Mr. J. S. Bright, formerly of Denver, together with local officials of the San Francisco Regional Office, and the District Engineers from the five Districts comprising the Western Region. Mr. J. W. Johnson of Denver, is at the head of District Number 3 organization. Representatives from the State Highway Departments of practically all the eleven states of the Region were present.

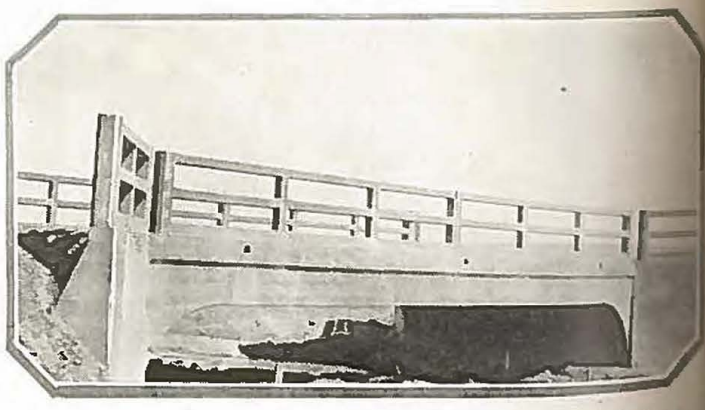
The predominant note of Mr. MacDonald's discussions was his disposition to avoid making any hard and fast rulings that could not be equally applicable to the diverse conditions of so many states covering so broad a region, but rather to leave the questions opeo so that they could be decided on their merits in the individual states as they came up. Mr. MacDonald very happily presented his attitude tbat the representatives of the states themselves were largely determining the trend of the policy of the Bureau by showing through their discussions the lines along which greatest benefits could be obtained, and that was the object of the Bureau administration.

Probably more time was spent in discussing the seven per cent systems than any other one subject. Colorado had little or no difficulty in agreeing with adjoining states as to approved highways, since the interest of all seemed to center on the same routes. Between some nf the nther states there was considerable conflict nf npinion.

A subject that was given considerable attention was the elimination of grade railroad crossings. The Federal Bureau is beginning a vigorous campaign with this object in view. It is recognized, however, that it will take considerable time before it can be fully accomplished, and the attitude of the Bureau is to require a state program that will begin by eliminating the most dangerous crossings in the immediate future, and make steady progress each year as far as funds will permit. The discussion served to bring out in no uncertain terms the fallacy of the expression sometimes heard: "This crossing is not dangerous". ALL GRADE CROSSINGS ARE DANGEROUS. Some are less dangerous than others, but the element of danger is present in all of them.

Some time was given to discussion of Forest Highway Funds. The allotments for expenditure on road buildings in connection with National Forests is divided into two classes,—Forest Highway Funds and Forest Development Funds. The former is spent on roads designated by the State Highway Department, which may be partly within and partly without and ad,acent to but of primary importance to the commnnities affected. Roads paid for from this fund are built by the forces of the Bureau of Public Roads. The other fund is to be spent on roads and trails of primary importance to the National Forests, and is entirely in the hands of the Forest Service.

COMPARE THESE TYPES OF COLORADO BRIDGES



The old and the new!

What an old saying. But nothing more aptly fits the bridge construction program of the Cnlorado Highway Department.

Compare the new, staunchly built concrete bridge to the old rickety, wooden bridge.

Possibly the wooden bridge would have "answered the purpose"—temporarily.

It is the aim of the Highway Department to build all of its new bridges just as strong and as permanent as it is making the roads of the state.

While it is true that the concrete bridges cost more to build, yet the life of these strnctures is indefinite. They will be left for future generations to travel over.

And there are no costly repairs and replacements to be made.

So in the end they are less expensive thau the cheap bridges that they replace.

The new type bridges are such as every citizen may justly feel proud of.

Fifth District Commissioners Discuss Road Matters

Members of the Fifth District County Commissioners Association had opportunity of inspecting the good roads of Kit Carson county on September 2.

It was the occasion of the bi-monthly meeting of the organization. G. W. Huntley of Flagler, newly elected president, presided over the meeting.

The roads of eastern Colorado and more particularly of Kit Carson county adjacent to Burlington, where the meeting was held, proved a revelation to the visiting commissioners.

Broad, smooth, well-maintained roads was the rule throughout the district. A comprehensive building program was also noted by the visitors and the commissioners of that section were warmly complimented upon the progress they have made in road work during the past year.

Road matters in general, including the proposed $6,000,000 highway bond amendment, were discussed. Several of the members of the organization spoke favorably of the bond issue and urged its passage on the ground that it meant a continuance of the present highway building and maintenance program.

Among the speakers at the meeting were: G. W. Huntley, of Flagler; J. W. Shy, of Cheyenne Wells; Richard Quinn, of Divide; William H. Bartell, of Colorado Springs; Dr. Paul P. Godsman, of Burlington; Harry Roe, of the State Highway Department; and M. W. Bennett, editor of Colorado Highways.

A banquet was served by the ladies of the First Methodist Church of Burlington, at 8 p. m. H. G. Hoskin of Burlington acted as toastmaster. Among the speakers were Ned R. Brown, president of the Burlington Chamber of Commerce; Louis Vogt, Charles W. Abbott, county court clerk, and John Crook of Denver.

Major Blauvelt Inspects Roads Under Construction

Major L. D. Blauvelt, head of the State Highway Department, left Denver on Tuesday, September 12, for an extended inspection tour of the highways in Colorado.

He expects to spend about two weeks on the trip. Nearly every county in the state will be visited. He will check up on the progress in road building operations made during the present construction season.

At this time the Department has 213 miles of Federal Aid roads under construction. The work is divided among 35 projects. There is also 540 miles of State Aid projects under construction.

The Department expects that 1,143 miles of new roads of all types will be completed in 1922.

Major Blauvelt will be accompanied by Robert H. Higgins, state superintendent of maintenance; J. E. Maloney, assistant highway engineer; and J. W. Johnson, district engineer of the Bureau of Public Roads.

On the way to Cumbres Pass. View shows part of road crew at work widening rock cut near Boyle's Bridge on State Highway No. 67, along the Conejos River.

Autos Registered Shows Large Increase

A report issued by Secretary of State Carl S. Milliken shows that a total of $898,029.66 had been collected from motor vehicle registration.

This is an increase over the same period in 1921. The total collections for last year was $906,059.27.

The June report shows that 132,847 passenger cars had been registered. Of this number 37,020 were Denver cars. Weld county ranked second with 9,537 registrations.

In June there were 8,909 trucks licensed in the state, as compared with 9,403 in 1921.

It is estimated that the automobile license collections this year will reach close to $1,000,000.

Since 1913 when the state assumed control of licensing of automobiles the collections have jumped from $60,833.00 to the present figures. In the first year 13,135 cars were registered.

The law allows 5 per cent of the funds thus collected for administration. The balance is distributed to the various counties and to the State Highway Department on a fifty-fifty basis.

The money can be used for construction, maintenance and improvement of the roads only.

MYSTERIOUS ROAD SECRET DISCOVERED.

Motor cars of all kinds have long been known to gather speed in some unaccountable manner when passing over smooth asphalt or bituminous macadam roads. The cause has long been unexplained but it is now held, both by automotive engineers and road engineers, to be due to the abnormal profusion of vegetation usually to be found along these "mystery" roads. Trees and plants exhude oxygen. Motors run more smoothly when there is plenty of oxygen in the air, as motorists are well aware. The increased amount of oxygen diffused in the localities where the vegetation is profuse, coupled with the smoothness of the road surfaces and the consequent decrease in tractive resistance, constitute the cause of the "picking up" of the motor and the increased speed. Scientists recently conducted experiments in several localities and along roads bordered by heavy vegetation and these experiments demonstrated to their complete satisfaction that the behavior of the car was due to the increased amount of oxygen in the air.

A. A. A. TO LOG ROAD FROM SAN FRANCISCO TO WASHINGTON.

Daniel J. Nee, official transcontinental road marker and logger for the American Automobile Association, will blaze a trail across the continent for the Shriners of America, who wish to make the trip to the great convention at Washington next year by automobile. Mr. Nee is having constructed a special car for transcontinental trips, of which he makes a score or more a year, and through the A. A. A. will be able to advise the Shriners of every locality as to exact condition on all roads leading into Washington.

Mr. Nee will leave San Francisco a month or more before the convention opens, in order that road reports may be sent to every city sending a delegation to the Washington convention. His new car will be mounted on a White chassis and will consist of a special body designed by himself, which, according to Mr. Nee, will contain "all the comforts of home." It will be equipped with special water tanks for crossing desert countries, and will have every facility for camping by the way-side.

Mr. Nee's reports will be broadcasted from the national headquarters of the A. A. A. at 1108 Sixteenth, N. W., Washington, D. C.

"Our attention has been called to the fact, by the motoring public, that Colorado highways have been in better condition for travel this year than in many years past. Thanks to the effort and accomplishment of the State Highway Department and those who worked to bring about these gratifying results."—C. F. Oehlman, secretary-treasurer, Denver Motor Club.

War Materials Available For Road Building

The following supplies are available for transfer to counties and municipalities in the State of Colorado for use in construction and maintenance of public roads.

Arraugements may also be made to rent equipment to contractors engaged in construction of Federal Aid and State Projects.

Requisitions should he mailed to State Highway Department, care of H. Roe, Denver, Colorado.

Description.	Price Each
Adze	$ .75
Anvils, 34-lb.	2.00
Anvils, 75-lh., each	3.75
Anvils, 90-lb., each	4.50
Asphalt, barrels	cwt. 2.00
Axe heads	.35
Axe handles	.45
Axe handles, short	.35
Axe, fire	.45
Axes, Hunters, each	.35
Bars, wrecking, 18-in.	.30
Bars, wrecking, 24-in	.50
Bars, wrecking, 36-in	.75
Bars, pinch, 60-in.	1.00
Bars, digging, 8-ft.	1.50
Belting rub, 2-in.	ft. .20
Belting rub, 2½-in.	ft. .20
Blox, Double Tack, 3-in	1.50
Blox, Double Steel, 8-in.	3.50
Blox, Single Snatch, 4-in.	1.50
Blox, Single Snatch, 6-in.	1.75
Blox, Single Snatch, 10-in.	3.50
Blox, Single Snatch, 14-in	7.50
Braces, Ratchet, 8-in.	1.00
Brooms, Stable	1.00
Cans, Galv. Iron, 20-gallon, each	.75
Cans, Galv. Iron, 30-gallon, each	1.00
Carts, Dump, 2-wheel (4 in stock), each	125.00
Carts, Water, 150-gallon tank (4 in stock), each	115.00
Chain, Skid, ⅜x20¾-in.	.21
Chain, Spoke Clamps	.17
Chain, Eyes Disc Wheels	.14
Caps, Blasting	per 100 .50
Cutters, Cold	.25
Chisel, Sq. Point	.20
Cable, Steel, ⅝-in.	ft. .06
Cable, Steel, ¾-in.	ft. .08
Carts, Concrete, 2-wheel	12.00
Carbide, ⅛-lh. cans	.05
Chests, Tool, Steel	7.50
Covers, Mattress, estimated price.	2.00
Double Trees, Steel (5 in stock), each	.50
Drills, Rock, 30-in.	1.00
Drills, Rock, 44-in.	1.50
Exploders, Hand Fuse	18.00
Feed Bags, Canvas, each	.25
Feed Boxes, Galv. 11-in.x14-in., ea.	.35
Feed Troughs, wood, 8-in.x10-in.x 46-in., each	1.75
Fuse	Per M 5.00
Forges, portable	12.00
Globes, Lantern	.08
Grindstones, Ball Bearing, estimated price	4.50
Hatchets, Claw	.35
Halter Ropes, each	.15
Hammers, Claw	.25
Hammers, Rivet, ¾-lb.	.35
Hammers, Jack, BCR, 430	75.00
Hammers, Sledge, 10-lb. no handle	.80
Hammers, Spike	.75
Hammers, Cross Pein, 3½-lb	.45
Hammers, Cross Pein, 4-lb.	.45
Hammers, Cross Pein, light	$0.35
Hammers, Stone	.35
Hammers, Ball Pein, 2½-lh.	.45
Handles, Hatchet	.10
Handles, Mach. Hammer, 10-in.	.10
Handles, Mach. Hammer, 14-in.	.10
Haudles, Mach. Hammer, 16-in.	.10
Handles, Mach. Hammer, 18-in.	.10
Hammers, Farriers	.25
Handles, Pick	.15
Handles, D Handle Shovel	.15
Handles, Long, Shovel	.15
Hardies, B. S.	.20
Harness, Wheel	set 15.00
Harness, Cart	12.00
Hasps and Staples, 4-in., each	.05
Hinges, 4-in. strap, pair	.05
Hinges, 6-in. strap, pair	.10
Hinges, 5-in. T., pair	.10
Hose, Disch, 2-in., 25-ft. lengths	ft. .15
Horse Rasps, each	.25
I-Beams, 10-in.x20 ft. (12 in stock), each	13.50
Beams, I, 3¼-in.x 6-in. x 15 ft	lb. .02¼
Lanterns	.50
Lanterns, Folding	.50
Mattox, Trench	.25
Mattox, Pick	.45
Nails, 10d	keg 3.50
Nails, 12d	3.50
Nails, 16d	3.50
Nails, 20d	3.50
Nails, 30d	3.50
Nails, 40d	3.50
Nails, 50d	3.50
Nails, 60d	3.50
Nippers, Farriers	.30
Oil, Leather	gal. .50
Oil, Neatsfoot (100-pt. case)	pt. .10
Oil, Spica	pt. .05
Paper, Roofing	roll 1.50
Paulins, large, estimated price.	4.00
Pipe, Iron, 1¼-in.	.07
Pipe, Iron, 2½-in.	.18
Pipe, Iron, 3-in.	.20
Pipe, Iron, 4-in.	.25
Post Hole Diggers	1.50
Points, Pick	.45
Pumps, Gould Rotary	10.00
Pumps, Blackmere Hand	6.00
Pumps, Hand Piston	4.50
Engine & Pump Novo Gas	125.00
Engine, Hill Centrifugal	850.00
Posts, Fence, Angle Iron	.25
Rakes, road, 14-tooth, estimated price, each	.75
Ranges, Field, 4-hole	10.00
Ranges, Field, 2-hole	7.00
Rope, ½-in.	lb. .08
Rope, ⅝-in.	.08
Rope, ¾-in.	.08
Saddle Bags, leather, 2 pocket	1.50
Saw Outfits, Portable	150.00
Saws, Hand, 26-in., Cross Cut, 7 pt.	.50
Saws, Hand, 26-in., Cross Cut, 8 pt.	.50
Saws, 6-ft. Cross Cut	1.50
Scales, Platform, weight 115 lbs., capacity 300 lbs., each	20.00
Shovels, S. H., Rd. Point	.45
Shovels, L. H., Rd. Point	.45
Spades, S. H.	.45
Spades, L. H.	.45
Shovels, Iron Handle, Rd. Pt.	.45
Shovels, D. H., Sq. Pt.	.45
Spikes, Wire, 7-in., kegs	3.50
Spikes, Wire, 8-in., kegs	3.50
Spikes, Wire, 9-in., kegs	3.50
Spring Auto Repair Kits	1.25
Staples, Assorted	3.50
Steel Rd. Chrome 1⅛-in.	lb. $0.03½
Tarpaulins, 5x6	2.00
Tarpaulins, Escort Wagon	5.00
Tents, 16 ft. x 16 ft. x 36 in.	12.00
Tents, 20x24x6, with poles	25.00
Tires, Solid, 38x5	28.00
Tires, Solid, 40x10	55.00
Casings, Motorcycle, 28x3	3.50
Tires, Q. D., 34x3½	16.00
Tires, Q. D., 34x4	16.00
Tires, Q. D., 34x6	22.50
Tires, Q. D., 36x5	25.00
Tires, Q. D., 36x6	27.50
Tiles, Q. D., 36x7	32.00
Tires, Q. D., 37x2½	18.00
Tires, Q. D., 37x6	28.00
Tires, Q. D., 39x5	30.00
Tires, Q. D., 34x4½, U. S. Cord.	10.00
Tools, Cement Finishers	2.00
Tnugs, B. S., Bolt 22-in.	.35
Tongs, B. S., Assorted	.35
Tongs, B. S. Clincher	.30
Tongs, B. S. Clincher, 14-in.	.30
Tongs, B. S. Clincher, 16-in.	.35
Tubes, Inner, Motorcycle, 28x3	.75
Vises, Bench, 4-in.	4.50
Vises, Bench, 4¼-in.	4.50
Vises, B. S., Small A	4.50
Vises, B. S., 5-in.	5.50
Vises, Pipe	5.00
Wire, Barbed, 40-rod	spool 1.40
Wheelbarrows	4.00
Wrench, Monkey, 10-in.	.30
Wheels, Frnnt, Escort Wagon.	1.50
Wheels, Rear, Escnrt Wagon.	1.50

COUNTY COMMISSIONERS TO HOLD ANNUAL MEETING OCTOBER 16.

On October 16 the annual convention of County Commissioners of Colorado will he held in Colorado Springs.

The largest number in the history of the organization is expected to attend the convention, according to Gus J. Johnson, president. It will be a two-day sessinn.

In his notice of the meeting sent out to members, President Johnson says:

"The deliberations of our next annual meeting we feel should be of import to the people of Colorado.

"Our organization has accomplished much for the betterment of Colorado, under many adverse cooditions. We are distinctively a legislative body when in annual meeting, while in our official capacity we are executive, and many times have to assume judicial authority.

"Our efforts have been hampered heretofore because of our annual meeting occurring after the Legislature has met.

"Your Executive Committee, by correspondence, has decided that it would be wise to hold our meeting before this fall's election, and by virtue of a majority vote of said committee, it was decided that said meeting should be held at Colorado Springs, and that at such meeting the Legislative Committee shall present fully their plans, and the meeting shall be primarily for the discussion of said report and such new legislation as in the opinion of the Commissioners shall he necessary.

"Colorado Springs' invitation for this meeting is very cordial, and they promise us a warm welcome. Special hotel rates have been made for the occasion."

It is said that the Legislative Committee will make report on several pieces of much needed legislation for the counties. There is a probability that bills will be drafted to be presented to the next Legislature for passage.

Road Work and Builders the State Over

Work has been started by the Allen Construction Company on the Canon City-Florence road, which will be gravel surfaced.

The road will be improved a little more than nine miles, extending from Ninth Street in Canon City to a short distance beyond Florence, ending at Rainbow Park.

Its cost under the contract will be $63,342.95. The undertaking is a joint federal and state project. The roadway will he eighteen feet aud the gravel will be put on in two layers to a depth of six inches. All bridges and culverts will be eighteen feet wide, providing ample passageway for two vehicles.

There are thirty teams and twenty-five men employed on the job at present.

To complete the road project on Red Mountain, the road between Silverton and Ouray was closed on August 15th, by order of Perry A. Bean, U. S. engineer, in charge of the construction work. The road between Ironton Park and the State Bridge over the Uncompahgre River will he closed until work has progressed sufficiently to make travel safe.

Motorists are advised to take the road over Lizard Head while the Silverton-Ouray road is closed. Elmer E. Hatcher, assistant superintendent of maintenance, reports that much work has been done on the latter road this year and is now in fine condition for travel. This route will save the trip around by Norwood and Dove Creek.

Another mile of concrete between Brighton and Greeley will be laid this fall, according to White and Johnson, contractors. The road is cemented three and one-half miles beyond Brighton at present, this stretch having been completed early in August.

The stretch on which the contractors are now working is eight miles and will take the concrete through the town of Fort Lupton to within a short distance of Platteville. It is not expected that the contractors will be able to complete more than a mile of their present contract before winter sets in. The project will be completed next spring.

A splendid new road between Wellington and Fort Collins was completed on August 19. There is about 12 miles in the project, which was carried out by Ace Gillette, contractor. The original intention was to gravel surface the road to a point four and a half miles northeast of Wellington, but the funds were exhausted and about one and a half miles of the road was left unfinished. The job is said to have been well done.

Traffic over the Independence Pass road is expected to be opened this fall. A crew of eighty men ara now at work on this project and are rushing same to completion. The citizens of Aspen are looking forward with much eagerness to this event. It has been suggested that a celebration of some kind should be held to mark the occasion.

Rainfall during the past month has caused several serious delays in highway work and done considerable damage to roads in various parts of the state. Traffic was interrupted by flood waters in the Grand Junction district early in August.

The new Vernon Canon road adjacent to Denver was washed out twice. Much damage was caused to the Turkey Creek road to Coulter by a cloudburst on August 20.

Approaches to a concrete bridge near Castle Rock were washed out and traffic held up for several hours until a temporary bridge could be constructed.

Heavy rains also caused much damage to the roads in the Colorado Springs district. New construction work stopped for several days in a number of places.

Maintenance crews were rushed to the damaged places and the roads were soon reopened to traffic.

The paved highway now being laid along the front of the penitentiary at Canon City is to be extended 800 feet further than was originally planned. Warden Tom Tynan has enlisted the cooperation of the C. F. & I., the State Highway Department, and the Fremont County Commissioners in supplying the necessary materials for the construction of the additional pavement. The extension will form a part of the road that leads to Canon City's famous Skyline Drive. It will also provide a paved highway for much heavy traffic from the quarry.

A contract has been let to Hinman Brothers for the gravel surfacing of three and six-tenths miles of the Fruita road out of Grand Junction. The contractors are moving their outfit from Craig to start work on the new project, which will cost $41,604.43. This job begins at the terminus of the concrete in the Pomona district and forms a link in the Midland Trail. A special loading plant will be installed by the contractors.

Efforts are being made by the citizens of Salida to open up a new road to the South Park district. An estimate of the cost of the road is $15,000. The new roadway will replace the old Ute trail which is washed out at present. A permanent road will be made of the proposed highway, which leads over the mountain and will be above the washout area. It will be used by the quarries of the Salida district which are now idle.

Following a bad accident near Pueblo in which a motorist drove off the road when blinded by the light of an approaching car, Adj. Gen. Patrick J. Hamrock has ordered State Rangers to make arrests of all violators of the state law relating to the dimming of headlights.

Financial aid has been voted by the city council of Montrose to the building of a new road to the Montrose Mountain Park at Buckhorn Lakes. This road will make the beautiful camp ground and recreatinn area more easily accessible and place Montrose in the column of progressive Colorado cities that have provided mountain playgrounds for their citizens.

Heavy rains damaged a number of bridges and culverts on the Canon City road to Colorado Springs the early part of August. The damage was particularly heavy to the road through Dead Man's Canon. Road gangs of El Paso county repaired the washouts.

A five mile stretch of new road will be constructed on State Road No. 30, through Calhan. Plans for the project have been approved. It will cost $20,000. Several concrete bridges and culverts are to be installed.

Touriat travel on the new Poudre Canon road shows a material increase this year, according to a Fort Collins report. At present nearly all of the road is completed to the mouth of Big South, except a mile or two below East Portal and a mile above Poudre Falls.

Poudre Falls and the falls on Roaring Creek above the Williams' place have been big drawing cards to the tourists this season. Also the Fort Collins mountain park has reported a larger number of campers than during previnus seasons.

Work on the Bennett Creek road is being pushed rapidly by the U. S. Forest Service, according to Supervisor William R. Kreutzer. Without unforeseen delays the road should he open for traffic by September 15.

When completed, the road will connect the Poudre Canon with Rockwell's on the Buckhorn.

Citizens of Pueblo are planning a big formal opening, including a celebration, upon the completion of the new Squirrel Creek road now being constructed by the U. S. Forest Service into the San Isabel forest.

The date of the opening will be announced some time in September. It was to have been held in August, but road cnnditions would not permit. A considerable amonnt of work remains to be completed.

A committee headed by A. V. Fagerstrom and G. L. L. Gann, of the San Isabel Public Recreation Association, and P. A. Gray, secretary of the Public Commerce Club, recently conferred with James Brownley and A. G. Hamel of the Forest Service at Beulah on the plans for the grand opening.

A contract has been let to Peterson, Shirley and Gunther for the construction of fifteen miles of new road wnrk in North Hardscrabble Canon near Greenwood in the San Isabel Forest. Work on the project will start in ten days. This road will open up one of the most beautiful sections of the forest.

The first road building policy ever conceived in the United States was inaugurated in Kentucky in 1821.

Read Carefully Proposed Road Bond Amendment

ON the November ballot there will be several amendments to be voted upon. One of these will be the highway bond amendment.

This amendment authorizes the issuance of $6,000,000 in bonds to meet Federal Aid appropriations during the next four years. The passage of the amendment means that Colorado will have $12,000,000 to spend on her highways in these four years, in addition to the regular annual maintenance and construction funds.

It is the duty of every citizen and taxpayer to know the provisions of this proposed measure before casting his ballot for or against it.

In order that all readers of Colorado Highways may be fully advised in the matter, we herewith reproduce same.

It should be noted that the measure provides that only one-half of the motor vehicle license collections, i. e., that portion now turned into the State Highway fund, is to be used to pay the interest and provide a sinking fund for the retirement of the bonds.

The amendment reads as follows:

And provided further, that, in addition to the amount of debt that may be incurred as above, the State may contract a debt by loan for the purpose of creating a fund to be expended as provided hy law, by the State Highway Department, for the construction and improvement of public highways in the State of Colorado; said debt to be evidenced hy registered, coupon, interest-bearing bonds to an amount not exceeding six million dollars.

Said bonds to an extent not exceeding one million five hundred thousand dollars, shall be dated June first, 1923; not exceeding one millinn five hundred thousand dollars shall be dated June first, 1924; not exceeding one million five hundred thousand dollars shall be dated June first, 1925; not exceeding nne million five hundred thousand dollars shall be dated June first, 1926; said bonds shall be issued payable serially. The last maturing series of each issue shall be absolutely due and payable not exceeding twenty (20) years from and after the date thereof, and shall be of the denomination of one hundred dollars ($100.00) each, or any multiple thereof. The interest on said bonds shall be payable semi-annnally, at the rate of five per cent. (5%) per annum, at the office of the State Treasurer, or at some place in the City of New York, U. S. A., and the principal of said bonds shall be payable at the office of the State Treasurer.

No snch bonds shall be issued except at par and accrued interest.

The moneys, or so much thereof as shall be necessary, payable to the credit and acconnt of the State Highway fund frnm the proceeds of motor vehicle registration license fees, under Chapter one hnndred sixty-one (161) of the Session Laws of Colorado of the year 1919, and all acts amendatory or in substitution thereof, shall be applied to the payment of interest and principal of the bonds of the Six Million Dollar authorized issue herein, but the revenues provided by said chapter to be accredited to the account of the State Highway fund shall never be diminished until all bonds issued hy virtue of tbis amendment shall have been paid off and redeemed; nnthing herein however shall be construed to prevent the enactment of laws whereby the amount of revenue derivable from motor vehicle registratinn license fees and payable into the said fund shall be increased.

The General Assembly shall, as by law provided, enact all such laws as may he necessary with reference to said bonds and with reference to carrying out tbe projects and purposes herein specified.

The Secretary of State, Attorney General and the Reporter of the Supreme Court do hereby designate and fix as the ballot title and submission clause to the prnposed constitntional amendment hereiu, the following:

A PROPOSED AMENDMENT TO SECTION THREE (3) ARTICLE XI OF THE CONSTITUTION, PROVIDING FOR THE ISSUE OF NOT MORE THAN $6,000,000.00 OF BONDS FOR CONSTRUCTION AND IMPROVEMENT OF STATE HIGHWAYS, AND PROVIDING FOR THEIR REDEMPTION BY MONEYS PAYABLE TO THE STATE HIGHWAY FUND FROM PROCEEDS OF MOTOR VEHICLE REGISTRATION LICENSE FEES.

CONTRACTS AWARDED DURING MONTH OF AUGUST

NO.	LOCATION	COUNTY	LENGTH	TYPE	CONTRACTOR	CONTRACT PRICE
FAP 209	Grand Jct. N. W.	Mesa	3.634 mi.	Gravel Surfacing	Hinman Bros.	$37,822.21
FAP 213-A	Hasty-Lamar	Bent	8.341 mi.	Gravel Surfacing	Monaghan & Cunningham	47,498.71
FAP 221	Loveland, North	Larimer	4.049 mi.	Concrete Paving	F. C. Dreher Con. Co.	124,842.20
SP 630	Las Animas, North	Bent	0.493 mi.	Concrete Paving	W. A. Colt & Son	12,348.50

PROJECTS ON WHICH PLANS HAVE BEEN SUBMITTED TO THE BUREAU OF PUBLIC ROADS BUT NOT YET ADVERTISED

NO.	LOCATION	COUNTY	LENGTH	TYPE
FAP 71B	Southwest of Durango	La Plata	3.609 mi.	Gravel Surfacing
FAP 116	Colorado Springs-Breed	El Paso	4.185 mi.	Concrete Pavement
FAP 119B	Cochetopa Pass	Saguache	7.474 mi.	Grading (surfacing portions)
FAP 190	Dillon-Kremmling	Summit	1.643 mi.	Grading and Bridge
FAP 210	DeBeque-Grand Valley	Mesa & Garfield	5.302 mi.	Gravel Surfacing
FAP 213B	East of Mancos	La Plata & Montezuma	5.296 mi.	Gravel Surfacing
FAP 216B	East of Granada	Prowers	5.377 mi.	Gravel Surfacing
FAP 225	East of Aurora	Adams	1.003 mi.	Concrete Paving
FAP 226C	Platteville-LaSalle	Weld	10.725 mi.	Concrete Paving

PROJECTS ON WHICH PLANS ARE BEING PREPARED

NO.	LOCATION	COUNTY	LENGTH	TYPE
FAP 125	Sapinero, West	Gunnison	2.819 mi.	Grading and Surfacing
FAP 158A	Lake George, West	Park	8 mi.	Crushed Rock Surfacing
FAP 159A	Ramah-Mattison	Elbert	5 mi.	Sand-Clay Surfacing
FAP 168B	Lamar, Northwest	Prowers	7 mi.	Gravel Surfacing
FAP 173	St. Charles River, South of Pueblo	Pueblo	.095 mi.	Steel Truss Bridge
FAP 215	East of Pagosa Springs	Archuleta	0.1 mi.	Steel Truss Bridge
FAP 218B	Hasty-Lamar	Bent	3.8 mi.	Gravel Surfacing
FAP 222	Broomfield, North	Boulder	1.538 mi.	Concrete Paving
FAP 223	Kremmling-Muddy Pass	Grand	3.5 mi.	Gravel Surfacing
FAP 224	Morrison-Bailevs	Park	5.621 mi.	Mountain Grading

Colorado's Tented Cities

(*Continued from page 3*)

tendance mark is reaching a higher level, and there is talk of doubling the space by next year. Pueblo now has two auto camps where everything is free and care is exercised to see that the visitors are given a genuine welcome. Fairmount Park was for many years the only municipal camp grounds, but early this season Bradbury Park in East Pueblo was thrown open to the traveler from Maine, the Hoosier from Indiana, and the Texan from the Lone Star State.

Within a week 413 persons from fifteen states registered at Pioneer Park camp grounds at Sterling. During June, 189 cars from twenty-three states registered at the tourists' camp at Walsenburg. Craig, tucked in the crest of the Rockies, has just placed six outdoor furnaces on the public camp grounds, keeping pace, in proportion, with the larger towns. The list seemingly is endless.

A majority of the tourists in the region of Colorado Springs, according to accounts from travel sources, are automobile campers, and the camping grounds bear out the records, which show a large increase over the 1921 camp patronage. In Denver, too, the registration at Overland Park in the middle of August was 33⅓ per cent ahead of last year. With the season about half over, the records of "Pat" Poyner, superintendent, showed that 8,983 cars had been registered, containing 29,949 motorists, lacking only 9,905 of the total of last year's entire motorist registration.

It's worth thinking about, and that is what communities everywhere on the main traveled highways, as well as in out-of-the-way places, are doing—measuring the canvas tops against the $35,000,000 which travelers left in Colorado last year, and doing what they can to get their rightful proportion of the part that is being spent by the automobile camper.

Road Construction of Different Types During Recent Years

(*Continued from page 6*)

which when complete will be the basis of the department's stand relative to the elimination of railroad grade crossings in the State. These may ordinarily be eliminated by one of two methods, namely: by re-location of the road, or by a grade separation by means of an overhead or underhead crossing. Any method is usually quite expensive and it will only be possible to do away with these dangerous places gradually.

It is with a view toward determining which are most important and consequently to be the first to go, that the investigation above referred to, is being conducted.

Motor busses with flanged wheels are being used by twenty-eight short line steam railroads.

Building of more miles of good roads per dollar is only one of the functions of the State Highway Department. Here is shown a dragline machine used in excavating new river channel near Del Norte.

OUR COVER PICTURE

To attempt to describe the limitless beauties of the mountains in Boulder and Larimer counties would be but to give a vague and bewildering idea of it all.

The cover picture this month shows one of the giant rock formations which are seen in the South St. Vrain canon, reached by a smooth, hard-surfaced highway. Considerable work has been done in extending the South St. Vrain road this year.

Colorado Road Scenes to be Filmed

Principal of Colorado's highways including the most luring scenic stretches and prairie routes are to be filmed soon for inclusion in the See-Colorado-First motion pictures series through which it is hoped to boost Colorado as the mecca state and playground of the nation.

The film series likewise will include the state's important mountain resorts, mountain parks, typical sunsets for which the West is noted, timberline wastes, noted trout streams, leading hotels and what not. In fact, everything that will appeal to the motorist's eye will be pictured for the out-of-doors lovers, according to Charles G. McGuckin, president of the See Colorado First Film Tours corporation which is launching the "say it with films" movement.

In addition, typical camping ground scenes in virtually every important town in Colorado, including the free camp ground at Overland park near Denver, will be included in the film series, he said.

Hundreds of feet of film portraying the scenic beauties up Bear Creek canon and in the environs of Evergreen, Eldorado Springs, and Idaho Springs have been taken already. Arrangements are being made to begin photographing the beauty spots in Boulder county and in the neighborhood of Fort Collins, Colorado Springs, Pueblo and Canon City soon.

The Lookout Mountain drive is to be included in the series, it was declared, as well as the Silverton-Ouray stretch, parts of the principal trans-continental highways and the like. It is expected that many of these outstanding points of scenic interest will be filmed by the See Colorado First company before the close of fall.

The State of Wiscousin leads all other states in the matter of marking her highways. It is said to be almost impossible for the motorist to become confused or lost on her highways. The Colorado Highway Department is considering the advisability of adopting the Wisconsin marker system.

"Concrete for Beauty and Permanence"

Picture shows magnificent Larimer Avenue Bridge, Pittsburg. Length of bridge is 670 feet with a clear arch span of 300 ft., and 67 ft. rise. It is 115 ft. above roadway at the highest point. The roadway is 30 feet wide, and there are two sidewalks on cantilever brackets. It was opened to traffic in July, 1912, and cost $167,000.

Durability, Safety and Economy are qualities characteristic of well-built concrete bridges and pavements.

Cement, an almost impalpable powder, when mixed with sand, broken stone, and water, quickly causes the combined materials to become solid Concrete with a hardness like native granite.

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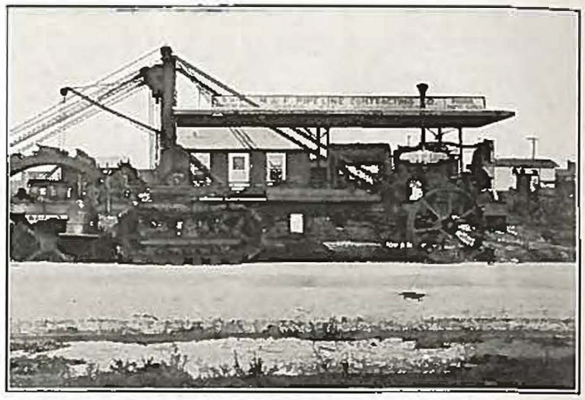
The Buckeye Chain and Bucket Excavators



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An excavator for every type of trench job. Equipment built with a reputation for speed and efficiency. Let us help you select the machine from the many models for your particular requirements. Kilbourne and Jacobs Wheelbarrows and Concrete Carts in Denver stock, they are serviceable long after others are junked. See them!

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Have you investigated the Baby Holt "Caterpillar" Tractor, the T-35, weighs 2 tons. Has lots of pep and is construeted of the best materials and workmanship. On account of INCREASED PRODUCTION they have been reduced in price $525.00. The price includes the power pulley attachment. The ideal machine for maintenance work or on the ranch.

The mere mention of Austin-Western lines is sufficient.

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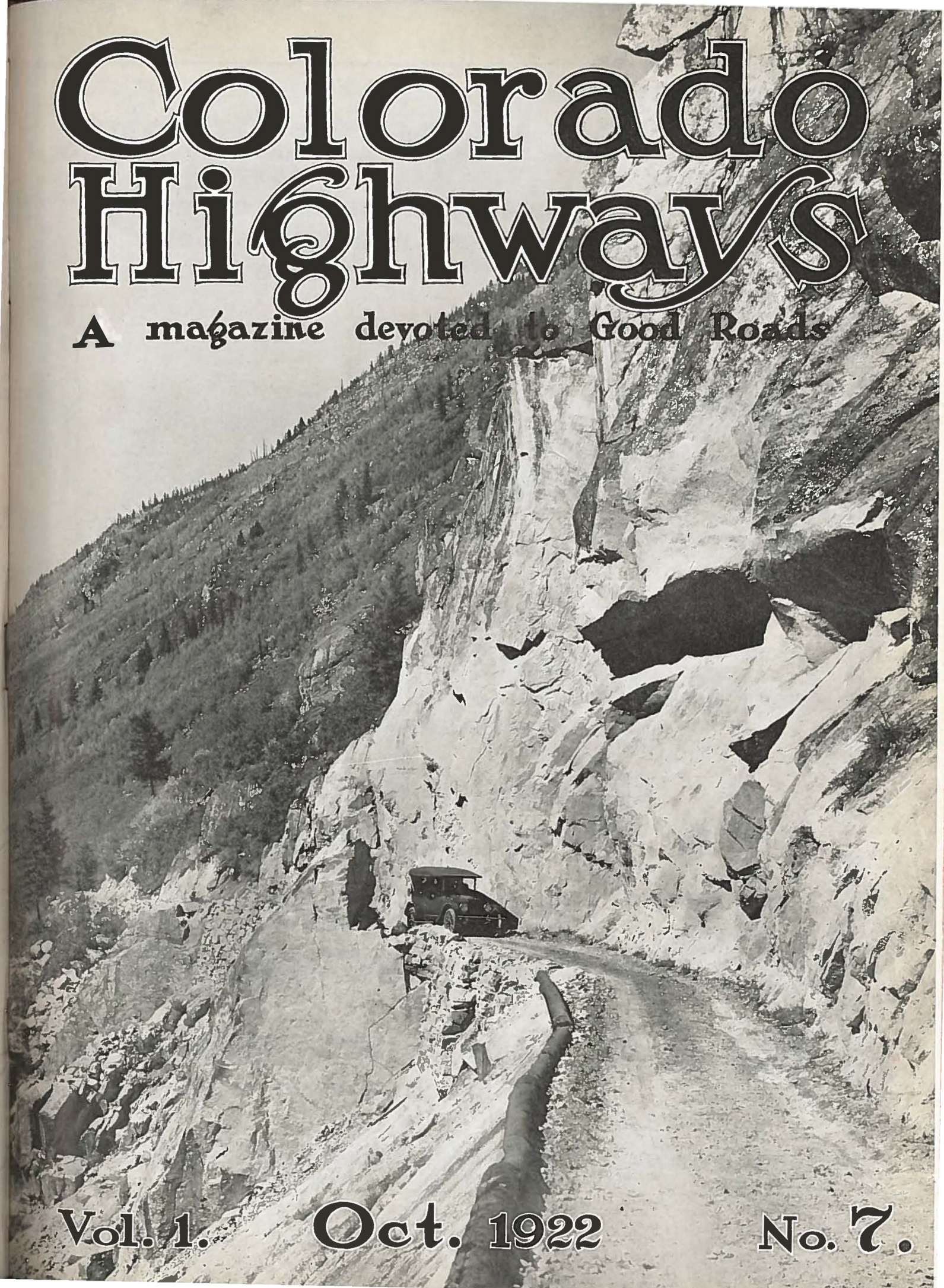
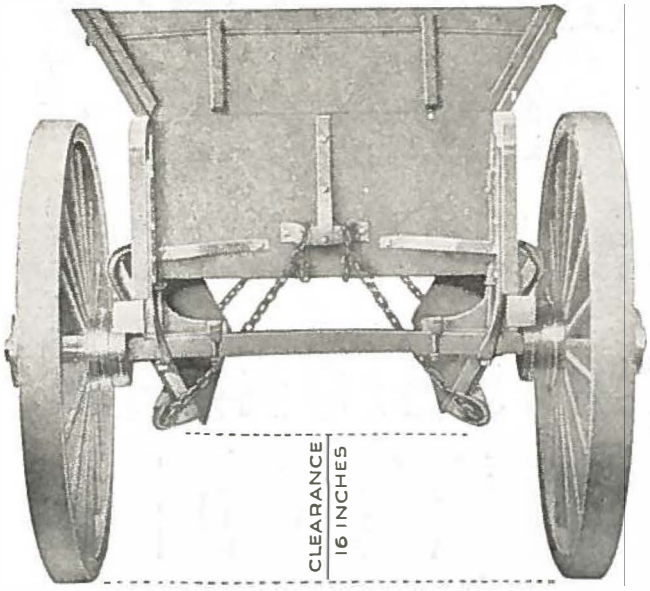
Colorado Highways

A magazine devoted to Good Roads



Vol. 1. Oct. 1922 No. 7.

FALSE TEETH *that don't fit*



WAGONS *that break down on the road;* ROCK CRUSHERS *that go to pieces in the midst of the job, are* DEAR *at any price.*

We don't sell false teeth--but we do sell

Watson Dump Wagons and Acme Road Crushers

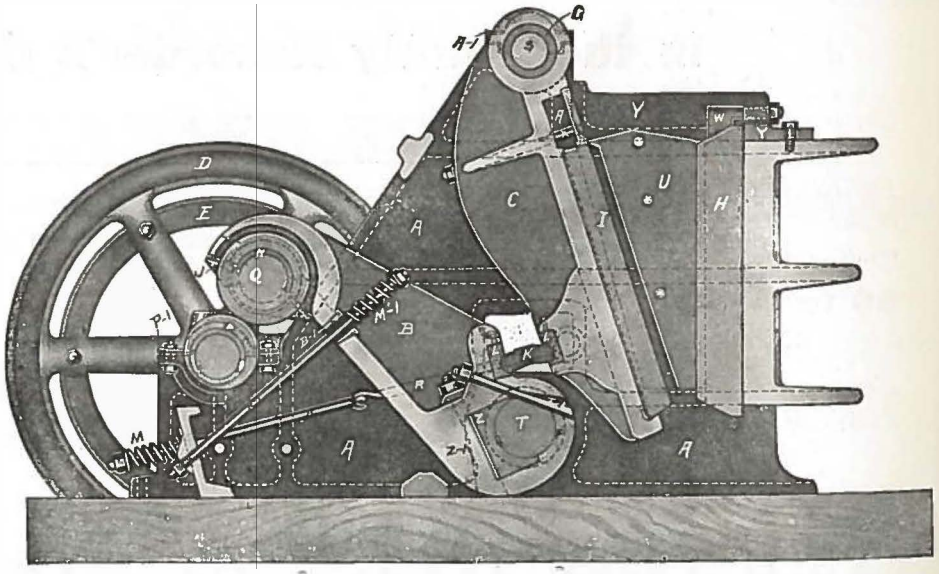
and they are

cheap

at any price.

Let us show you.

What you get for what you pay is more important than what you pay for what you get.



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EIGHTEENTH AND WAZEE STREETS

DENVER

Colorado Highways
"BETTER ROADS"
VOLUME I. OCTOBER, 1922. NUMBER 7.

$12,000,000 of Better Highways Without Additional Taxation

Approval of Highway Bond Amendment at November Election Will Bring $6,000,000 of Money from U. S. Treasury to Colorado

COLORADO has 48,000 miles of public roads. To date 8,335 miles of the public roads have been designated as "state highways", and of the state highways, 3,360 miles are included in the "Federal Aid 7 per cent system."

The "7 per cent system" comprises 7 per cent of Colorado's 48,000 miles of public roads and is Colorado's portion of the interstate highway system as provided for in the Phipps-Townsend bill. Under the terms of this bill, Federal Aid funds can only be expended on the "7 per cent system." Practically 65 per cent of the population of the state is centered adjacent to this system and it serves practically 80 per cent of the traffic.

At the end of this year Colorado will have a total of 3,020 miles of IMPROVED state highways. This covers 1,731 miles of graded and drained roads, 542 miles of sand clay surfacing, 626 miles of gravel surfacing and 121 miles of concrete paving, including construction during the last four years, as follows:

1919	204 miles.
1920	301 miles.
1921	371 miles.
1922	1,143 miles.

There remains 5,315 miles of state highways yet to be improved, of which 1,500 miles is of the "7 per cent system."

Since 1916 Congress has appropriated to the several states the sum of $540,000,000 for Federal Aid. Colorado's allotment totals $9,518,000. To date, Colorado has received $3,018,000, leaving a balance of $6,500,000 yet to be met by the state. This money is allotted in a national effort to encourage the states to enter immediately upon a nation-wide program for the substantial improvement of the road system of the entire nation.

But the Government makes it a condition that the several states must put up an equal amount for the improvement of interstate highways. If for any reason Colorado refuses to appropriate money to meet Federal Aid, then her share will revert to the Government and be prorated among the states which do comply with the conditions of the Federal law.

The general receipts of the Highway Department are not sufficient to maintain the roads already built, construct new state roads and at the same time meet Federal Aid. For this reason the people of Colorado will be asked to approve at the coming November election the method of financing as outlined by the State Highway Department.

Under this plan the State Treasurer will be authorized to apply such portion of the Highway Department's one-half of the motor vehicle license fees as may be necessary for the payment of interest and retirement of a $6,000,000 highway bond issue.

The money thus diverted represents the State Highway Department's share of the annual motor vehicle license fees. This amount to about $500,000 per year. The one-half of motor vehicle license fees now being apportioned to the counties **will not be disturbed** and will continue to be distributed to the counties as heretofore.

Under the provisions of the amendment the State Treasurer is authorized to issue highway bonds not to exceed $1,500,000 per year for the next four years. These bonds will be issued serially and will be retired in nineteen years without increasing taxes one penny. **No additional taxation** will be necessary for this bond issue.

Among the most enthusiastic supporters of the bond amendment are automobile owners, as expressed through their automobile associations and clubs. Those who own and operate trucks are also most active in support of the measure. Experts have found that the automobile owners save in reduced operating costs the total amount required to build and maintain good surfaced roads. These owners realize that they have created a demand for better roads. They agree that the creator of a demand should bear the cost of the thing demanded.

Colorado now has 140,000 motor vehicles. The assessed valuation of these vehicles in 1921 was $54,000,000. (Tax Commissioner's Report, 1921.) Taking 7,000 miles as the average yearly run for a car in Colorado, the 140,000 motor vehicles would cover a total of 980,000,000 miles.

In 1921 there was sold in Colorado 60,000,000 gallons of gasoline. (Oil Inspector's Report, 1921.) The cost of gasoline at an average of 25 cents per gallon would be $15,000,000. The number of tires used in Colorado yearly is 500,000. (Figures furnished by the Gates Rubber Company.) The cost of tires per year averaged at $20 apiece would be $10,000,000. Thus the total annual operating cost to Colorado motor vehicle owners, covering gasoline and tires only, is $25,000,000.

By cutting the grades and improving the surface of the 5,315 miles of state highways yet to be improved, an annual

Ten Reasons Why You Should Vote YES on the Highway Bond Issue

1 *Because it will bring to Colorado $6,000,000 from the United States Treasury for road building purposes, that would otherwise go to other states.*

2 *Because it will remove from the counties the burden of building 1,500 miles of expensive State and Federal Aid highways.*

3 *Because it will release sufficient State funds to reconstruct and maintain approximately 2,000 miles of arterial roads throughout the State.*

4 *Because these highways can be constructed and maintained without increasing taxes a penny. THERE WILL BE NO INCREASE IN GENERAL TAXES.*

5 *Because the automobile owners who pay the license fees which will be used to pay the interest and retire the bonds will get their money back three-fold through a saving in the operation of their cars.*

6 *Because it will enable Colorado to handle its road building program in a business-like way.*

7 *Because it will add millions of dollars to the wealth of the state by reducing marketing costs and development of our agricultural resources.*

8 *Because it will bring millions of dollars into Colorado every year by making our beauty spots accessible to tourists from other states.*

9 *Because it will carry the benefits of good roads to all parts of the State simultaneously without awaiting slow and wearisome road building.*

10 *Because it will give Colorado a magnificent system of State and Federal Aid roads without increasing the burden of taxation one penny.*

saving of at least one cent a mile in depreciation, gasoline, oil and tires will be made in at least half of the total mileage, or a saving to the motor vehicle owners of at least $4,900,000 per year, or an average of $35 to each owner.

Congressional reports show that while motor vehicle traffic has increased more than 1,900 per cent in the period 1910 to 1921, the actual expenditures for highway construction and maintenance, taking into consideration the increase in cost of materials and labor during the war and the readjustment period, was only slightly over 200 per cent.

The farmers of Colorado are highly favorable to the bond issue and a very large majority of them are most active in securing its adoption. Good roads are more vitally essential and profitable to farmers than any other class of people. Good roads passing through or near a farm in any community at once adds greatly to the value of the farm lands; it makes such community readily and cheaply accessible to markets; it brings it in touch with the interests and institutions of the villages, towns or cities nearby.

In 1916, before the days of modern transportation, the estimated cost of hauling in wagons from farms to shipping points averaged about 30 cents per ton mile for wheat, 33 cents for corn and 48 cents for cotton. Hauling in motor truck or by tractors over improved roads, the averages are 15 cents for wheat and corn and 18 cents for cotton.

It has been found that among the most ardent boosters are quite a number of farmers who live from eight to ten miles from the main highways. They feel that good roads in any state increases the total value of all lands in the state. They are assured that by voting the bonds to meet Federal Aid the general funds will become available for the construction and improvement of roads not included in Federal Aid system and it will enable the state and county authorities to get good roads to the more distant farming communities in much less time than it would otherwise.

Labor is a unit for the bond issue because practically all of the money that will be expended on the roads will go to labor in one form or another. Labor must grade the highways; labor must prepare the sand and gravel and must actually build the roads.

It is estimated that an average of 6,000 men will be given steady employment for the next four years if the bond issue carries. At the height of the construction period, during the summer months, approximately 8,000 men will be employed.

Business men from all sections favor the bond issue because they feel that it will make for the upbuilding of the state.

Almost without exception the county commissioners of Colorado favor the passage of the amendment because it releases funds which can be used for building in their counties, state roads not included in the "Federal Aid 7 per cent system." These commissioners are co-operating by exerting every effort to improve and maintain their county highways and to bring them up to a standard comparable to the state highway system.

The people of Colorado as a whole, whether they are the owners of an auto or not, are for good roads from a standpoint of state pride. With our highways improved so that they are useable during all seasons of the year the highways of Colorado would be used every day in the year, for probably no other state in the Union has such favorable climatic conditions for the use of automobiles as Colorado. With the people of Colorado owning 140,000 automobiles, and with three hundred and sixty-five days of sunshine in Colorado in which to use them, necessity demands better highways.

The Government is willing to assist us in improving our highways and has already authorized an appropriation to cover its share of the cost.

Amendment No. 1, to be voted on at the general election in November, if carried, will provide for Colorado's share of the cost of the better highways.

With $6,000,000 from the Government and $6,000,000 from the bond issue, $12,000,000 will be available for better highways **without additional taxation.**

FOREST SERVICE EMPLOYS NOTED LANDSCAPE ENGINEER.

Dr. Frank A. Waugh, professor of landscape engineering at the Massachusetts Agricultural College, Amherst, Mass., has been appointed recreation engineer in the Forest Service, United States Department of Agriculture. Dr. Waugh, a noted author, and one of the leading landscape architects of this country, will spend the summer formulating plans for the development of public-camp grounds and summer-home sites in the national forests of Colorado, Wyoming, Utah, Idaho, and other Western States. This study is a part of the established plan of the Forest Service toward providing adequate camp and sanitation facilities for the 5,500,000 persons who yearly seek rest, health, and enjoyment in our national forests.

OUR COVER PICTURE

Here we find an unusual photograph of a section of the famous Independence Pass Highway. Dynamite in car loads was necessary to blast the way for the motor vehicle on this stretch of the picturesque Rockies.

The Twin Lakes, Chaffee County, from Holy Cross Way, with Mt. Ebert in the background. Ebert and Mt. Massive are tied for the honor of being the highest mountain in the state, elevation 14,402 feet.

Difficult Road Project Completed

Highway Officials of Summit County Make Fine Showing on Job that Contractors Refused to Accept

"Well, there's one of the toughest jobs that I have ever tackled, put on the completed list."

Thus mused Engineer H. L. Jenness as he handed in the "final estimate" on F. A. P. No. 28. After two years of the hardest kind of rock excavation this project was completed and ready for traffic on August 15th.

The project which is a little over two miles in length and is located about nine mile northerly from the town of Dillon was started early in the spring of 1920. The first bids received on the project were so high that the State Highway Department orderd the job re-advertised.

There were no bids received on the second advertisement; in fact, there wasn't a contractor within five states who wanted the job. Finally the work was turned over to Summit county at the request of the commissioners.

For years this short stretch of road, which passes through a famous placer mining district, had been a source of great inconvenience to the traveling public. Incidentally, it had cost the county thousands of dollars in maintenance, due to a heavy landslide which kept moving the grade into the river.

An appeal was made to the State Highway Department for assistance. With Federal Aid the project was made possible. The total cost of the work runs about $45,000.

The route of the project follows the historic old Blue river, beginning at a point on the old road about 600 feet from Rock Creek and rejoins the old passageway about a quarter of a mile north of "Boulder Hill" at the mouth of Boulder creek. It is on State Route No 47 from Dillon to Kremmling, and is located in one of the greatest precious metal bearing regions in the world.

Originally the old road crossed the Blue river a short distance below Rock creek and followed down the east side of the river to a short distance below Boulder hill, where is recrossed the river to the west side.

It followed an old railroad grade for this distance. There was a very good grade and alignment, but it developed that the whole side of the mountain on the east side along which the road ran is sliding into the river for a distance of half a mile or more, and extending up the hill for several hundred feet.

This meant moving the road to the west bank which was infested with heavy boulders. It was the removal of these boulders that presented many difficulties to the engineers on the job.

Although there were no ledges of solid rock in place and only a small percentage of boulders that would measure up to the solid rock classification, the ground consisted for nearly the whole length of the project of a nest of boulders, and with but a modicum of earth and gravel to fill the vacant spaces between them.

This situation caused all bidders to name figures much in excess of the estimate, which had already been boosted to what seemed a very liberal figure.

Finally the Summit county officials agreed to take over the job at the estimated figure and stand the loss, if any, themselves. As it has developed the county will just about break even on the project.

Two views of completed Federal Aid project No. 28 in Summit county, between Dillon and Kremmling, showing good results in boulder material.

The completed road reveals a firm, durable thoroughfare, with easy grades traversing a stretch with scenic beauty which will make it a pleasure to the traveling public. The Summit county officials are to be commended for their efforts in getting the road built.

There was about 20,000 cubic yards of common excavation and 2,500 cubic yards of rock excavation. Plans are now being drawn for another project to connect with Federal Aid Project No. 28 on the north, which includes a 100-ft. steel span bridge over the Blue river. Also plans are in the making for a second 100-ft. span bridge to be constructed over the Blue a short distance from the second project.

A. J Tanner Jr. and W. A. Whitney of the State Highway staff were resident engineers on F. A. P. No. 28, working under the direction of H. L. Jenness, division engineer.

The old railroad bed which the highway follows was used years ago to bring out the rich ores from the numerous world-famous placer mines in the district, which have yielded millions in treasure. Scores of prosperous hay and cattle ranches are served by the new highway.

Signs of gold are found in nearly all of the gulches along the road. Rock creek, which empties into the Blue at one end of the completed project, is a rapid, noisy stream, famed for trout fishing.

Colorado Highways

"BETTER ROADS"

Published Monthly by
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Denver, Colorado.

Address all communications to State Highway Department, attention M. W. Bennett, Editor.

Owing to the necessarily limited edition of this publication, it will be impossible to distribute it free to any persons or institutions other than the state and county officials actually engaged in the planning or construction of highways, instructors in highway engineering, newspapers and periodicals, and civic associations. Others desiring to obtain Colorado Highways can do so by sending 10 cents for each number desired. Associations desiring to distribute the magazine can obtain it at cost in lots of from 500 copies up.

Subscription Price, $1.00 per year.

EDITORIAL COMMENT.

"More miles for less money."

This is the slogan upon which the State Highway Department has been working for the last two years.

Results already are in evidence throughout the state.

Free from politics and conducted in a business-like way, the Department has won the favor of farmers, merchants and road-users everywhere.

By this good roads program Colorado has been placed among the progressive states of the country. A trunk line system of roads has been planned. An efficient patrol system has kept the roads connecting the principal trade centers of the state in pink of condition.

These are indisputable facts. Any motor vehicle owner will verify them. Particular attention has been given to the construction and maintenance of roads in the rural districts.

To be able to continue this splendid work for the coming four years, there has been devised a financial plan whereby $6,000,000 of highway bonds may be issued without adding one penny to present taxation.

This plan will be presented to the people for approval at the November election.

By the terms of the amendment one-half of the state automobile license fees will be used to pay the interest and retire the bonds.

There will positively be no increase in taxes.

With the money derived from the sale of the bonds the State Highway Department will be enabled to carry out the following program:

1 To meet $6,000,000 of Federal Aid funds already allotted to Colorado.
2 To continue the present comprehensive highway construction program.
3 To build more gravel-surfaced roads in counties not included in the Federal Aid 7 per cent system.
4 To properly maintain our State Highways with patrol crews.
5 To construct more feeder roads for the benefit of isolated farming communities.
6 To relieve the counties of some of the burden of trunk road construction.

A total of 617,285 automobiles entered Canada for touring purposes during the last calendar year, according to returns compiled by the Canadian department of customs.

This is an increase of 600 per cent over the previous year, when 93,300 cars were registered.

Of the total number of cars registered in the Dominion last year, only 2,211 remained for more than one, but less than six months. The balance were in Canada less than a month.

Experts of the parks branch of the Canadian government calculate that this motor traffic represents an expenditure in Canada of more than $108,000,000.

The same authority estimates that on a basis of 5 per cent "improved roads are worth over two billion dollars without taking into account the service they render Canadians themselves."

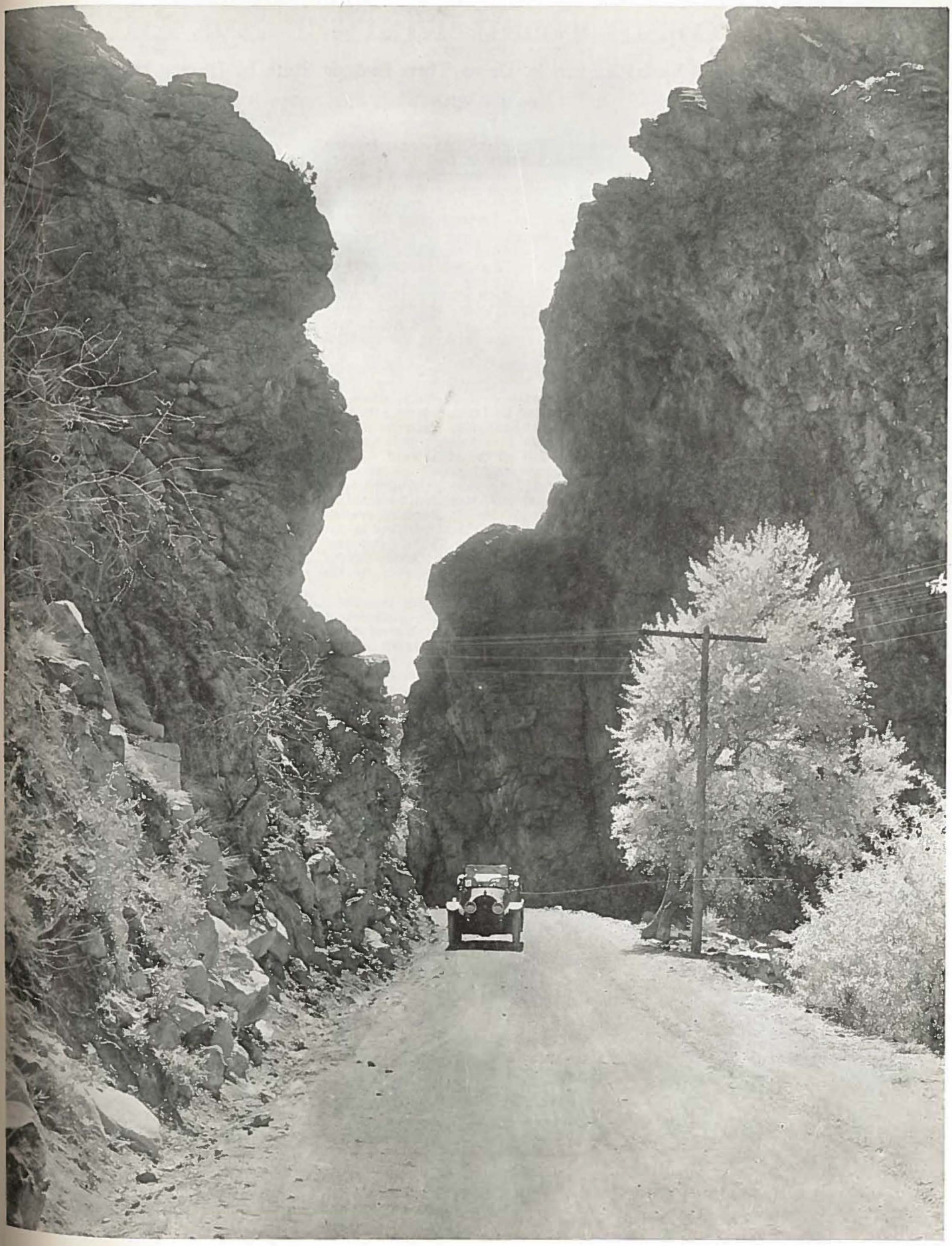
In Colorado it was found by conservative figures that motorists spent $35,000,000 here last year.

Registers in the principal Colorado camp grounds show an increase of 20 per cent this year.

Colorado's gold output was $8,780,000 last year.

The value of the wheat crop was $18,004,385 in 1921.

It is calculated that Colorado's highways paid 25 per cent on the investment last year.



A Fall Scene in Bear Creek Canon, Entrance to Denver Mountain Parks.

Wisconsin Road Marker System

Colorado Tourist Finds Added Pleasure in Drive Thru Badger State by Unique Highway Signs

By H. P. WILSON

THIS season I have traveled about 6,000 miles over Colorado highways.

And I will say here that the roads of the state in general have been in better condition than during any previous year.

This I attribute to the splendid system of maintenance adopted by the present State Highway Department. Everywhere throughout the state you can see the results of this important road work. Maintenance as it is now carried on has come to stay.

But there is another problem equally as important which the Highway Department should consider without delay. This is the matter of properly marking the highways in order that the traveling public may reach their destinations with the least possible discomfort.

We may have the finest highway system in the country and it would be of no great value to the motorist unless it was so marked that it could be traveled without trouble. Already we hear an insistent demand for adequate marking of our trunk highway system.

This demand comes not alone from the thousands of tourists who visit our state each year and leave millions of dollars with us, but our own citizens see the necessity of such improvement.

A few weeks ago I made an automobile trip to Wisconsin and had opportunity to note the market systems of five states. On other occasions I have followed the road markings of other eastern and western states. But of them all I take my hat off to the Wisconsin system.

It is this system that I would recommend to Colorado highway officials. Motorists find it a real pleasure to drive over the Wisconsin highways, because they feel a sense of security of knowing they are on the right road at all times. Such a thing as getting off on the wrong road is next to impossible once you cross the borders of the state.

The principal highways of Wisconsin are called by their numbers. The people call the numbers just as naturally as trains are called by number. For instance we asked in Madison the road to Milwaukee. We were told "Take State Trunk Highway No. 19," and No. 19 took us into Milwaukee without the slightest inconvenience.

We found "No. 19" stenciled on telephone and telegraph poles, fences, culvert end walls and in some cases on boards nailed to trees, where other objects were not available. Each one of these markers was a welcome reminder that we were still on the right road.

Just before reaching each of the turns or cross roads, we were delighted to find an "R" or an "L" stenciled beneath the No. 19. The Wisconsin standard marker consists of a triangle containing at the top the words "State Trunk Highway" and then the number in large figures, with the word "Wis" painted in the lower point of the triangle.

The triangle and lettering is painted in coach black on a white background. We found a profuse number of these markers along the entire distance between Madison and Milwaukee, as well as in all other sections of the state that we visited.

The marking is continued through all cities, which we found a very welcome innovation. This feature of highway marking I have always considered very essential, and to my mind can hardly be overdone. In addition to the road number we found mile-post markers.

In addition to the state highways, the Wisconsin road officials also have devised a system of marking for the county road that is most effective. Intersections are so well marked that it is hardly necessary for the traveler to slow down at cross-roads. The signs are so placed that the driver can see at a glance which direction to take.

Then we noted uniform danger signs for hills, curves and railroad grade crossings.

We also found erected county-line and state-line signs, giving the name of the two counties and the county highway commissioner's name and address. Likewise each maintenance patrol section has a sign at each end, giving the name of the patrolman each way from that point.

It was learned that these signs stimulated the spirit of competition and pride among the patrolmen.

Extra pains are taken in the mater of marking all detours. Paper signs similar to the state trunk highway marking, are used to mark the course around construction work. It was also found that patrolmen were kept busy doing what they could to make the detour route free from ruts.

In this connection it is suggested that the road contractors and foremen should make it a practice to be more considerate of the traveler. There has been too

(*Continued on page 18*)

Fig. 1. The standard Trunk Highway marker which is stenciled on telephone poles and other convenient places. (C. 405.)

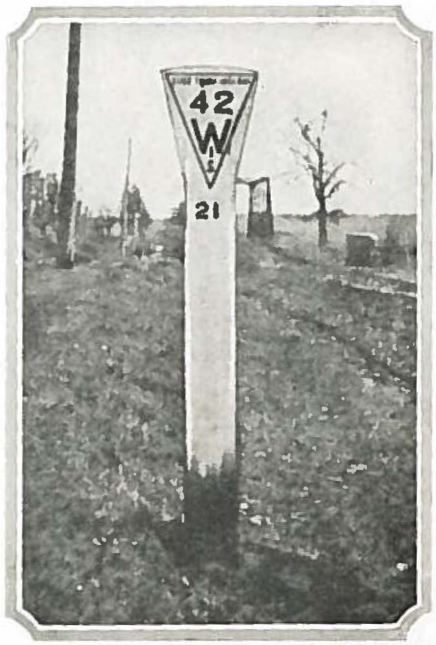


Fig. 2. The standard Trunk Highway mile post, showing within the triangle the Trunk Highway number and below the mile number. (C. 406.)

Fig. 3. The standard danger sign for railroad crossings, dangerous hills or curves. (C. 407.)

Scene on a hay ranch in Gunnison county. No better hay is grown in the West than that which comes from Colorado's mountain ranches

Big Wheat Tonnage Demands Good Roads

By Howard Sullivan,
Statistician, State Board of Immigration.

THE development that has taken place in all lines of industry in Colorado in the past ten years has taxed the transportation facilities of the state to their utmost. There has been comparatively little railroad building in the Centennial State in the past decade, yet the tonnage of freight that is now being transported into and out of the state is perhaps fully 75 per cent greater than it was ten years ago and the volume of freight being hauled within the state has shown an almost equally large increase.

This enormous increase in tonnage of freight accounts in a measure for the greatly increased demand for better highways. Ten years ago there was not a mile of hard-surfaced road in the state outside of the incorporated cities. There was very little surfaced road of any kind in Colorado then. In the plains counties highways were little more than worn tracks across the prairie, with the grades that nature made and an occasional bridge or culvert. In the mountains the roads were moderately good where there were roads, but the grades were heavy, the turns were sharp and the tracks were narrow.

Yet there was less demand for highway construction then than there is now. Those who were forced to travel over such highways as were available were used to just such highways as they had and were not particularly ambitious for better ones, especially if it were necessary to increase the tax levy to get them. There were few automobiles any place and very few in Colorado. There were no motor trucks and farm tractors. There was little farming except near the railway lines, and the livestock that was raised in the more remote districts did not need highly improved roads over which to tramp to market.

But all that is changed today. Whereas the amount of wheat grown in Colorado in 1909 was but little more than was required to supply the needs of Colorado people, there are today being shipped from the state perhaps 10,000,000 bushels annually—nearly 3,000,000 more than was raised in 1909—and there still remain 12,000,000 bushels to be moved about more or less within the state to supply the needs of Colorado people.

That is not an especially large amount of wheat for a big state like Colorado, but the increase has been very marked in the decade and has required a vast improvement in transportation facilities to meet it. The increase in production of other crops has been equally marked. The value of metals produced, when the newly-developed metals such as vanadium, uranium, tungsten and molybdenum are considered, has decreased but little in the past ten years, and the tonnage of ore that must be handled to produce the same amount of values has increased very sharply. The output of the state's factories has increased steadily and the production of coal is nearly twice what it was ten years ago.

Naturally this heavy increase in tonnage to be transported has placed a vast burden upon the highways of the state, for the simple reason that there has been very little railroad development in the past decade. Automobiles, trucks and wagons are moving thousands of tons of freight of various kinds today over highways that were only trails a decade ago, and yet the railroads are hauling more freight than they ever hauled before. There is a more urgent demand for good roads in Colorado today than there has ever been because it comes from nearly all the people and is principally an economic demand. The farmer feels that he can well afford to pay $1 more on each $1,000 of the value of his farm if by so doing he can market his crops more quickly and can save $10 in marketing expense for each $1 he spends in road taxes.

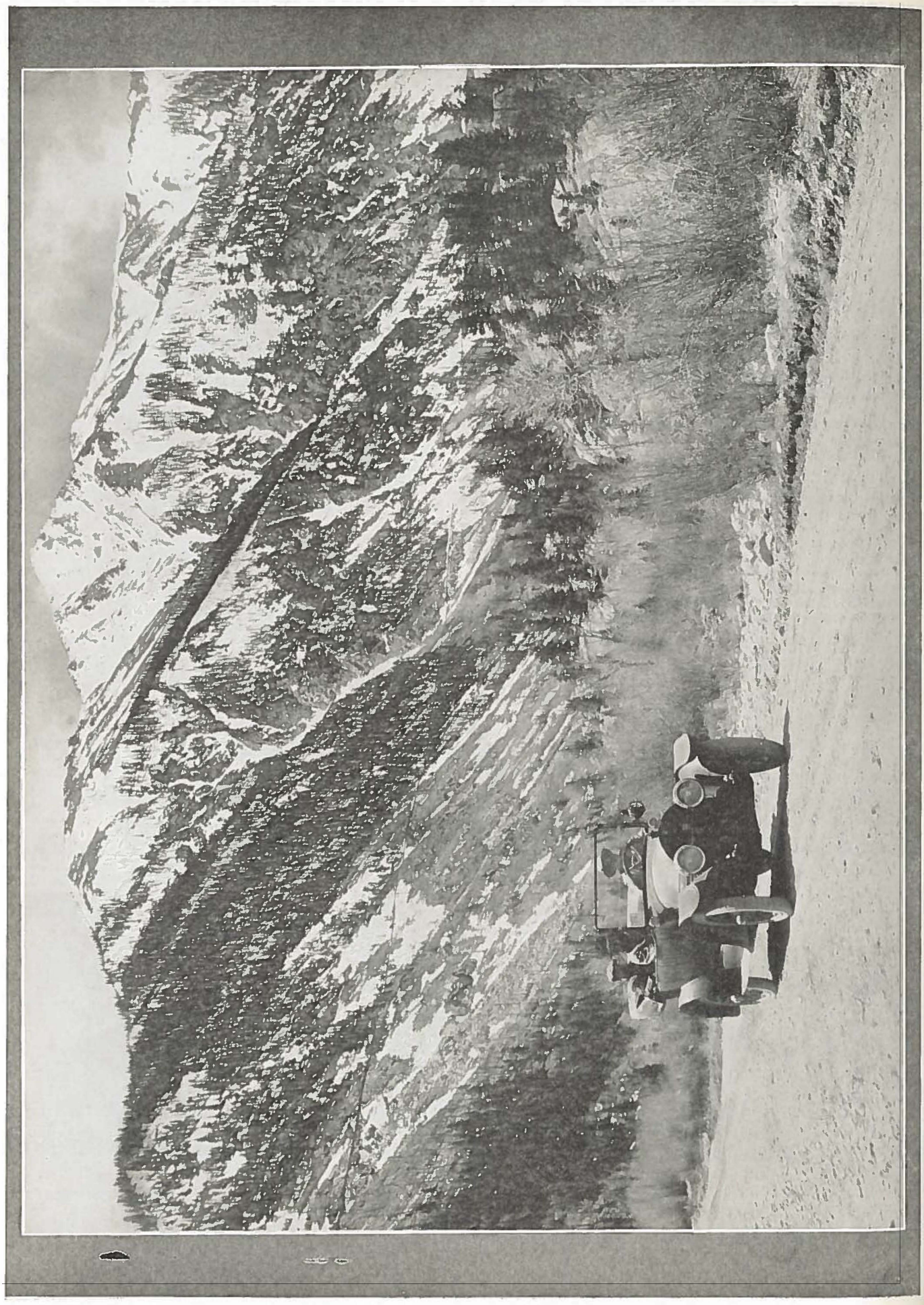
When the period of real road development began in Colorado the demand for improved roads came chiefly from those who are interested primarily in increasing tourist travel to and through the state. Tourist roads were the first laid by the State Highway Commission. Tourist roads were the first built and advertised.

The demand for tourist roads is just as strong today as it was then and there are hundreds of miles of wonderfully fine scenic highway in Colorado as a reward to those who first realized the need of making our mountain scenery accessible. As a further and more substantial reward it is generally conceded by those whose task it is to count the tourists and relieve them of some of their war profits that there has never been so many of them in Colorado as this year.

But added to the call for good roads for tourists is another and even stronger call for good roads for Colorado people—for the farmer, the stockman, the miner and the manufacturer. Everybody wants good roads, and most everybody is beginning to realize that the only way to get good roads is to pay for them.

ROBERT BURNS ON BAD ROADS

I'm now arrived—thanks to the gods!
  Thro' pathways rough and muddy,
A certain sign that makin' roads
  Is not this people's study—
Altho, I'm not with Scriptures cram'd,
  I'm sure the Bible says
That heedless sinners shall be damn'd
  Unless they mend their WAYS.



The rugged majesty of the Rockies in the high altitudes of Colorado. Mt. Hope, one of the points of interest along the Independence Pass Road in Chaffee County.

Illinois Experiment Eliminates Guess-Work From Road Building

(By Ralph R. Benedict, Asst. to Chief Highway Engineer, State of Illinois.)

SEEKING to eliminate guess-work from road-building, highway officials of the state of Illinois have just completed the fifth test of the Bates Test Road, so called because of its proximity to the station of Bates, about twelve miles southwest of the city of Springfield, for the purpose of observing the effects of different loads on different road materials.

The Bates Test Road, like many another useful project, was the outgrowth of necessity—the necessity of the State of Illinois to know just what road-building material would be the best investment for an expenditure of close to $100,000,000.

In November, 1918, the people of Illinois voted a $60,000,000 bond issue for the construction of a system of hard-surfaced roads approximating 4,800 miles. In addition to this amount large sums had been made available to the State by the Federal Government for road construction.

When the governor of the State and road officials found early in 1920 that the State had in contemplation the expenditure of possibly $100,000,000 for a road-improvement program, it was decided that it would be unwise to undertake a program of this size without scientific knowledge of the behavior of certain pavements under truck traffic and rural condition.

With this in mind, the construction of an experimental road of unprecedented magnitude was undertaken. That the experiment has demonstrated its worth is shown conclusively by the knowledge already gained, which will save the taxpayers of the State many thousands of dollars in future road construction.

The experimental road was started in June, 1920, and completed in July, 1921. It is about two miles in length and includes sixty-three sections, each approximately 200 feet long and representing all types of modern pavements, several thicknesses of each type being used, so that when trucks are operated over the road with increasing loads the capacity of each section, in terms of weights and numbers of trucks, will be plainly obvious.

Commencing in the fall of 1920 and continuing until the truck traffic tests were started in March, 1922, an average of ten investigators were occupied in research work. An enormous volume of data was collected and preliminary analyses made. At several road meetings during the past year a paper, showing the result of this research work, with typical illustrations in the way of photographs and diagrams, was presented by Clifford Older, chief highway engineer.

During the week of March 27, 1922, the actual testing of the road by truck traffic was started and is still in progress. A fleet of ten to twenty trucks is used in the test. The trucks are operated at the speeds provided in the Illinois motor vehicle act, i. e., fifteen miles for loads of les than 5,000 pounds down to twelve miles per hour for loads of twelve tons. The truck operation, which is carried out on a regular schedule, is controlled by a superintendent, aided by a mechanic, and checkers who are stationed in towers, one at each end of the road. The superintendent also has at his disposal several additional trucks for hauling maintenance material, and a force of maintenance men who are employed in repairing breaks which occur in the road. The effect of traffic is noted by a number of station observers, to each of whom is assigned a certain number of sections. In addition, free lance observers are continuously traveling the road, as well as representatives of the United States Bureau of Public Roads and of the chief engineer and testing engineer of the Illinois division of highways, and other interested parties. The station observers make minute records of all cracks, depressions and other indications of failure and matters of general interest. All breaks and other defects which appear are immediately painted and detailed sketches recorded. A record is also kept of the amount of gasoline and oil used in the operation of the trucks during the test, which should provide valuable data on the cost of gas and oil used in the operation of trucks over the improved highways.

In order that the effect of truck traffic may be observed by night as well as by day, a very complete lighting system has been installed. The generator and materials used in this lighting system, as well as the trucks which are used in this test, are supplied from the surplus war equipment allotted to the State by the Federal Government.

As the maximum curling of pavement has been indicated to take place between the hours of 9 p. m. and 6 a. m., the night traffic has been applied during those hours.

In the case of rigid pavements, traffic breaks are considered failures when the area of the section broken free from the balance of the pavement is so small that subsequent applications of the same wheel load depresses the section, thus causing undue impact on the broken sections as well as on the adjacent pavement. The Bates road tests confirm observation made on heavy-traffic loads that such breaks are quickly followed by progressive failure of the adjacent pavement, no doubt on account of the impact which results.

In the case of the so-called flexible surfaces, such as asphaltic concrete and bituminous-filled brick on a concrete base, failures are recorded when the base becomes broken in the manner previously described.

In the case of the asphaltic concrete and bituminous-filled brick sections laid on macadam base, failure is recorded when a sufficiently marked disturbance of the wearing surface occurs as to indicate plainly that subsequent applications of the same load will cause complete disintegration of both the surface and the base.

Upon the completion of each increment of load, a news bulletin is issued by the Division of Highways. Each bulletin contains a description, illustrated by means of photographs, of the behavior of the various sections under that particular increment of load.

For the first increment three ton Liberty trucks were stripped to chassis and cab so that the load on each rear wheel was 2,500 pounds and on each front wheel 2,450 pounds. The trucks made regular trips up one side of the road and back on the other side over the sixty-three sections at a constant speed of 15 miles per hour. By means of guide lines, painted near each side of the pavement, the trucks were held to a straight course such that the center line of travel of the outside rear wheels was six inches from the edge of the pavement on all sections except those having macadam bases. On the macadam base sections, the first 500 round trips were made with the trucks traveling near the center of the pavement except at passing points. The last 500 round trips were made with the center of the wheels traveling at a distance of 18 inches from the edge of the pavement over the macadam-base sections. A total of 1,000 round trips was made during this first stage of the test, which was completed on April 5, 1922.

The second test was applied with 3,500 pounds on each rear wheel and 2,150 pounds on each of the front wheels, the same trucks as were used for the first test being employed. The load was gradually increased through the third, fourth and fifth tests until, during the week of July 3, when the sixth test was started the Illinois legal road limit of 8,000 pounds on each rear wheel and 1,930 on each front wheel was applied, and it is intended to make 10,000 applications of this load in order that a thorough test may be given the sections which have not been entirely destroyed in the previous tests. As the maintenance of the sections will present a complicated problem with this new and greater load, this test, the final one, is expected to extend over a period of six or eight weeks.

During these tests a force of men have been at work maintaining the right of way or, in other words, making all necessary repairs in order to furnish an adequate idea of just what repairs will be necessary under certain traffic conditions.

While no definite conclusions can be reached until the traffic tests have been finally completed, the results so far obtained have been highly satisfactory.

The behavior of the various sections in supporting truck loads has given valuable information in the way of confirming or disproving theories which have been advanced as to the load-supporting capacity of pavements of different thicknesses and different types.

A field office is maintained at the site of the experiment, where all visitors are

(*Continued on page 18*)

ACTIVITIES OF STATE AND

Pueblo Commerce Club Asks Removal of Signs

A RESOLUTION has been passed by the directors of the Pueblo Commerce club asking the State Highway Advisory Board to exercise its powers to remove and prevent the further erection of guide signs on the state highways.

Complaint is made that the advertising signs are so numerous now that they have become a menace to safety of the traveler. Oftentimes the signs mar the beauty of the natural scenery.

Under the Highway Act of 1921 the Advisory Board is given power to remove all objectionable signs from the State Highways. Also the board is given power to regulate the design of all signboards along the highways.

Big Thompson Canon Gravel Surfacing Started

IN recognition of the tremendous tourist travel the past year into Estes Park and environs, the Larimer county commissioners recently voted to expend $6,000 of their bond money on the Big Thompson canon road.

An outfit with a rock crusher has already been moved onto the project, which will start at the "Half-way House." The gravel will be hauled down the canon. Plans call for the improvement of seven miles of this much-traveled road.

The upper half of the canon has held up remarkably well under the strain of this past summer's heavy traffic. Arrangements are now being made to improve the stretch of road just outside of Estes Park to the upper end of the canon. This section of the road is somewhat difficult of passage in bad weather.

Engineer A. B. Collins of the State Highway Department is in charge of the work.

Dry Weather No Handicap in Road Work

"GENTLEMEN, we have simply got to do something about the road over about Lafayette."

It was Charles Brock, assistant superintendent of maintenance of the State Highway Department, speaking. He was addressing the Boulder county commissioners.

"Well, what can we do about it? We know that it is bad, but there doesn't seem to be anything that we can accomplish now during this dry spell," said one of the commissioners.

"I can fix it so that it will be at least passable," replied Brock.

"All right, if you can fix it, go to it; you have our very best wishes. We will give you all the equipment you want to make the experiment."

Two days later three maintenance outfits were at work on the road. Each outfit was given the task of putting in shape four miles of highway. In less than ten days the road was improved to such an extent that motorists can drive at the rate of thirty-five miles an hour over it.

"I just wanted to show that it could be done," said Brock. "Now everybody is delighted. It was a hard job, but I am sure that the effort was justified by the result."

The stretch of road improved starts at the top of Goodhue Hill and runs north through the town of Lafayette to the Larimer county line.

Results accomplished with the three "blading" outfits is a revelation to maintenance men. With a tractor and a 10-foot blade the heavy dust was moved to the sides of the road. Blades will be run over the road every other day until it rains.

Fleet of Trucks Put On Fort Collins Paving

TO expedite completion of the concrete paving south of Fort Collins, a fleet of heavy trucks has been engaged by the Mutual Construction Company to do the hauling of materials for the project.

These trucks comprise a part of the outfit of the Colorado Haulage Company, the firm that has the contract for the hauling on the Colorado Springs street paving project.

Every effort is being made to complete the Mutual job by the end of the construction season. Grading has been started on the paving project which adjoins the Mutual project on the south. The latter contract is being handled by Fred C. Dreher, and will take the paving from Fort Collins to the city limits of Loveland.

That portion of the work already completed is said to be well done, and will give that section a stretch of paving second to none in the state.

Dreher will complete the first mile of his project into Loveland this fall, the balance, a little over three miles, to be finished next spring.

Senator Callen Boosts New Road Through Forrest

IF the wishes of citizens of Garfield county, headed by State Senator R. E. Callen, are carried out a new modern highway between Collbran and Silt will be constructed the coming year.

Boosters of the proposed road point out that it will reduce the distance between Glenwood Springs and Grand Junction, and will open up a new section for settlement.

The road runs through the Battlement National Forest. Already the Forest Service is said to have agreed to bear a portion of the cost of the highway.

Senator Callen recently appeared before the Mesa county commissioners and urged them to co-operate with the Garfield officials in the construction of the proposed route. Surveys of the road were recently completed.

Broadmoor Roads to be Paved as an Experiment

AN interesting experiment in the oiling of roads adjacent to the Broadmoor Hotel in Colorado Springs is to be carried out by Spencer Penrose, with the permission of the El Paso county commissioners.

Mr. Penrose is to pay the expense of the oiling. An order for a carload of oil already has been placed with a Wyoming concern. If the experiment proves successful the oiling of El Paso county roads may become general.

Several years ago the city of Colorado Springs tried the oiling of streets to keep down the dust. The oil applied at that time was said to be too light to be of any great value.

Road From Durango to Farmington Planned

IT is proposed to designate a road of the best dirt type to have its beginning at Durango and run thence to Aztec, Farmington, Towaoc, and back to Durango by way of Hesperus. Farmington is sponsor to the movement and the plan is to prevail upon the government to use certain funds belonging to the Indians and now available for building roads to build the portion of the road on the Ute and Navajo reservations, the plan also including the road from Shiprock to Gallup. Seven counties in four states have been interested in the undertaking and their influence and co-operation has been enlisted to bring the movement to a successful conclusion. The effort is in line with the Navajo Trail road, which has been laid out from Thompson Springs, Utah, to follow, in part, the same route.

Material Tests Are Under Way on Western Slope

GUESS work on road projects as far as material and its availability is concerned will be eliminated on all future contracts made by the State Highway Department on the western slope.

A complete survey of materials needed for bridges and roads in that section is being made by J. A. Skerritt, field superintendent of the State Highway Materials Survey Department. During the past two weeks the crew under Mr. Skerritt inspected materials along the route from Fruita to the Utah State line.

At present they are working along the roads through Grand Junction, Delta, Montrose and Durango.

This division of the Highway Department has examined and tested materials from about seventy-five pits during the past season and has located over 2,000,000 cubic yards of sand, gravel and quarry stone.

Reports of the division are used as a basis for estimating costs. Heretofore there were no locations of material made, and engineers were compelled to guess at costs of projects.

COUNTY ROAD BUILDERS

Tourists Praise Roads Over Mountains

PRAISES come from tourists as well as local users of the road between Villa Grove and Salida, as they are now able to travel over the Poncha Pass on high speed. The new roadbed is of magnificent construction, which will prove an everlasting road with little expense of upkeep. The Poncha and Cochetopa Passes are wonderful, easy grades, although the scenery is grand, especially the Cochetopa. They are free from danger.—Saguache Crescent.

Denver - Broomfield Paving Nearly Completed

THE new concrete paving on the Denver-Broomfield road will be opened to traffic about November 15, if the unforeseen does not happen. This work has been progressing at a very rapid rate during the last few weeks, and only the finishing touches remain to be made.

When completed it will give a paved road into Broomfield, a distance a little over twelve miles. Plans have been made to grade another link of the road beyond Broomfield through the Zang stock farm to the Top of Goodhue Hill, for paving to be laid next spring.

Then there will probably follow a project which will eliminate the "U" curve on Goodhue hill and take the paving down the hill and over the Burlington tracks. An overhead bridge is planned, to do away with this dangerous crossing.

Battle Mountain Soon to Be Ready For Travel

THE famous Battle Mountain road project, which has been under construction for two seasons, is nearing completion. It is expected that the new highway will be ready for travel on November 1st.

This project is about six miles in length, extending from Redcliff to Rex, connecting with the Tennessee Pass road. It has proved one of the biggest road jobs undertaken by the State Highway Department.

The total cost will be approximately $300,000, but those who have gone over the project say it is some road.

For several years Battle Mountain has been the graveyard of flivvers and twin-sixes, and a nightmare to tenderfoot drivers from the plains. The scenic beauty of this section was lost to visitors through the tremors of fear.

Yawning canons, ragged cliffs below, with eyes riveted on the narrow, rough road, driving over the highway before the present improvements were made was anything but a pleasure.

The new road reaches down into Redcliff canon, which is one of the noted beauty spots of the state. Battle Mountain was the missing link in the Ocean-to-Ocean Highway from Leadville to Glenwood Springs.

The editor would be glad to have brief items for this column from county officials, road superintendents, maintenance overseers, and others interested in road building. Copy should reach us by the 20th of the month preceding publication.

Squirrel Creek Road to San Isabel Forest Completed

A WONDERFUL new highway has just been completed into the San Isabel forest leading from Pueblo.

It is called the Squirrel Creek road. Occasion of the opening of the road to public travel was celebrated recently with a big picnic under the auspices of the Pueblo Chamber of Commerce.

The construction of the scenic road was the work of the U. S. Forest Service. Road builders consider it a fine example of highway engineering. The new route offers a wonderful bit of mountain scenery that can scarcely be surpassed in Colorado or the great West.

Dinner was served the three hundred visitors, after which there was a short dedication program.

The committee in charge of the dedication ceremonies follows: B. V. Rippel, Ben Bergerman, F. J. Buch, A. G. Hamel, W. L. Wilder, J. P. Harbour, Geo. L. L. Gann, Chas. Haines, H. B. Cadwell, Geo. Herrington and W. H. Billington.

New Steel Bridge at Almont Under Way

A NEW steel bridge is being constructed over the East River at Almont on State Highway No. 63. This bridge replaces an old wooden structure which was badly damaged by the flood waters of last year.

The new bridge will be in one span, 81 feet long and will be 18 feet wide. B. L. Flanagan of the Highway Department is supervising the construction work, which is under contract to the Monarch Engineering Co. of Denver.

Survey of Holy Cross Trail Started by State

SURVEY of the Holy Cross Trail has been started by State Highway forces under the direction of John P. Donovan, division engineer.

The start of the survey was made on top of Loveland Pass and the party is now working toward Dillon. Engineer Donovan expects to complete the survey this fall. None of the grades will exceed 6 per cent.

It is proposed to build two stretches of road between Silver Plume and Redcliff. The Trail will cross two 11,000-foot passes—Loveland and Shrine. The distance between Denver and Redcliff will be reduced by approximately 100 miles. The present route by way of Buena Vista and Leadville is about 200 miles.

Likewise the proposed road will bring Denver within 150 miles of Glenwood Springs. It passes through one of the most romantic mining sections in the west.

Engineer Donovan has been consulting with several of the old residents of Dillon, some of whom drove stage coaches over Loveland Pass years ago, to learn where the snow lies deepest along the road in winter. These stage drivers prided themselves in their ability to land passengers at their destination on schedule time every day in the year.

About sixteen miles of the Loveland Pass road will be located on a new survey; the balance of the distance between Graymont and Dillon will follow the old stage route.

The cost of the two stretches of road will be approximately $300,000, and will provide one of the finest scenic and commercial roads in Colorado.

Officials of the State Highway Department say the amount of money to be apportioned to the Holy Cross Trail the next two years will depend upon the action of the voters on the proposed highway bond amendment at the coming November election.

War Materials Available For Road Building

The following supplies are available for transfer to counties and municipalities in the State of Colorado for use in construction and maintenance of public roads.

Arrangements may also be made to rent equipment to contractors engaged in construction of Federal Aid and State Projects.

Requisitions should be mailed to State Highway Department, care of H. Roe, Denver, Colorado.

Description.	Price Each
Adze	$ .75
Anvils, 34-lb.	2.00
Anvils, 75-lb., each	3.75
Anvils, 90-lb., each	4.50
Asphalt, barrels	cwt. 2.00
Auto jacks	1.50
Axe heads	.35
Axe handles	.45
Axe handles, short	.35
Axe, fire	.45
Axes, Hunters, each	.35
Bars, wrecking, 18-in.	.30
Bars, wrecking, 24-in	.50
Bars, wrecking, 36-in	.75
Bars, pinch, 60-in.	1.00
Bars, digging, 8-ft.	1.50
Belting rub, 2-in.	ft. .20
Belting rub, 2½-in.	ft. .20
Blox, Double Tack, 3-in	1.50
Blox, Double Steel, 8-in.	3.50
Blox, Single Snatch, 4-in.	1.50
Blox, Single Snatch, 6-in.	1.75
Blox, Single Snatch, 10-in.	3.50
Blox, Single Snatch, 14-in	7.50
Braces, Ratchet, 8-in.	1.00
Brooms, Stable	1.00
Cans, Galv. Iron, 20-gallon, each	.75
Cans, Galv. Iron, 30-gallon, each	1.00
Canvas water buckets	.25
Carts, Dump, 2-wheel (4 in stock), each	125.00
Carts, Water, 150-gallon tank (4 in stock), each	115.00
Chain, Skid, ⅜x20¾-in.	.21
Chain, Spoke Clamps	.17
Chain, Eyes Disc Wheels	.14
Caps, Blasting	per 100 .50
Cutters, Cold	.25
Chisel, Sq. Point	.20
Cable, Steel, ⅝-in.	ft. .06
Cable, Steel, ¾-in.	ft. .08
Carts, Concrete, 2-wheel	12.00
Carbide, ½-lb. cans	.05
Chests, Tool, Steel	7.50
Cots, folding canvas	1.75
Covers, Mattress, 3′x6′x6″	1.50
Double Trees, Steel (5 in stock), each	.50
Drills, Rock, 30-in.	1.00
Drills, Rock, 44-in.	1.50
Exploders, Hand Fuse	18.00
Feed Bags, Canvas, each	.25
Feed Boxes, Galv. 11-in.x14-in., ea.	.35
Feed Troughs, wood, 8-in.x10-in.x 46-in., each	1.75
Fuse	Per M 5.00
Forges, portable	12.00
Globes, Lantern	.08
Grindstones, Ball Bearing, price	2.50
Hatchets, Claw	.35
Halter Ropes, each	.15
Hammers, Rivet, ¾-lb.	.35
Hammers, Jack, BCR, 430	75.00
Hammers, Sledge, 10-lb. no handle	.80
Hammers, Spike	.75
Hammers, Cross Pein, 3½-lb.	$0.45
Hammers, Cross Pein, 4-lb.	.45
Hammers, Cross Pein, light	.35
Hammers, Stone	.35
Hammers, Ball Pein, 2½-lb.	.45
Handles, Hatchet	.10
Handles, Mach. Hammer, 10-in.	.10
Handles, Mach. Hammer, 14-in.	.10
Handles, Mach. Hammer, 16-in.	.10
Handles, Mach. Hammer, 18-in.	.10
Hammers, Farriers	.25
Hammer, sledge, per lb.	.08
Handles, Pick	.15
Handles, D Handle Shovel	.15
Handles, Long, Shovel	.15
Hardies, B. S.	.20
Harness, Wheel	set 15.00
Harness, Cart	12.00
Hasps and Staples, 4-in., each	.05
Hinges, 4-in. strap, pair	.05
Hinges, 6-in. strap, pair	.10
Hinges, 5-in. T., pair	.10
Hose, Disch, 2-in., 25-ft. lengths	ft. .15
Horse Rasps, each	.25
I-Beams, 10″x20′, each	13.50
Beams, I, 3¼-in.x 6-in. x 15 ft.	lb. .02¼
Lanterns	.50
Lanterns, Folding	.50
Mattox, Trench	.25
Mattox, Pick	.45
Nails, 10d to 60d	keg 3.50
Nippers, Farriers	.30
Oil, Leather	gal. .50
Oil, Neatsfoot (100-pt. case)	pt. .10
Oil, Spica	pt. .05
Paper, Roofing	roll 1.50
Paulins, large	20.00
Pipe, Iron, 1¼-in.	.07
Pipe, Iron, 2½-in.	.18
Pipe, Iron, 3-in.	.20
Pipe, Iron, 4-in.	.25
Post Hole Diggers	1.50
Points, Pick	.45
Pumps, Gould Rotary	10.00
Pumps, Blackmere Hand	6.00
Pumps, Hand Piston	4.50
Engine & Pump Novo Gas	125.00
Engine, Hill Centrifugal	850.00
Posts, Fence, Angle Iron	.25
Rakes, road, 14-tooth, each	.50
Ranges, Field, 4-hole	10.00
Ranges, Field, 2-hole	7.00
Rope, ½-in.	lb. .08
Rope, ⅝-in.	.08
Rope, ¾-in.	.08
Saddle Bags, leather, 2 pocket	1.50
Saw Outfits, Portable	150.00
Saws, Hand, 26-in., Cross Cut, 7 pt.	.50
Saws, Hand, 26-in., Cross Cut, 8 pt.	.50
Saws, 6-ft. Cross Cut	1.50
Scales, Platform, weight 115 lbs., capacity 300 lbs., each	20.00
Shovels, S. H., Rd. Point	.45
Shovels, L. H., Rd. Point	.45
Spades, S. H.	.45
Spades, L. H.	.45
Shovels, Iron Handle, Rd. Pt.	.45
Shovels, D. H., Sq. Pt.	.45
Spikes, Wire, 7-in., kegs	3.50
Spikes, Wire, 8-in., kegs	3.50
Spikes, Wire, 9-in., kegs	3.50
Spring Auto Repair Kits	1.25
Staples, Assorted	3.50
Stoves, Sibley	1.50
Steel Rd. Chrome 1⅛-in.	lb. .03½
Tarpaulins, 5x6	2.00
Tarpaulins, Escort Wagon	5.00
Tarpaulins, 17x30	20.00
Tents, pyramid, 120 lb., with covers	12.00
Tents, new, heavy, with poles, 14x 16x5	$30.00
Tents, 16x20x5	37.50
Tents, 16x24x5	43.50
Tents, 8x10x4	16.00
Tents, 10x12x4	19.75
Tents, 12x14x4	24.00
Tents, 16 ft. x 16 ft. x 36 in.	12.00
Tires, Solid, 38x5	28.00
Tires, Solid, 40x10	55.00
Casings, Motorcycle, 28x3	3.50
Tires, Q. D., 34x3½	16.00
Tires, Q. D., 34x4	16.00
Tires, Q. D., 34x6	22.50
Tires, Q. D., 36x5	25.00
Tires, Q. D., 36x6	27.50
Tiles, Q. D., 36x7	32.00
Tires, Q. D., 37x2½	18.00
Tires, Q. D., 37x6	28.00
Tires, Q. D., 39x5	30.00
Tires, Q. D., 34x4½, U. S. Cord	10.00
Tools, Cement Finishers	2.00
Tongs, B. S., Bolt 22-in.	.35
Tongs, B. S., Assorted	.35
Tongs, B. S. Clincher	.30
Tongs, B. S. Clincher, 14-in.	.30
Tongs, B. S. Clincher, 16-in.	.35
Tubes, Inner, Motorcycle, 28x3	.75
Vises, Bench, 4-in.	4.50
Vises, Bench, 4¼-in.	4.50
Vises, B. S., Small A	4.50
Vises, B. S., 5-in.	5.50
Vises, Pipe	5.00
Wire, Barbed, 40-rod	spool 1.40
Wheelbarrows	4.00
Wrench, Monkey, 10-in.	.30
Wrenches, Stilson, 18 in.	1.50
Wheels, Front, Escort Wagon	1.50
Wheels, Rear, Escort Wagon	1.50

EQUIPMENT NOTES

Archuleta county has two F. W. D. 3-ton dump trucks, available for transfer to other counties or municipalities within the state, for public road work—transfer price approximately $1,100 each. Condition good.

Park county has one F. W. D. 3-ton dump truck for transfer—now located at Denver. Price about $1,100. Condition good.

The State Highway Department has on hand:

162 Steel I Beams, 10″x20′, weight each 600 lbs.

On hand also: 100—3¼″x6″—16′ Steel I Beams, 184 lbs. each.

Price 2¼c lb. f. o. b. Denver.

Just received—400 tarpaulins, 17′x30′.

100 mattress covers, 3′x6′ 6″.

On hand at Denver—100—16x16 pyramidal tents—no poles.

We have for transfer to counties:

1—Rebuilt Selden truck, 3¼ ton—cargo body.

2—G. M. C. 1½ ton, rebuilt, price $1,000 each.

If any of the above are desired, address State Highway Dept., Denver, care of H. Roe.

Redeeming a highway bond is easier than pulling through mud. In the first place, payment comes only once; in the second, every time it rains.

Read Carefully Proposed Road Bond Amendment

ON the November ballot there will be several amendments to be voted upon. One of these will be the highway bond amendment.

This amendment authorizes the issuance of $6,000,000 in bonds to meet Federal Aid appropriations during the next four years. The passage of the amendment means that Colorado will have $12,000,000 to spend on her highways in these four years, in addition to the regular annual maintenance and construction funds.

It is the duty of every citizen and taxpayer to know the provisions of this proposed measure before casting his ballot for or against it.

In order that all readers of Colorado Highways may be fully advised in the matter, we herewith reproduce same.

It should be noted that the measure provides that only one-half of the motor vehicle license collections, i. e., that portion now turned into the State Highway fund, is to be used to pay the interest and provide a sinking fund for the retirement of the bonds.

The amendment reads as follows:

And provided further, that, in addition to the amount of debt that may be incurred as above, the State may contract a debt by loan for the purpose of creating a fund to be expended as provided by law, by the State Highway Department, for the construction and improvement of public highways in the State of Colorado; said debt to be evidenced by registered coupon, interest-bearing bonds to an amount not exceeding six million dollars.

Said bonds to an extent not exceeding one million five hundred thousand dollars, shall be dated June first, 1923; not exceeding one million five hundred thousand dollars shall be dated June first, 1924; not exceeding one million five hundred thousand dollars shall be dated June first, 1925; not exceeding one million five hundred thousand dollars shall be dated June first, 1926; said bonds shall be issued payable serially. The last maturing series of each issue shall be absolutely due and payable not exceeding twenty (20) years from and after the date thereof, and shall be of the denomination of one hundred dollars ($100.00) each, or any multiple thereof. The interest on said bonds shall be payable semi-annually, at the rate of five per cent. (5%) per annum, at the office of the State Treasurer, or at some place in the City of New York, U. S. A., and the principal of said bonds shall be payable at the office of the State Treasurer.

No such bonds shall be issued except at par and accrued interest.

The moneys, or so much thereof as shall be necessary, payable to the credit and account of the State Highway Fund from the proceeds of motor vehicle registration license fees, under Chapter one hundred sixty-one (161) of the Session Laws of Colorado of the year 1919, and all laws amendatory or in substitution thereof, shall be applied to the payment of interest and principal of the bonds of the six million dollar authorized issue herein, but the revenues provided by said chapter to be accredited to the account of the State Highway fund shall never be diminished until all bonds issued by virtue of this amendment shall have been paid off and redeemed; nothing herein, however, shall be construed to prevent the enactment of laws whereby the amount of revenue derivable from motor vehicle registration license fees and payable into the said fund shall be increased.

The General Assembly shall, as by law provided, enact all such laws as may be necessary with reference to said bonds and with reference to carrying out the projects and purposes herein specified.

The Secretary of State, Attorney General and the Reporter of the Supreme Court do hereby designate and fix as the ballot title and submission clause to the proposed constitutional amendment herein, the following:

A PROPOSED AMENDMENT TO SECTION THREE (3) ARTICLE XI OF THE CONSTITUTION, PROVIDING FOR THE ISSUE OF NOT MORE THAN $6,000,000.00 OF BONDS FOR CONSTRUCTION AND IMPROVEMENT OF STATE HIGHWAYS, AND PROVIDING FOR THEIR REDEMPTION BY MONEYS PAYABLE TO THE STATE HIGHWAY FUND FROM PROCEEDS OF MOTOR VEHICLE REGISTRATION LICENSE FEES.

BIDS RECEIVED DURING SEPTEMBER

NO.	LOCATION	COUNTY	LENGTH	TYPE	LOW BIDDER	PRICE BID
F. A. P. 71B	Southwest of Durango	La Plata	3.609 mi.	Gravel surfacing	Peterson, Shirley and Gunther	$62,273.55
F. A. P. 119B	Cochetopa Pass	Saguache	7.474 mi.	Grading and drainage	Girardet and Hotchkiss	44,654.00
F. A. P. 213B	East of Mancos	La Plata and Montezuma	5.296 mi.	Gravel surfacing	Shields and Kyle	91,193.70
F. A. P. 222B	Broomfield North	Boulder	1.519 mi.	Concrete paving	Miller, Douglas and Hanes	56,884.56
F. A. P. 225	East of Aurora	Adams	1.003 mi.	Concrete paving	Colorado Contracting Co.	31,024.90
F. A. P. 226C	Platteville-LaSalle	Weld	10.731 mi.	Grading	C. R. Conover and Bro.	32,997.35

PROJECTS BEING ADVERTISED FOR BIDS

NO.	LOCATION	COUNTY	LENGTH	TYPE	BIDS TO BE OPENED
F. A. P. 173	Over St. Charles River, South of Pueblo	Pueblo	83 ft. span	Concrete girder bridge	Oct. 9. 1922
F. A. P. 190	Dillon-Kremmling	Summit	1.643 mi.	Grading & Steel Truss Bridge	Oct. 9. 1922
F. A. P. 216A	Kansas State Line to Holly and Northwest	Prowers	5.377 mi.	Gravel surfacing	Oct. 9. 1922
S. P. 655	West of Bergen Park	Jefferson	18 ft. span	Concrete bridge	Oct. 9. 1922

PROJECTS WHICH HAVE BEEN SUBMITTED TO THE BUREAU OF PUBLIC ROADS BUT NOT YET ADVERTISED

NO.	LOCATION	COUNTY	LENGTH	TYPE
F. A. P. 116	Colo. Springs Breed	El Paso	4.185 mi.	Concrete pavement
F. A. P. 210A	DeBeque-Grand Valley	Mesa and Garfield	5.302 mi.	Gravel surfacing
F. A. P. 215	East of Pagosa Springs	Archuleta	0.170 mi.	Steel truss bridge and approaches

PROJECTS FOR WHICH PLANS ARE BEING PREPARED

NO.	LOCATION	COUNTY	LENGTH	TYPE
F. A. P. 125	Sapinero West	Gunnison	2.819 mi.	Grading and surfacing and Steel Arch Bridge
F. A. P. 157	Buena Vista to Otero Lake	Chaffee	12.614 mi.	Grading and drainage
F. A. P. 158A	Lake George West	Park	11.75 mi.	Grading
F. A. P. 159A	Ramah-Mattison	Elbert	6.288 mi.	Sand-clay surfacing
F. A. P. 168B	Lamar Northwest	Prowers	6.862 mi.	Gravel surfacing
F. A. P. 211	Meeker-Craig	Rio Blanco	1.60 mi.	Gravel surfacing
F. A. P. 218B	Hasty-Lamar	Bent	3.489 mi.	Gravel surfacing
F. A. P. 223	Kremmling-Muddy Pass	Grand	4.9 mi.	Gravel surfacing
F. A. P. 224	Morrison-Baileys	Park	5.621 mi.	Mountain grading
F. A. P. 231	Over Six Mile Cr. East of Pueblo	Pueblo	0.455 mi.	Steel truss bridge and approaches

Hard Surfaced Highways Pay Big Dividends

At a recent district meeting of the State Grange held in Jefferson county, a farmer raised an objection to paved roads.

"These paved roads cost too much money," he complained.

It later was learned that this particular farmer lives on a good gravel surfaced highway.

He is proud of this road. Since it was built his property has increased in value several hundred dollars.

"We have reached the limit in road building in this state," he continued. "Our taxes must not be increased more than they are now. We are overburdened with taxation.

A short distance from where this man lives there is a fine paved road. It is one of the heaviest traveled roads in Colorado.

From a banker familiar with the conditions in this particular county, we learned that farm lands have increased on an average of $40 to $50 an acre, and this particlar amount of increase extends back from the road one mile on each side.

In other words the paving has increased the value of the lands immediately adjoining the road approximately $32,000 per mile—the cost of the paving. To say nothing of the earning power of the road in time and gasoline saving.

The banker attributes a great deal of the increase of business his bank has enjoyed to the improved roads which now radiate through his district.

This same banker will tell you that paved roads do pay. He declares that the taxpayers get back both principal and interest.

Bankers have a way of dealing with facts and figures that is disconcerting at times.

Highway Authorities Must Regulate Traffic

Regulation of the character and weight of highway traffic to prevent undue injury to the highway is an administrative matter and cannot be properly taken care of by detailed and arbitrary legislation. This is the conclusion of the Bureau of Public Roads of the United States Department of Agriculture, based on experiments to determine the effect of all kinds of traffic on road surfaces and observations on conditions throughout the United States.

Even in a single state conditions vary to such an extent that a load which may be carried on one road without injury may cause untold damage to another. Under the average regulatory law thus far made effective, the greatest service has not been secured from the best roads, nor the safety of the lesser capacity roadways assured. The influence of sub-grade soils, tire equipment, distribution of load to the wheels, speed, and many other variables is too complex to be written into law.

The seasonal variation alone in the carrying capacity of the roadbeds, due to moisture conditions, is one of the most serious of all the causes of road damage. Highway authorities therefore must be given wide discretion in traffic regulation. The Bureau urges that as a solution of the problem the State Highway officials of each state be given broad powers, so that traffic can be regulated to suit conditions as they exist at any particular time.

ADVANTAGES OF GOOD ROADS.

Good roads decrease the cost of transportation, permit the cultivation of crops not otherwise marketable, stabilize the price of products, making orderly marketing possible, tend to equalize traffic between the seasons, help the consolidation of rural schools, facilitate rural mail delivery, make living in the country more attractive, increase neighborly visiting and tourist travel—make possible the "touch of Nature" that "makes the whole world kin."

Traffic census counts and general estimates indicate that approximately 10 per cent of the nation's highways carry 80 per cent of the traffic. This fact was the basis for the selection and improvement of the first main or primary system of roads in state or nation.

Good roads cost money, so do good schools, good churches. Are they worth it? Other States think so.

What legacy would be more appreciated by the future generations than a first-class system of highways?

Wisconsin Road Marker System

(*Continued from page 6*)

much of the feeling on the part of the road builder to look upon travel as a common enemy.

After all it is the traveler who is largely paying the bill. To inconvenience him unduly and arbitrarily may make an enemy to the good-roads movement. Everything possible should be done to make every man its friend.

In adopting highway marker system I think the first thing that should be done would be the elimination of all present markers along our highways. A few days ago I had occasion to make a trip to Burlington. On the way I counted no less than half a dozen different markers. They were painted in black and yellow, red and black, and white and black, etc., all very confusing to the traveler.

It would also be advantageous to place Camp Site signs along the highway system at points where the traveler should turn off to reach the camp nearest the route.

These I am sure would be highly appreciated by our tourist friends who make Colorad their playground each summer.

Illinois Experiment Eliminates Guess-Work From Road Building

(*Continued from page 9*)

asked to register. To date our records show that approximately 500 people have visited the Bates Road, coming from all parts of the United States and some few from foreign countries. Engineers who have visited the experiment concede, generally, that the data obtained will be of extreme value in future road construction. We have the statement of one State Highway engineer that had such information been available heretofore his state in one contract alone would have been saved a very considerable sum.

That the experiment has demonstrated its worth is very gratifying to those state officials who had the courage to undertake the construction and the great amount of research work that has been carried forward on the Bates Test Road.

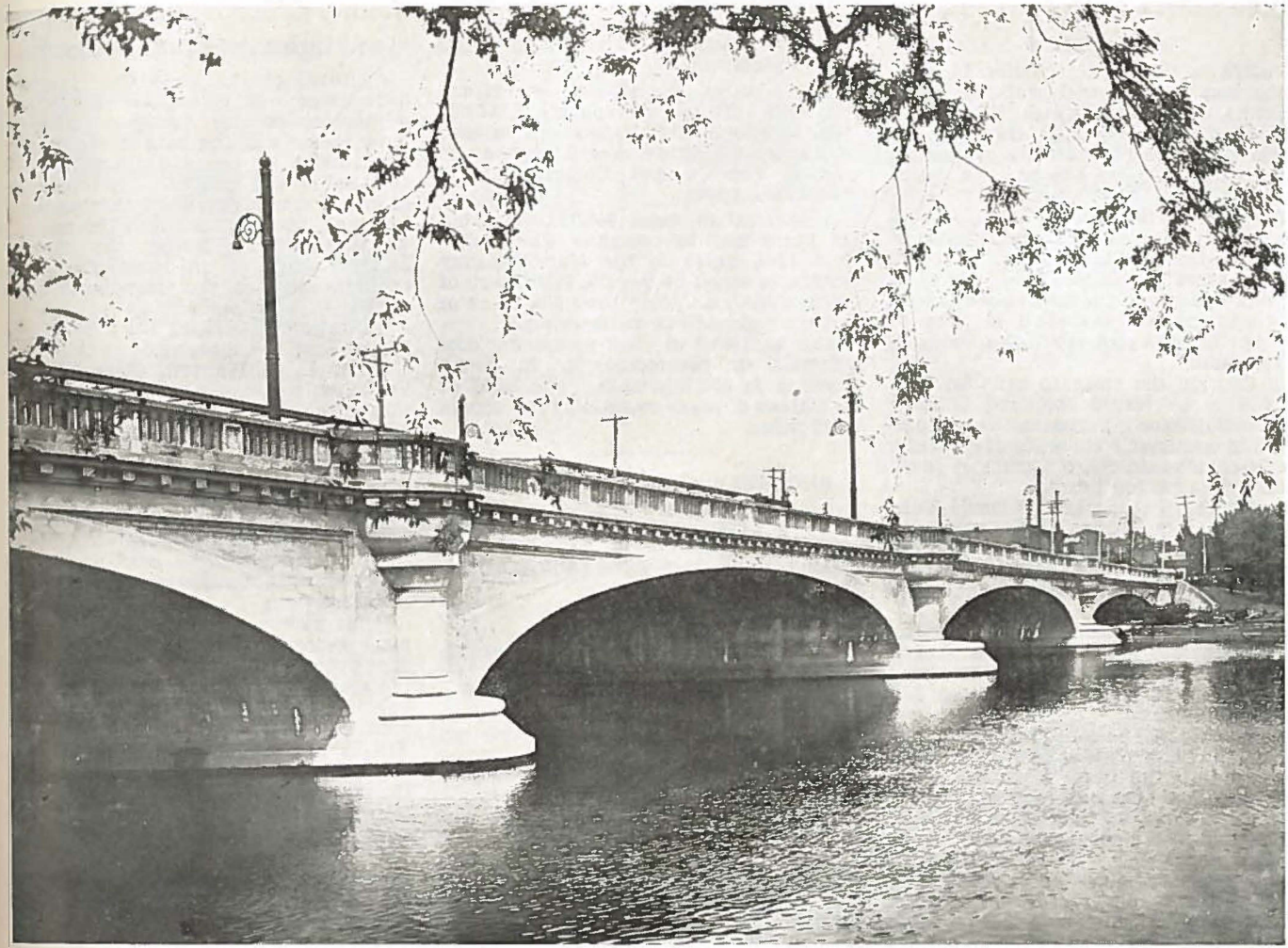
SOUTHERN STATES HAVE BIG ROAD PROGRAMS.

In road building and street-paving work the Southern states are showing greater activity than at any time in their history. Contracts reported during the past four months aggregate in value about $40,000,000. Every state in the South is showing tremendous progress, especially in road improvement. Contracts awarded in the last four months include, in value, the following: Alabama, $1,870,000; Arkansas, $842,000; Florida, $4,800,000; Georgia, $780,000; Kentucky, $870,000; Louisiana, $932,000; Maryland, $966,000; Mississippi, $844,000; Missouri, $2,735,000, North Carolina, $7,780,000; Oklahoma, $1,975,000; South Carolina, $1,104,000; Tennessee, $833,000; Texas, $6,657,000; Virginia, $690,000; West Virginia, $4,523,000.

In addition to the actual contracts awarded, there is a tremendous volume of highway improvements for which plans are being made and for which bids will be received during the year.

Foreign countries are displaying keen interest in highway construction in the United States. During recent months engineers from South America, Poland, Siam, South China and Japan have visited various highway commissioners in this country.

Good roads are to be urged principally for the same reason that good schools are maintained; namely, because they increase the intelligence and value of the citizen to society.



CONCRETE BRIDGES IMPORTANT FACTOR IN CITY DEVELOPMENT

Upper view shows Jefferson street bridge over the St. Joseph river, at South Bend, Ind. Total length, 554 ft. Carries a 52-ft. roadway, and two 10-ft. sidewalks. Four 110-ft. elliptical arch spans, built on 60-degree skew. Cost, including removal of old street bridge, $135,875.

CIVIC progress largely depends on pride in the present and vision for the future. Substantial, well-designed, street and highway concrete bridges create pride and vision and act as a city and state tonic. Durability, safety and economy are qualities characteristic of well-built concrete bridges and pavements.

"CONCRETE FOR BEAUTY AND PERMANENCE"

Three States to Vote on Highway Bonds

Voters in three states, Colorado, Kentucky and Georgia will cast ballots on highway bond measures at the coming fall elections. In each instance the bonds are to be retired from automobile license tax, gasoline tax or by a 3-cent road tax.

In Kentucky the issue is for $15,000,000 for the improvement and maintenance of roads for the next three years. The bill which passed the Senate by a vote of 63 to 34 provides that the automobile license fees and gasoline tax shall be used to pay the interest and retire the bonds in thirty years.

In Georgia the measure calls for $75,000,000 to be issued for road building and maintenance purposes. It is proposed to construct 5,500 miles of a county-seat-to-county-seat State system of roads within the next ten years.

It is claimed that with the bonds Georgia will be in a position to do in 10 years what it would be impossible to do in 30 years without the bonds. The bonds will be retired thru the automobile and gasoline tax.

In Colorado the measure calls for the issuance of $6,000,000 of highway bonds at the rate of $1,500,000 per year for 4 years to be used to meet Federal Aid appropriations.

The bonds will be retired from the one-half of the automobile license fees which now go into the State Highway Fund. The counties share of the automobile licenses will not be touched and will be distributed to the counties for road work as heretofore.

It is estimated that the automobile license fees will total $1,000,000 this year. This sum is divided equally between the counties and the State Highway Fund.

By capitalizing the state's share of the automobile license fees, thru the proposed bond issue, Colorado will be enabled to secure a total of nearly $6,000,000 from the Federal Government for road building purposes.

This, added to the receipts from the bonds, will give a total of $12,000,000 for building new roads throughout the state in the next four years.

The state of West Virginia is spending this year $4,000,000 of a $15,000,000 bond issue authorized for highway construction by their last legislature. As a result of the passage of the bond issue, West Virginia has been enabled to devise one of the most comprehensive construction programs of any state in the union.

In Alabama there was recently voted $25,000,000 in bonds for roads. This measure was carried by a 25-to-1 vote, after the proposal had once been declared unconstitutional by the supreme court of Alabama.

Road work to the extent of $7,500,000 is being done this year in Tennessee, while Michigan's road building program for 1922 alone totals $15,000,000. In 1921 Iowa's road bill was $38,741,627, and almost an equal amount is being expended this year.

The State Highway Department of California recently estimated that $65,000,000 will be required for the maintenance and reconstruction of highways in that state during the next four years. The tremendous increase in passenger automobile and truck traffic over the highways of that state has brought about a condition where maintenance becomes a prime necessity. Nearly 5,000 miles of road are to be maintained.

In November the citizens of Arizona will also vote on a proposed $2,500,000 bond measure. This money will be used to construct a hard-surfaced highway to connect Phoenix and Central Arizona with Los Angeles.

A proposal to spend $34,000,000 within six years and to complete within that time 4,000 miles of the state highway system, is urged before the legislature of South Carolina. More than 600 miles of the new road will be hard-surfaced.

The total cost of work now under construction or contracted for in North Carolina is $26,153,832.39. The total of all classes of roads covered by the sum is 1,525 miles.

SUGGESTIONS FOR PATROLMEN BY JOHN STAMM,

Asst. Supt. of Maintenance.

Don't try to float when road is frozen. Use your blade.

Don't bother with snow when under two inches deep.

Don't get too close to gravel when removing snow.

Don't let your road get rutty. Use your blade.

Don't let your ditches and culverts get clogged. Drainage is necessary.

Don't try to float with the wheels of grader. Use the blade.

Don't try to cover your road in one round. It can't be done.

Don't kill the job in order to fatten your horses.

Don't let the sod grow on the brim of your road. Use your blade.

Don't forget you are responsible for the condition of your section.

Don't travel the same way with your drag. Reverse every three or four trips.

Don't forget to drag the center or crown every few days.

Don't forget to drag the gutters. It stops the weeds from growing.

Don't forget to treat the taxpayers as you would like to be treated if you were paying the bills.

Don't think you are not doing any good when dragging the road when it is dry, because you are. Drag, drag, drag and keep your road in shape to take the moisture when it comes.

GET BACK OF THE GOOD ROADS MOVEMENT!

Man's battle for good roads has been going on for thousands of years, ever since prehistoric man cleared a path through the jungles.

It may be that the roads of the future will be in the air, with flying machines carrying passengers and freight.

That, however, is bound to be a long ways off. It is good to dream about. But, meantime, let's keep our feet on the ground and get behind the good-roads movement stronger than ever. Prosperity and recreation come slowly over bad roads.—New Jersey Highwayman.

The politician who shouts loudest in behalf of the taxpayer is really shouting to save his own political hide.

County Officials Voice Approval of Highway Bond Measure

Approval of the $6,000,000 Highway bond issue was voiced by county commissioners of the Arkansas valley at their recent meeting held in Pueblo

With one or two exceptions, the entire gathering favored the proposed amendment and expressed themselves as being entirely satisfied that the measure would go far in solving the highway building problem in Colorado. None could see wherein the amendment would result in increased taxes.

Commissioner W. L. Rees of Pueblo presided at the meeting.

Major L. D. Blauvelt, State Highway Engineer, spoke of his 2,000-mile inspection tour. He said that the roads all over the state were in splendid condition considering the dry weather.

A motion by A. P. Knucky of Prowers county, that a resolution be presented at the state convention of the commissioners, endorsing Major Blauvelt and his entire personnel for the next administration was unanimously passed by the association.

Commissioner W. H. Bartels told of the plans being made to entertain the commissioners in Colorado Springs during the state convention to be held on October 16-17. Besides a number of prominent speakers, business meetings, there will be automobile trips, a special show at the Burns theater and a banquet at the Antlers Hotel, he said.

Among those attending the Pueblo meeting were:

L. D. Blauvelt, state highway engineer; G. L. L. Gann, highway commissioner; Robert Higgins, state superintendent of road maintenance; Lewis Swink, district superintendent of roads; F. L. Clay, engineer state Highway department; James Bell, district engineer; H. W. Moore, Denver; H. P. Wilson, Denver; J. A. Zimmerman, Pueblo; Charles Stepp, road superintendent, Pueblo; Commissioner J. P. Harbour, O. G. Smith and W. L. Rees, County Clerk William Barber, County Attorney J. A. Phelps of Pueblo county; Commissioners George Elley, John M. Johnson, John M. Craft of Baca county; Commissioners Dan Carl, J. L. Thompson and Leve Dumbauld of Bent county; Commissioners J. E. Downey, J. H. Cowden and W. F. Tarbox of Crowley county; Commissioners Clarence Pond, William Kettle and F. S. Canda of Custer county; J. V. McCandless, Charles Somerville, Frank Steinmier and James McCandless of Fremont county; W. F. Decker and Ray McGrath of Prowers county.

One hundred and thirty-six years ago, or in 1786, Robert Burns wrote the following epigram on rough roads:

I'm now arrived—thanks to the gods!—
Thro' pathways rough and muddy,
A certain sign that makin' roads
Is not this people's study:—
Altho, I'm not with Scriptures cram'd,
I'm sure the Bible says
That heedless sinners shall be damn'd
Unless they mend their WAYS.

The road ahead for this nation leads back to the farm.

Press Comment

BUSINESS AND POLITICS

A most valuable lesson might be learned by Colorado people from the highways of this state. Here is a department of the state government that is free from the evils, both of partisan politics and of sectional partiality, and that is run honestly and with good business methods, for the public good.

Anyone in any part of the state can testify to the quality of the roads that are being built across the plains and through the mountains, while those who travel generally through the state know that the money is being spent impartially and that every county of the state is receiving its share of the benefits.

Such a method of carrying forward a huge work involving the expenditure of a great amount of money is a rare thing in political history. Such was not the case in the early days when the "state road fund" was regarded as the legitimate spoils of successful politicians. Such was not the case in regard to other enterprises undertaken nominally for the public good and made to serve the ends of selfish ambition or of mercenary greed.

Colorado highways money is spent honestly and impartially because the commissioners and the highways engineers are competent men and honest men, working sincerely and impartially for the public interests, and because there is back of them a governor who is not working to build up a personal machine or play narrow partisan politics or to feather the nests of himself and his friends.

The highways department is coveted as a rich prize by every avaricious demagogue and political schemer. The distribution of the highways money would give rich pickings into the hands of incompetent or dishonest officials, and it might easily be made the basis of the most powerful political machine this state has ever known.

Only an unceasing vigilance on the part of the highest State officials and the retention of the highways department in the hands of men like those who now hold its control can protect the public interests.—Pueblo Chieftain.

WHERE OUR ROAD MONEY COMES FROM.

The United States Bureau of Public Roads, of the Department of Agriculture, has announced an estimate of the total expenditure for construction and maintenance of roads in this country last year. In round figures, the Bureau's estimate is $600,000,000. Where did this money come from? The Federal Road Bureau states that it came from the following sources, as an nationwide average:

Motor vehicle revenues 19%, State road bonds 7%, local road bonds 33%, State taxes and appropriations 12%, Federal aid 14%, county, township and district taxes and assessments 14%, miscellaneous 1%.

There is available in the United States for street and highway construction approximately $1,360,000,000.

This huge sum is not all available for construction this year. The amount spent in total for highway construction and maintenance in 1922 will probably be less than three-quarters of a billion dollars. While this sum seems large, it represents an increase over 1914, for example, of only about 150%, while the increase in highway traffic since that date has been around 450%.

The immensity of the task confronting our highway builders in endeavoring to keep up with the increasing demand for modern highway improvement is obvious. Our highway traffic is apparently increasing three times as fast as our facilities for it are being bettered and increased.

FORT MORGAN GETS MODERN CONCRETE BRIDGE.

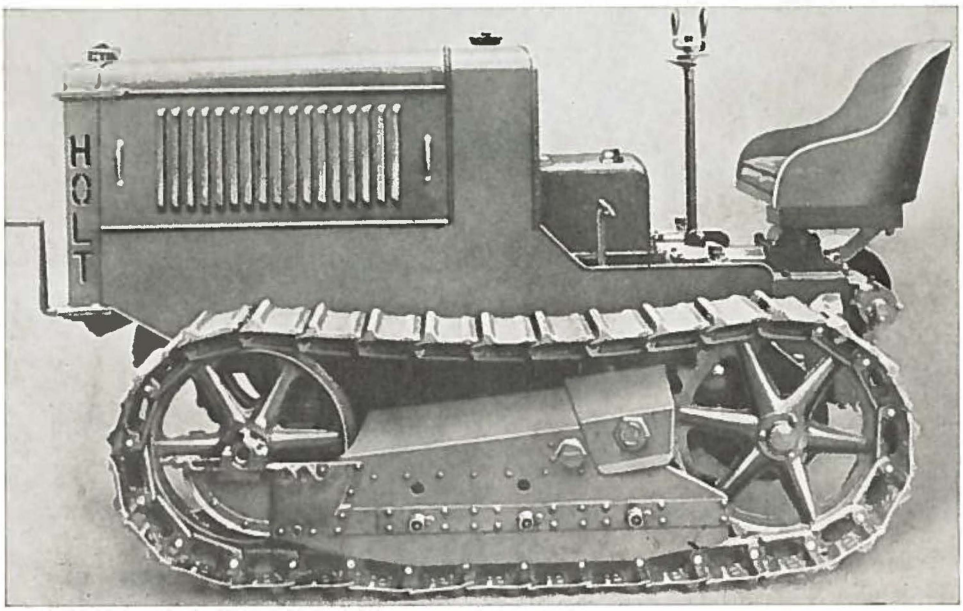
Announcement is made that work on a new $100,000 concrete bridge over the South Platte river at Fort Morgan will start immediately. This bridge will be 1,000 feet long and will have twenty 50-foot concrete girder spans.

Danzig, Poland, with a population of 350,000, has 561 automobiles—a small number for an American city of 10,000.

Detroit, with approximately 350,000 families, has one automobile to each three families. This is said to be the highest percentage in the world.

Bad road tax is more than good road tax.

SAVE YOUR TRUCKS *for* HAULING PURPOSES



Holt's Baby Caterpillar Tractor, Size T-35, Weight Approximately Two Tons

USE THE

HOLT T-35 TRACTOR

for Maintenance Work

it will pay!

ALL FEATURES OF THE 5 AND 10-TON HOLTS ARE INCORPORATED IN ITS DESIGN. THE STATIONARY POWER UNIT IS REGULAR EQUIPMENT. WITH IT YOU CAN DRIVE VARIOUS STATIONARY UNITS—ANOTHER REASON WHY THEY ARE 100 PER CENT EFFICIENT.

Length over all, 103 inches.
Height, 52 inches to top of hood.
Width, 48 inches.
Width of track, 11 inches.

Speeds—Miles per hour:
Forward—Low ------- 2 1/8
" Second ----- 3
" High ------ 5 1/4

Pressure per sq. inch, bearing surface track, 4 pounds.
Low speed, 2600 pounds.
Intermediate, 1850 pounds.
High speed, 1100 pounds.

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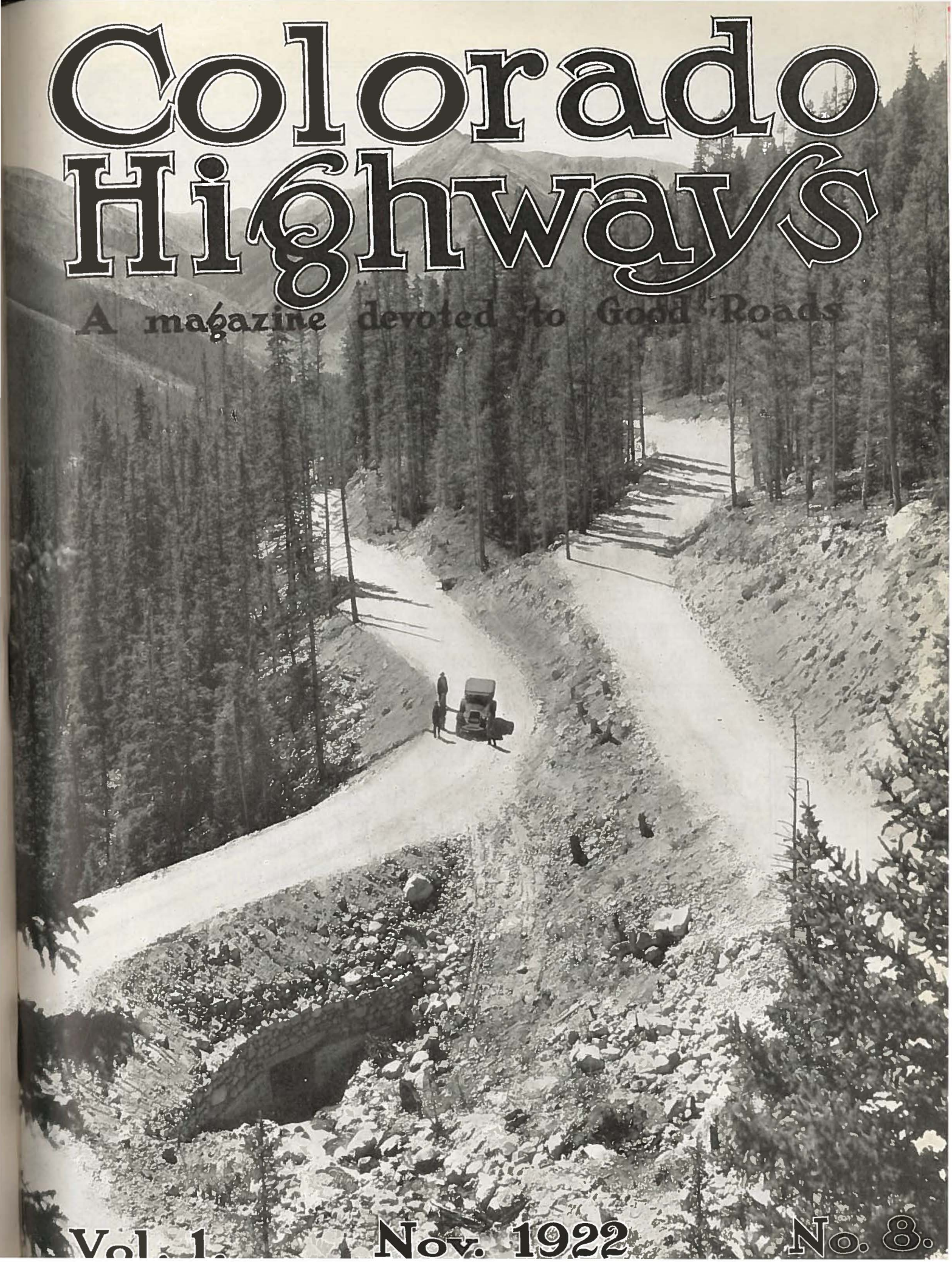
Colorado Highways

A magazine devoted to Good Roads



Vol. 1 Nov. 1922 No. 8.

Precision of statement and promise regarding the performance of the machinery they sell is something the salesmen in this organization are trained to.

Decision to buy of this organization brings a customer permanently into a relationship of friendship and co-operation that frequently eventuates in such confidence that many of our customers of years' standing order from us machinery that they have never seen and on which no price has been quoted, so sure are they of getting a square deal from this organization.

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DENVER

Colorado Highways
"BETTER ROADS"
VOLUME I. NOVEMBER, 1922. NUMBER 8.

A Message of Appreciation

BY L. D. BLAUVELT,
State Highway Engineer.

Adoption of the Good Roads Amendment at the November election marks a long step forward in road-building activities in Colorado.

I am sure that news of the passage of the amendment was received with unmixed joy by every citizen interested in the welfare and development of this State.

A finer compliment could not have been paid to those in charge of State Highway affairs.

Passage of the amendment enables the State to obtain $6,000,000 from the United States government in Federal Aid money. It makes available a total of $12,000,000 for construction of our main highway system roads during the next few years, without increase in taxes.

In addition to this $12,000,000 the State Highway Department will have available during the same period the sum of $8,000,000 for maintenance and for construction and reconstruction of roads not included in the Federal Aid Seven-Per Cent System.

The result of the vote on the bonds brings a wholesome and heartening conviction that the people of Colorado appreciate the efforts of the Highway Department.

Hearty praise is due the County Commissioners all over the State for their splendid efforts and co-operation in bringing about this happy result. I also take this means to thank the editors of the State for their whole-hearted support of the measure.

With our financial problem settled, it will be possible to work uninterruptedly toward completion of the highway system as laid out by this department.

Already plans are being formulated for the work that is to be done next year. The program will provide for adequate maintenance of those roads already built, in order that they may be kept smooth for travel. At the same time we will continue the policy of constructing roads to serve the greatest number of people and at the least possible expense to the taxpayer.

County Officials Hold Annual Meet

Commissioners Back Proposed Measures to Reduce State and County Expenses and Correct Inequalities of Existing Laws.

County Commissioners grouped in front of the Antlers Hotel, Colorado Springs, during their annual convention held October 16, 17 and 18.

IT was some convention! Over 250 county commissioners, road builders, their families and friends were there. For three days things were all awhirl about the Antlers Hotel in Colorado Springs—October 16-17-18. Harmony ruled supreme. Not a dispute to upset the proceedings. It was all business—straight through from the addresses of welcome to the wind-up.

The sixteenth birthday of the County Commissioners' Association of Colorado was celebrated in real, progressive style. Undoubtedly the proceedings will go down in the minutes as the most notable since the organization was formed.

There were five sessions, with a banquet—the annual Hardesty feast,—and a corking vaudeville entertainment, besides automobile drives and receptions for the ladies. The members of the entertainment committee did themselves proud—no gainsaying that.

In charge of the gavel was Gus. J. Johnson of Grand Junction. He was congratulated upon the able manner in which he conducted the sessions. The proceedings went along so smoothly that President Johnson took occasion to compliment the members upon their good behavior.

Speeches! Yes, they went over big. All the big road men of the state were there. While most of the talks were on the subject of roads, the commissioners found time to pass several important resolutions. Some of these will be presented to the next legislature in the form of bills which the association will recommend be enacted as laws.

This is the first time the commissioners have held their annual meeting before the legislature convened. Now they can go before the general assembly with a united front. Every bill proposed by the association has the unanimous support of the members.

The legislation proposed by the commissioners, it is claimed, will bring about economies in state and county administration and remedy inequalities in existing laws. Bills which they will advocate to the general assembly include:

A law creating a co-operative insurance plan whereby the state would bond county officials; an amendment permitting the monthly distribution of the gasoline tax among the counties; a bill that will be broad enough to include equitable means of taxing automobiles as well as livestock.

Another resolution called for the framing of a bill whereby commercial passenger-carrying vehicles and trucks operated by transportation companies will pay increased taxes—commensurate with their "use and abuse" of the roads.

A bill repealing that section of the present motor vehicle laws relating to "X" or free license tags, also is to be presented to the legislature by the association's legislative committee.

Likewise it was proposed to draft a bill limiting the number of tons that may be hauled by trucks over the public roads, amending the present statutes, which, it

(Continued on page 12)

New Road to Mesa Verde Park

State, County and Government Forces Combine in Constructing Highway Over Cumbres Pass —Another Beauty Spot to Attract Tourists

A TWO-WAY road into the Mesa Verde National park. This will be the net result of the work now in progress on Cumbres Pass by the State Highway Department.

At the eastern terminus it will connect at Antonito and at Pagosa Springs on the western end, with the Wolf Creek Pass road.

The northern route now takes the traveler over Wolf Creek Pass, one of the best known mountain passes in the state. On the southerly route the motorist will traverse Cumbres Pass, with an elevation of 10,365 feet.

By the Cumbres Pass, or more properly the La Manga Pass, the traveler will go out of the state for a short distance into New Mexico on his way to Pagosa Springs.

Work on the latter road has been in progress for the greater part of the past summer. It follows an entirely new survey and when completed will make accessible one of the garden spots of the state.

Along the new route are numerous small lakes. At the point where the road crosses the Continental Divide there is one small lake with outlets on both sides of the Divide.

The road will also open up one of the few great fishing spots left in the state. In this region mountain trout are said to abound in great numbers and fishermen look upon it as a veritable paradise.

At present the state and Conejos county are constructing ten and a half miles of road, reaching to the Divide, where the project connects with a Forest Service project, six and a quarter miles in length.

About five miles of the state-county project will be completed this fall. None of the road will exceed 6 per cent grade.

Ed. O'Neill has the government contract, which will take the new road to the state line. An agreement has been made by the government with the New Mexico highway department to rebuild the old road from Chama to the point where it crosses the Colorado line.

There is about eight miles of this work to be done. It consists of installing culverts and small bridges and regrading the old road.

Plans are being made to complete the road into Pagosa Springs next summer. It is said this can be done at minimum expense.

Snow will probably run the workmen out about the latter part of this month, and the two projects now under way will be closed down until spring.

The work being done by the state and county is by "force" account. Two outfits are employed—about 65 men and 40 teams. The road already constructed will average about twelve feet, with frequent turnouts. Later the road probably will be widened.

(Continued on page 16)

Showing State Highway work in progress on Cumbres Pass in Conejos County. Upper left: Conejos County forces removing difficult boulder material. (Circle) Clearing for new road. (Center) Engineering party, left to right, William Blackstone, George Fitzmorris, Robert Wallace, H. O. Lemon, Walter Wilson and W. M. McLeod. (Lower left) View from Station 194, with Conejos River in the distance. (Lower right) Map showing route of new road from Antonito to Pagosa Springs.

Colorado Highways
"BETTER ROADS"

Published Monthly by

COLORADO STATE HIGHWAY DEPARTMENT

Denver, Colorado.

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Owing to the necessarily limited edition of this publication, it will be impossible to distribute it free to any persons or institutions other than the state and county officials actually engaged in the planning or construction of highways, instructors in highway engineering, newspapers and periodicals, and civic associations. Others desiring to obtain Colorado Highways can do so by sending 10 cents for each number desired. Associations desiring to distribute the magazine can obtain it at cost in lots of from 500 copies up.

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EDITORIAL COMMENT

The ideal highway system—one interconnecting every county seat affording access to the state's agricultural, scenic, manufacturing and resort interests, and connecting with the principal highways of adjoining states.

This is the end to which the Colorado Highway Department is working.

Results have fully justified this policy. Conservative estimate places the improvement 50% this year. The State Highway Department's maintenance division is chiefly responsible for this splendid showing.

Never before has the traveling public in Colorado had such smooth highways to drive over. As a result auto owners have saved thousands of dollars in reduced costs of operation on their machines.

Good roads are a financial asset.

No doubt about it. One has only to note the rivalry between the citizens of different localities along the highways.

Very often they come to "ten points" over the amount of publicity their respective highways receive. Are these people wasting good energy over nothing?

Not by a jug-full. There is only one deduction to make. These roads are a tremendous asset to the communities they serve.

And, the progressive citizens take a pride in them. There is something of value at stake, to be sure.

The economic existence of the nation rests upon transportation. This was most forcibly demonstrated during the world war.

France's marvelous highway system was a prime factor in saving her from destruction.

Even back in the days of the Pharohs the value of transport facilities was appreciated. The marble roads they built give definite testimony to this fact.

When the last vestige of the Roman Empire disappeared their roads remained.

Likewise the roads of France today stand as a monument to the great Napoleon. They are still a source of national pride and economic wealth.

These great empire builders may have gone amiss on some other things but they played safe in constructing roads.

On another page of this issue there is an article by Charles T. Brock, assistant superintendent of Maintenance.

These few lines by Mr. Brock are good stuff. We like his style. He is a "go-getter". His ideas are full of meat for every man in the road game.

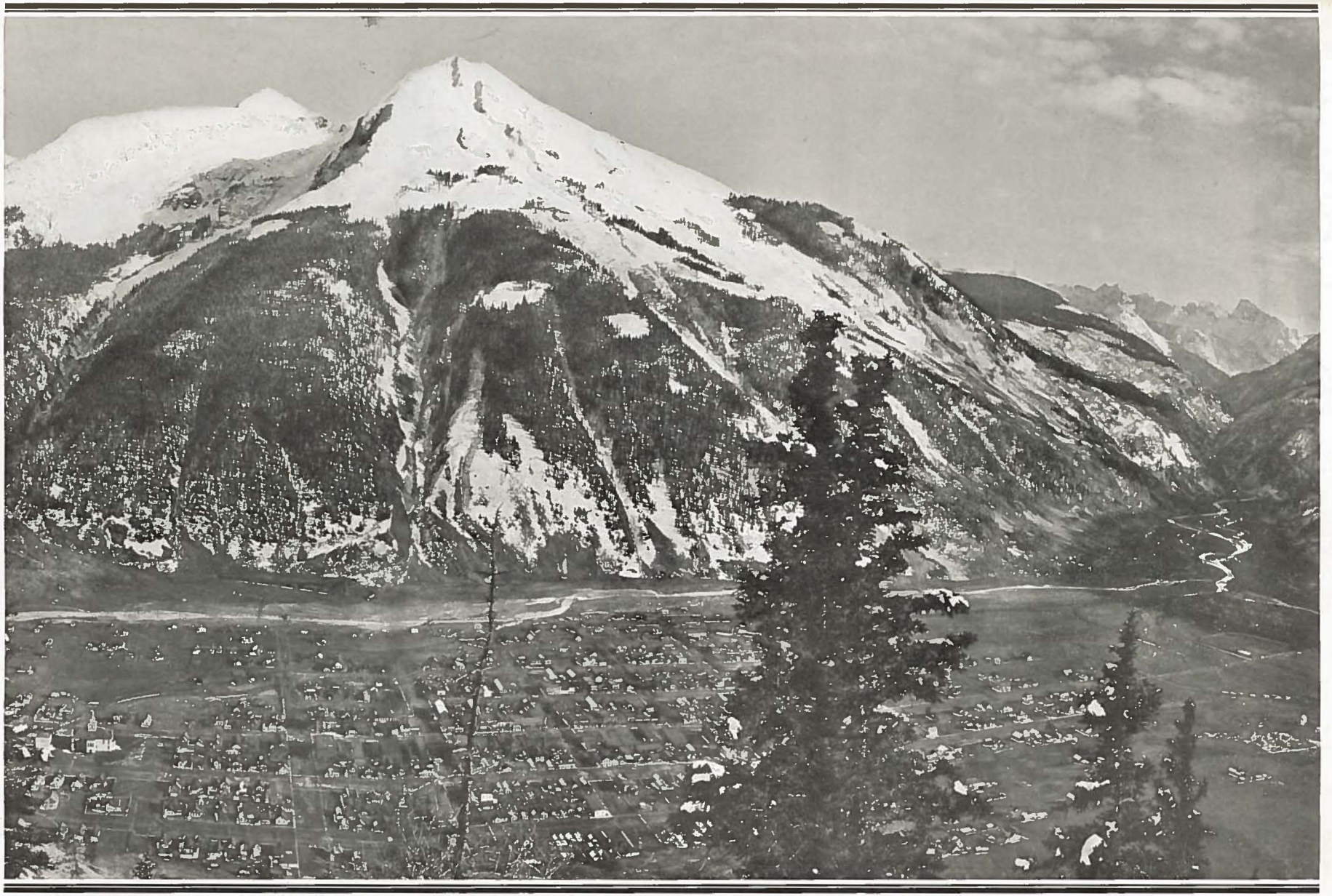
We are pretty sure he knows what he is talking about. A score of roads under his supervision in District No. 1 give mute testimony to his ability as a road man.

In the Denver-to-Limon road we have one of the finest examples of what can be accomplished through proper maintenance to be found anywhere.

Here we have almost a perfect boulevard at a time of the year when ordinarily roads are heavy with dust and sand from the long drought.

It was just a simple case of staying on the job continually says Mr. Brock.

Roads like this will add fame and fortune to Colorado. Let us all strive to get more of them.



SILVERTON, COLORADO—Winter scene—Mount Kendall in background. The Needle Mountains down the river at right side of picture are fourteen miles distant. On the Durango-Silverton-Ouray Highway, "The Scenic Route to the Mesa Verde".

Maintenance Keeps Roads Smooth

Constant Dragging Has Proved Efficient Method of Keeping Highways Free From Ruts—County Commissioners Co-operate in work

BY C. T. BROCK,
Assistant Superintendent of Maintenance, Division No. 1, State Highway Department

MAINTENANCE wins with flying colors. On all sides you hear praises for the State Highway Department on the good roads it has given the people of Colorado this year.

Most of those who speak about the roads comment upon their smooth condition. Few of the citizens know how this was accomplished. They see a truck pulling some sort of a contraption down the road, and their knowledge of the work ends about there.

But the dragging of this contraption over the roads at frequent intervals is the thing that has made the highways smooth for an ever-increasing traffic.

And here's where the Maintenance Division enters upon the scene. It is the duty of those connected with this division to see that everything possible is done to keep the ruts out of roads.

To maintain 4,400 miles of roads in smooth condition for the traffic of over 100,000 motor vehicles is no small job.

Some say it is the most important function of the Highway Department. Very often I am inclined to believe they are right, especially when a drouth hits us, such as we have had to contend with the past summer.

But dry weather should be no great handicap in keeping roads smooth if the work is handled right. A dry spell means that we have to do just that much more work—and keep at it continuously.

Wherever this has been done the roads have been smooth. In the places where the maintenance crews were allowed to shut down on the work during the dry spell the roads have been rough and difficult to drive over.

The finest example of how this works out may be found in the road east of Denver to Limon. This is a common, ordinary sand-clay road. Yet today, after six weeks without a drop of moisture, it is as smooth as the floor to drive over.

This result was obtained through constant maintenance, thanks to the splendid co-operation of the two counties through which the road runs. And the road will stay in this shape until the heavy thaws next spring. But then it won't be so bad, because of the splendid condition in which the surface has been kept during the past summer.

The traffic over the Denver-Limon road this year has been the heaviest in history. The bulk of the tourist traffic from Kansas and Missouri passed over this road. A count recently showed over 100 cars per hour. No dirt road without proper maintenance will stand up under such traffic conditions.

A few weeks ago the road to Lafayette was in bad condition. It was nearly impassable. Deep ruts were in evidence for a distance of about ten miles. We got busy with three outfits and in less than three weeks got it in shape. In places there were three and four inches of sand. This was removed to the sides of the road. Now this stretch is as fast as "greased lightnin'."

These instances are cited to show what can be done.

But first of all the maintenance men must have the full support and co-operation of the county commissioners. Without this they will be unable to succeed in any work they undertake.

The great necessity for adequate maintenance of our highways is now generally understood and appreciated.

In Division No. 1 we have roads of several different kinds of material, in the mountains one kind and in the plains another. The methods of maintenance must naturally be varied to meet conditions.

The roads through Clear Creek, Gilpin and Jefferson counties differ very much in the character of soil. In one stretch we have granite and down in the valleys of Jefferson county we must contend with adobe and sand-clay.

The scenic roads through Gilpin and Clear Creek counties are extremely difficult to maintain in places. This is also true in Jefferson county. Traffic over the roads during the summer months is extremely heavy.

For this reason it is essential that maintenance be carried on continuously in order to give any sort of a surface for the automobiles to move over. In the years to come this traffic will show a steady increase. With the completion of the highway over Berthoud Pass, which by the way affords the motorist one of the grandest mountain views in Colorado, a large increase of transcontinental traffic is sure to be recorded.

(Continued on page 12)

PHOTOS BY COURTESY OF DENVER TOURIST BUREAU

Two views of new Virginia Canon road recently completed by State Highway forces. Lower picture shows Idaho Springs in the valley below and Mt. Evans in the Distance.

New Highway Over Midland Roadbed

Old Right-of-Way of Colorado Midland Railroad to be Converted Into Scenic Drive Thru Eleven Mile Canon

AN automobile highway is to be constructed through the famous "Eleven Mile Canon" between Lake George and Howbert on the old Colorado Midland Railroad right-of-way.

Steps have been taken by the State Highway Department for the immediate construction of the new road.

This action on the part of the state is of prime moment to every citizen of Teller county. A survey is now being made by highway engineers to determine whether it will be feasible to use the right-of-way between Divide and Lake George.

The road when completed through "Eleven Mile Canon" will give another automobile circle trip from Colorado Springs. The canon is one of the most famous in the west and during the heyday of the Colorado Midland, was one of the big scenic attractions of the state.

The right-of-way of the "junked" railroad was a gift to the state by A. E. Carlton, the Colorado Springs capitalist. It is estimated that the roadbed is worth one million dollars.

A total of $60,000 has been made available for the construction of the first link in the new highway. The distance is eleven and three-quarter miles, with nothing over a two per cent grade, and no curves over 24 degrees.

By utilizing the railroad right-of-way between Lake George and Howbert, the present steep grade over Wilkerson Pass will be eliminated. At the same time it will afford the farmers of that section a splendid roadway for the hauling of their crops to market.

However, the present road over Wilkerson Pass will not be abandoned. This will form a part of the circle trip from Colorado Springs. Eleven miles of railroad ties will have to be torn up.

The work of surveying the road has been in the hands of George F. Davis, locating engineer of the State Highway Department.

Through the canon the motorist will find a very lovely landscape for the entire distance. It is extremely rugged in places, some of the cliffs rising 600 feet from the edge of the roadway. It affords a delightful change of scenery from the trip over the pass.

The road follows a quiet little stream through the canon, which is well stocked with trout, and gives very little trouble at flood stage.

There are three tunnels along the route. These will be used as a part of the highway. They are about 100 feet in length. The tunnels are 16 feet wide now, but will be widened to 18 feet. They are 18 feet high. Two of them are only a short distance apart near Idlewild. The other is about three miles below the station.

At present the roadbed is 14 feet on the fills, and 14 to 16 feet wide in the cuts. It is planned to widen the road to 18 feet.

The new road will be 905 feet lower than Wilkerson Pass which has an elevation of 9,500 feet at the summit.

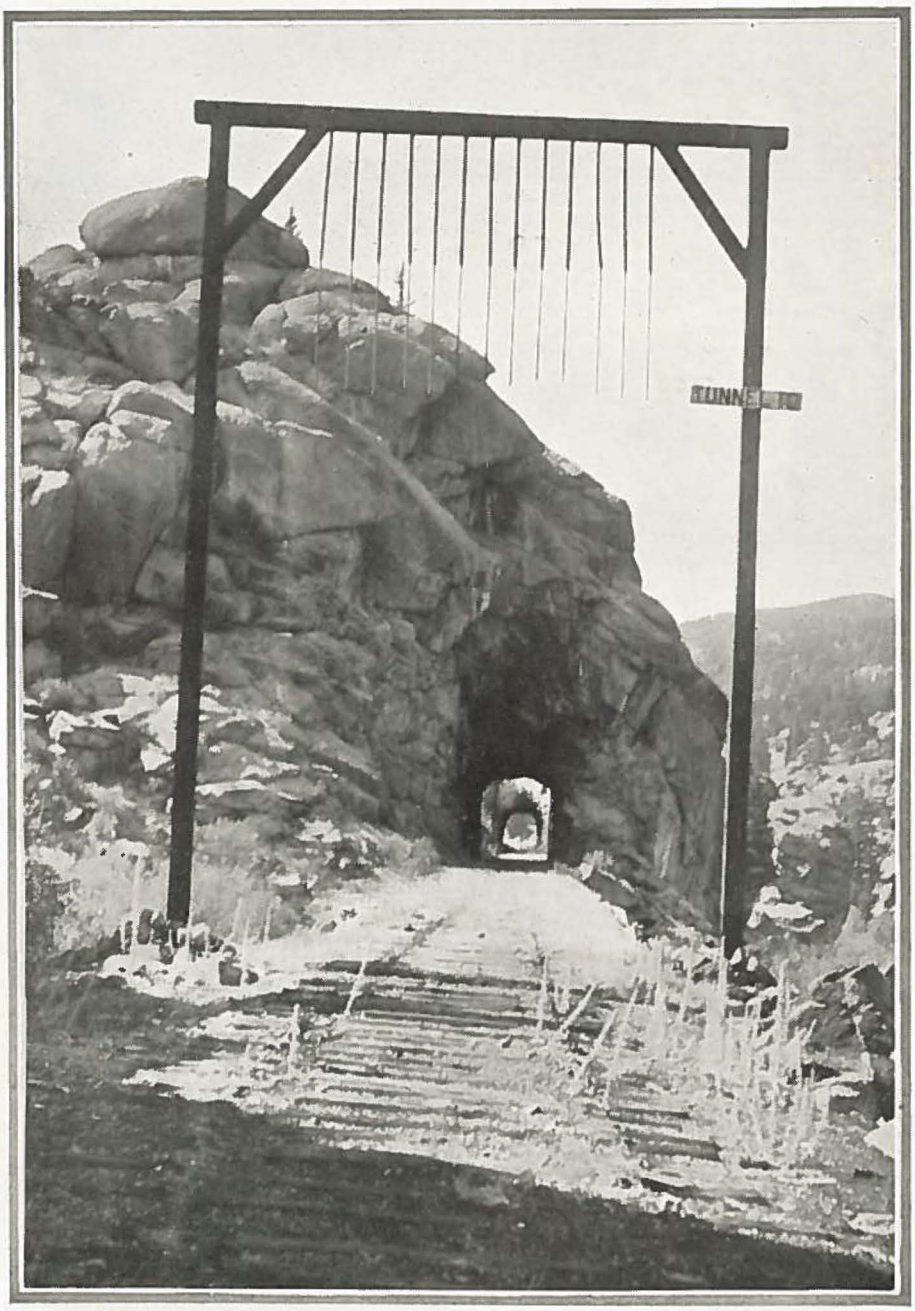
Only at one place does the new highway leave the roadbed. This is for a distance of about one mile, in order to eliminate about 550 feet of bridging.

In the eleven and three-quarter miles it will be necessary to build sixteen bridges. The longest of these will be 64 feet with a steel span. The rest will be frame structures. It is planned to use the foundations and timber from the old railroad bridges in the construction of the latter. The bridges are to be 20 foot standard structures, and will be acceptable should the road ever be widened to 24 feet.

There will also be 14 culverts which it is planned to construct from the timber taken out of the old bridges.

Later it is likely that the right-of-way

(Continued on page 12)



Picture shows tunnels Nos. 10 and 11, located on the old right-of-way of the Colorado Midland Railroad in Park County, between Lake George and Howbert, which will be converted into a modern highway. It is planned to widen tunnels two feet, to give a "two-way" road through them.

History of Road Building

BY COL. H. L. BOWLBY,
U. S. Bureau of Public Roads.

WHILE we know little about the roads that existed prior to the Roman Empire, we do know from records remaining that not only the Romans but the Egyptians, the Carthagenians, the Sumarians and other ancient peoples, employed much the same materials that we are today using in highway construction.

There is evidence that both the Romans and the Egyptians used a mineral cement. The Bible tells of the manufacture and use of bricks. As early as 44 A. D. the Romans used bricks in England. Actual scientific and quantity production did not begin, however, until 886, when Alfred the Great directed that bricks be produced under government supervision.

The earliest recorded use of asphalt was by the Sumarians, a people inhabiting the Euphrates Valley prior to the ascendancy of the Babylonians. An asphalt cast excavated at Logash near the mouth of the Euphrates dates back to 2850 B. C. As mortar for bricks, similar to the filler now used in brick city streets, asphalt was used in the construction of the Tower of Babel. One historian claims this same substance was used about 1500 B. C. to daub the basket which served to conceal Moses in the bullrushes when the children of Israel were suffering under the bondage in Egypt.

It was Nabopolassar, King of Babylon, who, about 500 B. C., first used asphalt as a filler for brick pavements. His son, Nebuchadnezzer, continued the practice. In the Western Hemisphere asphalt was used in ancient times by the Incas, who established an elaborate system of highways in Peru and Ecuador. Thus we see that cement, brick and asphalt instead of being products of exclusively modern use, really are world-old materials, the use of which has been handed down to us through the centuries to be improved upon and adapted to civilization's growing needs. The same is true of stone, except that in modern usage stone is crushed for use in road building, whereas in the days of Rome's greatness, stone was used in the form of large slabs frequently two feet thick. Roads of this type carried Caesar's armies forward to conquest.

Herodotus tells us that in Egypt a great king built a magnificent road across the sands for the transportation of materials for the Pyramids, employing for this purpose 100,000 men for a period of ten years. This road was built of massive stone blocks and was lined on both sides with mausoleums, statues and temples. Traces of what may have been a part of this ancient highway are today found near the great Pyramids and comprise what is probably the oldest remains of a road surfaced with stone.

Early historians write of wonderful roads radiating from the city of Babylon about 2,000 B. C. and running to Susa, Ecbatana, Sardis and Ninevah, as having been paved with brick. The ancient Persians, Assyrians, Carthagenians, Chinese and Peruvians were all renowned road-builders. Their works, however, have passed away and the records of their great achievements are now lost to mankind.

Specimens of Roman roads are still to be seen in Rome and Pompeii. The "Appian Way" or "Queen of Roads", begun by Claudius Appius about 312 B. C., led from Rome to Capua, a distance of 142 Italian miles. This road was later extended to Brundisium, sometimes called Brindisi, a total distance of 360 miles, and was finally completed by Julius Caesar. It was in excellent condition until 500 A. D.

The "Flaminian Way", the second of the great Roman roads, was begun about 220 B. C. This road crossed the River Nar about 60 miles from Rome by means of a great stone-arch bridge, with a central span of 150 feet and a rise of 100 feet. The "Flaminian Way" originated at the Milvian Bridge in Rome and terminated at the bridge in Rimini. Other famous Roman highways were the Aurelia, Aemilia, Cassia, Latina, Solario and Valeria. When Rome was at the height of her glory no less than 29 great roads radiated from her gates and the empire was well served with highways that have endured to this day in Italy, Spain, England, Gaul, Illyricum, Macedonia, Thrace and Egypt.

From the days of the ancients, road-building has developed until it is today a principal industry in every civilized country of the world—the United States, England, France and Germany leading all other nations in its application. Its development has brought about many innovations, and while the basic materials employed by the ancients are still in use, many new materials have been evolved and applied with success.

The United States, which stands at the dawn of the greatest road-building era in all history because of the development of the motor vehicle, leads all nations in road building.

Those living today will see the time when the United States will have the finest and most ertensive system of arterial and tributary highways the world has ever known, a system of beautifully paved roads, properly located, splendidly shaded with trees, adorned with hedges and shrubbery, edged with sidewalks and gutters, lighted by electricity, kept in repair by working patrols and protected against highwaymen by mounted police. Grade crossings will have disappeared and our rural highways will equal in beauty and practicability the most beautiful and practical of our city streets. Rural life, therefore, because of these and other modern improvements, will approach more closely the ideal of human existence and young men from the city will seek life in the country.

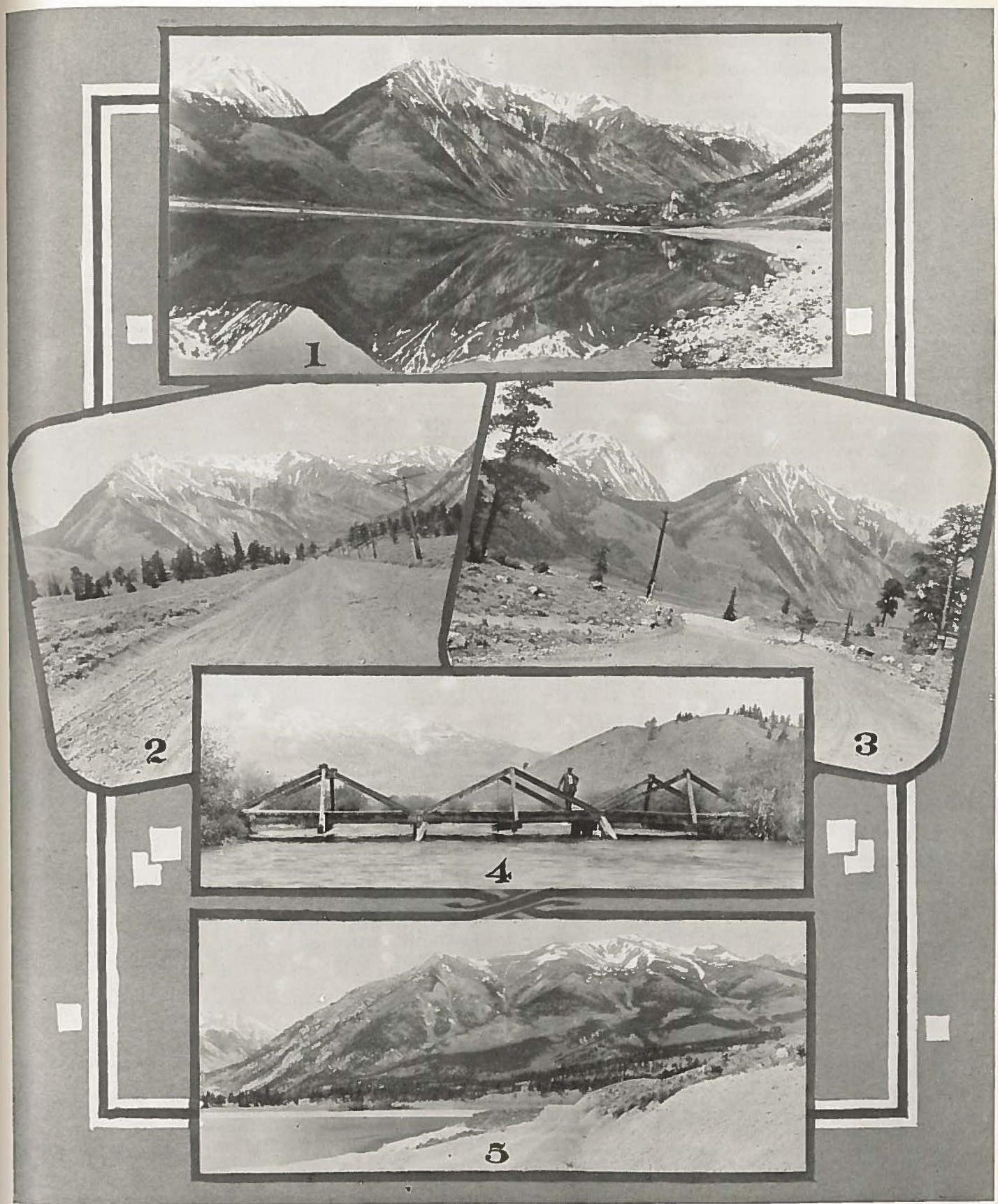
Highway work is constantly developing new types of roadways. Its development in America has brought many peculiar types of pavement ranging from the old earth roads and military plank roads down to Portland cement concrete and those refined petroleum asphalt pavements now largely manufactured since the discovery of asphaltic petroleum in California and Mexico. Native lake asphalt is still in use but the bulk of the asphalt used in paving is now manufactured from petroleum oil. Many odd types of roads have been tried only to fail because of cost, climatic or traffic conditions. There have been in the United States probably more experiments with odd and unusual materials in road-building than in any other country in the world.

It was at Newton, Mass., in 1908 that the molasses refuse of a sugar refinery combined with lime was first used as a binder for road materials, but it was found impracticable because of its increasingly high cost and the fact that the binder was somewhat soluble in water. The road, however, did sustain traffic for a number of years. Plank roads were legion in the United States during the pioneer days and are much used today by military engineers. Road binders have been made from sulphite liquors obtained from tanneries and attempts have been made to burn roads that were surfaced with clay, so as to make a surfacing material approaching brick in hardness.

A recent attempt to harden clay roads by burning was made near Clarksdale, Miss., in 1904, when experiments conducted by the United States Bureau of Public Roads proved to be successful but too costly and practicable only in regions where an ample supply of timber could be secured for fuel. Roads have been constructed of chats from zinc mines, slag from blast furnaces, and shells from the sea. Oyster and clam shell roads are now to be found in many places in the coast states. Rubber has also been utilized as a road material in experimental highway construction. In fact, successful rubber roads have been in very limited use in India for some time. The ordinary broken stone or macadam road, invented by John Macadam, a Scotch road engineer of Ayrshire, has until recently been in general use. These are now giving way to the hard surfaced roads that are better adapted to automobile and truck traffic. Seaweed, cotton, hay and straw have often been used in the construction of roads, and in contrast to such materials it is interesting to note that iron and steel have been used. A steel road has been in use in Calencia, Spain, for twenty years. Portland cement roads in America are now commonly being reinforced with steel.

While highway improvement has made tremendous strides in the United States in recent years, it is still in its infancy. Eighty-five per cent of American roads are yet to be improved. It is not now so much a question of raising the money required to build good roads as it is the problem of spending wisely the large sums available in every state for this purpose.

Colorado Leads World in Outdoor Scenery



Beautiful scenes on or reached by State Highways. 1. Road around south shore of one of the Twin Lakes. 2. A stretch of road leading to Independence Pass and Aspen. 3. Mts. Faith and Hope. 4. Picturesque bridge in Lake County. 5. Mt. Elbert, 14,400 ft., skirted by highway.

ACTIVITIES OF STATE AND

Colorado Harvests Another Big Tourist Crop

RECREATION seekers to the number of 219,164 visited the Rocky Mountain National Park during the twelve months period ending October 20th. They traveled in 52,112 motor cars.

These are figures announced by Roger W. Toll, superintendent of the park. For seventy-two days rangers stationed at three entrances to the park kept tab on the number of persons entering.

There were automobiles from forty states and visitors from forty-five states registered within the park. The traffic census showed the Fall River entrance to be the most popular, with Beaver Point second.

This is about a 15 per cent increase over the previous season. In 1915, 5,000 automobiles visited Estes Park. The number of persons registered that year was 31,000.

It is estimated that $40,000,000 was spent and left in the state by tourists this year. This cash was distributed in nearly every section of the state. For instance, a survey showed that an average of $2,000 was being spent by the tourists in Cheyenne Wells located in eastern Colorado, while the cash crop that Gunnison merchants reaped from the tourist trade equalled $4,000 per week.

Colorado's cash receipts from the tourist crop this year was five times the annual gold output, and twice the total value of our wheat crop.

Our annual state investment for good roads has been about $3,500,000, and is probably the best investment that the state makes from the viewpoint of the business man.

To increase the cash receipts from the tourist crop it will be necessary to make our unsurpassed mountain beauty spots more accessible to the motorist nomads.

Grading on New Broomfield Paving is Started

GRADING work was started a few days ago on the Broomfield cut-off road, which connects with the present end of the concrete paving at Broomfield.

Contract for the grading and paving was awarded to Miller, Douglas and Hanes.

Completion of the work at present under way at Broomfield will eliminate two grade crossings over the Denver-Boulder interurban railroad. The new road runs through a part of the Zang farm, parallel to the railroad tracks.

The project is one and a quarter miles in length and ends on top of Goodhue Hill, above the Zang ranch. The grading will be done this fall and the concrete laid next spring. Cost of the new work totals about $56,000.

Plans are now being made to continue the paving over Goodhue Hill to a point about a mile south of Lafayette. Later the paving will be extended through Lafayette, to connect with a paving project which has been proposed on the Boulder road.

The editor would be glad to have brief items for this column from county officials, road superintendents, maintenance overseers, and others interested in road building. Copy should reach us by the 20th of the month preceding publication.

La Salle "Cut-Off" Road Contract Awarded

FOR nearly a score of years road boosters of Weld county have discussed the La Salle cut-off road. A few days ago this dream of years moved one step closer to realization, when the State Highway Department let a contract to C. R. Conover & Bro. of Denver for the grading of ten and one-half miles of the road.

Under the contract, which was for $32,997.00, the contractor will prepare the grade preparatory to the laying of concrete next summer The project starts from the present end of the cement below the La Salle bridge and runs to a point two miles north of Platteville.

The new road will reduce the distance between Greeley and Platteville about three miles, in addition to eliminating the difficult route through the river bottom. The new route runs parallel to the Union Pacific tracks.

Traffic Count at Trinidad Shows Heavy Increase

SOME interesting traffic "dope" comes to hand from the maintenance men located at Trinidad.

It shows that a total of 1,760 vehicles of all kinds passed over the three main roads serving Trinidad during a ten-hour day.

The census was carried on for six days and the above figure was the average. The roads on which the count was taken were: No. 26, Raton Pass to Pueblo; No. 29, Trinidad to La Junta, and No. 55, Trinidad to New Mexico line.

The daily average on No. 26 was 1,031 vehicles; 332 on No. 29, and 397 over No. 55. A large proportion of the cars traveling over No. 55 were tourist cars either going to or coming from New Mexico and Texas points.

A total of 10,566 vehicles was the count for six days. The count covered ten hours of the day.

These figures are the first that have been taken in the Trinidad district in several years and the increase in traffic has exceeded estimates made by highway engineers of that district.

Of the total, 5,047 were Colorado cars; 2,075 tourist cars; 1,640 trucks, and 1,804 horse-drawn vehicles, which shows that Old Dobbin has not entirely vanished from the scene.

The traffic count will be used by the engineers as a basis for determining the type of surfacing that is to be used on the roads of this district in the future.

Yellowstone-Mesa Verde Highway Planned

AN excellent highway connecting Yellowstone and Mesa Verde National Parks will be the ultimate result of the work now being done by the State Highway Department on the Paradox and Rangeley roads north and south of Grand Junction.

With the completion of these roads early next year, only one link of six miles between the two parks will remain to be built, according to William Weiser, member of the State Highway Advisory Board.

This short link is in a forest reserve to the north from Vernal, Utah. It is said that the U. S. Forest Service already has allotted funds for its construction.

This road will complete a giant circle trip from Denver, the gateway to the National Parks.

Thousands of persons visit Yellowstone Park each year, and with the road from the south entrance open to the Mesa Verde, it is calculated that a large number of them will take advantage of the beautiful scenic attractions which the new road will afford.

It is one of the most scenic routes to be found anywhere in the west, passing as it will through a part of Wyoming south into the Uintah basin, south to Grand Junction, where the Grand Mesa and Monument Park will be available to the tourist, south through the Unaweep Canon and the world's greatest rare mineral district, and on to the Mesa Verde cliff dwelling ruins.

During the past summer considerable construction work has been done on both the Paradox and Rangeley roads under state supervision.

Work on Highway Bridges Rushed by State

SEVERAL important improvements have been made on the road south of Colorado Springs to Pueblo this past summer. On this stretch of the "North and South Highway" several new bridges have been installed. A new steel bridge is nearing completion over the Fountain river at Buttes.

Considerable difficulty has been experienced in the construction of this bridge due to unusual soil conditions. A battery of pumps was required to keep water out of the foundations for the abutments. Floods during the summer also retarded the work several days at a time.

The engineers on the project, however, confidently expect that the bridge will be opened for traffic in a few days.

During the past month the 150 ft. span steel bridge over Salt Creek, located about two miles east of Pueblo, was completed.

The new Arkansas River bridge near Las Animas, consisting of five 150-ft. steel spans, is nearing completion.

COUNTY ROAD BUILDERS

More Colorado Beauty Spots to Attract Tourists

TEN new graded highways each varying from ten to thirty miles in length, have been completed under the supervision of the U. S. Forest Service this past summer.

These roads tap hundreds of square miles of magnificent mountain and forest lands in Colorado, and make accessible to automobile nomads virgin empires of scenic grandeur.

They were constructed through the cooperation of the government, state and counties at a cost of approximately $1,300,000.

Rapid progress has been made on the Durango-Silverton-Ouray road, known as the "$1,000,000 Highway", and which taps the world-famous Red Mountain district. Construction on this road is in its final stages, and by the time the tourist season opens next year, it will be ready for travel.

By making this road comfortable for travel, road experts say, one of the most beautiful sections of the state will be ready for exploitation.

From the D.S.O. road ingress to the San Juan national forest will be possible. Until recently only rough trails existed between the three towns. The road is fifty miles in length. The first section from Durango to Silverton was completed at a cost of $600,000 under Federal Aid. This sum will be raised to $1,000,000 with the completion of the second section.

In describing the beauties of this section of the state an engineer who has been employed on the project, said:

"When they finished with the Durango-Silverton-Ouray district in making scenery they exhausted their supply.

"This section of the state from a scenic standpoint has all others that I know of beat a country block. If there is such a thing as a "corner on scenery" they have it down there."

The roads and trails which have been built through the forest reserves of the state this year, will make it possible to view at close range many scenic marvels heretofore unrevealed.

Included in the list of new highways built this year into the forest reserves are: the short, but important six miles from Bennett Creek to the Cache La Poudre river; the "Cuchara-Stonewall" road from La Veta to the Blue Lakes in San Isabel forest; from Beulah to the north Hardscrabble; known as the Squirrel Creek Canon road; another link on the Berthoud Pass highway; and a new road from the town of Marvine to Trappers' Lake in the White River forest.

Also there has been completed a branch road from Cochetopa Pass eleven miles west of Saguache into the Cochetopa forest. This recreational region heretofore has been inaccessible.

Another road is nearing completion from Greenwood west to Westcliff, which will open up the Wet Mountain and Sangre de Cristo ranges. A rough wagon road here is being transformed into a motor highway.

A new road twelve miles long also has been constructed from the town of Mesa to the wonderful Mesa Lakes and the Grand Mesa. Here the tourist visitor finds unusual formations of rock and strange scenic splendors.

Plans are being made to extend the road across the Grand Mesa to Alexander Lakes.

State Highway Surfaced With Silver

STATE road covered with silver— This would not be possible anywhere else except in Colorado. We have so much of the precious dust that we can afford to spread it over our highways for surfacing.

The silver surfacing was used on eight miles of the Durango-Silverton highway, completed this month.

The entire eight miles of road was covered with a heavy surfacing in thirty days from the time the contract was awarded. Near the right-of-way there was an abandoned silver mine dump. It was found that the material would make excellent surfacing and it was used. Wood & Morgan were the contractors.

A goodly amount of silver content has been found in the dump.

Motorists have noted a great improvement already, and when the surfacing receives moisture this stretch of road will become one of the best pieces along the famous "$1,000,000 Highway".

Fort Collins Paving South Nears Completion

WORK is being rushed to completion on the paving south of Fort Collins to Loveland, where the gap in the concrete between these two towns is rapidly being closed. By early spring this road will be completed, and the work of extending paving south of Loveland toward Longmont will probably be started.

It is expected that within the next two or three years that both roads north from Denver, the one to Greeley and the other to Fort Collins, will be paved for the entire distance.

At the same time plans call for the paving of a considerable stretch of the Denver-Colorado Springs Highway. Arrangements have been made for the immediate grading of four and a quarter miles of the road from Colorado Springs to Breed. This work includes paving next spring.

The State Highway Department also has about completed plans for an extension to the paving ending at Wolhurst. It is planned to eliminate the dangerous grade crossing at this point with a subway under the railroad tracks.

In line with the policy of the Bureau of Public Roads every grade crossing between Denver and Colorado Springs will be eliminated with the construction of new roadway in future years.

The project planned to connect with the present paving at Wolhurst is two and a quarter miles in length. Besides eliminating the grade crossing, it will be built in a straight line, thus doing away with a right-angle turn in the road and two steep grades.

Advisory Board Meets to Set Highway Budget

MEMBERS of the Highway Advisory Board will meet in Denver on November 15 for the purpose of drafting the 1923 budget for the State Highway Department.

H. A. Edmonds of Fort Collins is chairman of the board, which is composed of seven members.

The meeting this month will be the most important of the year, because the expenditures for the coming year will be fixed during the session. It will probably last three or four days.

After the budget has been fixed it will be submitted to the Governor for his final O. K.

For the last two years the Highway Deartment has been on a cash basis, and contractors and others employed on road work have been paid promptly for all duties performed.

Every effort will be made to continue this policy during the ensuing year.

It has been indicated that a liberal appropriation will be made for maintenance in 1923. This phase of the Highway Department's activities has produced splendid results the past year.

Logan County Completes Big Road Program

A TOTAL of 80 miles of roads has been graded and surfaced in Logan county the past summer by the State Highway Department.

This is a record for state work in this county. The work included 28 miles of surfacing on the D. L. D. Highway, 31 miles on the Lincoln Highway, 18 miles on the D. L. D. west of Sterling, and 3 miles on the road south from Atwood, which also has been improved in Washington county.

A few days ago W. A. Lewis, resident engineer of the highway department, opened for traffic the new road over Riordan Hill east of Sterling. The new road is south of the old road and has a maximum grade of 3½ per cent, compared with 12 per cent on the old route.

The D. L. D. highway has been gravel surfaced the entire distance between Sterling to the Colorado-Nebraska line. Nearly all of the work has been done with farm labor, who were paid on the yard-mile basis.

The cost of the work by this plan averaged $400 per mile, including engineering and supervision. Availability of materials and the splendid co-operation of the Logan county commissioners were big factors in keeping down the costs, says Engineer Lewis.

Work on the concrete paving south of Sterling has been shut down for the winter and traffic has been turned on the stretch completed. The remaining two miles of paving will be finished in the spring, according to Lanier, Selander & White, contractors.

County Officials Hold Annual Meet

(Continued from page 2)

is claimed, does not cover conditions in Colorado.

Welcoming addresses were made by Mayor Ira Harris and C. P. Bennett, president of the Chamber of Commerce.

Other speakers were: President Johnson, Major L. D. Blauvelt, state highway engineer; Senator David Elliott, Willis Strachan, district attorney; H. A. Edmonds, president of the State Highway Advisory Board; J. W. Wood, Public Examiner; Edwin Mitchell, Auditor, and Robert H. Higgins, Superintendent of Maintenance, State Highway Department, and Col. Peck, of the U. S. Forestry Service.

A large part of the discussion was devoted to the $6,000,000 good roads bond issue voted at the polls on November 7. The big majority by which the measure carried was largely due to the efforts of the county commissioners, who more than any other public officials, realize the great need for better roads in Colorado.

Officers elected were: J. W. Shy, of Cheyenne Wells, president; W. H. Bartell, Colorado Springs, first vice-president; H. G. Tiffancy, Brighton, second vice-president; Dr. George Sullivan, Gunnison, third vice-president; and T. W. Monnell, Montrose, re-elected secretary and treasurer.

Selection of the city in which to hold the 1923 convention was left to members of the executive committee.

On Monday night, October 16, the commissioners were the guests of the Out West Printing Company at an entertainment given at the Burns theatre. Herbert Riley was in charge of arrangements.

At 8 o'clock the following evening they sat down to a sumptuous dinner as guests of the Hardesty Manufacturing Company of Denver. T. H. Patterson, vice-president of the concern, was on hand personally to supervise the affair. As on previous occasions, the banquet was one of the "high-lights" of the convention.

Maintenance Keeps Roads Smooth

(Continued from page 6)

A big increase of travel also is noted on the Virginia Canon road which was completed for a distance of five miles in the direction of Central City this summer. At present this highway from a scenic standpoint compares favorably with any in the state.

And with the completion of the remainder of the road into Central City, I believe, will afford a diversity of scenery unsurpassed anywhere. An airplane view could hardly be any more thrilling than that to be had from one side of the Virginia Canon road, while the other impresses one in the same way as a canon drive.

A patrol system is maintained on these roads. We have found that a truck and blade give the best results in keeping the surface and shoulders in condition.

The patrolmen also repair the guard rails and retaining walls. On the steep grades they have installed concrete drain boxes which are placed along the roads to catch the water which runs off the banks. The concrete boxes prevent the ditches from washing out and the water is kept from the roadway, being diverted from the road down the mountainside without doing damage to the surfacing.

A good patrolman also keeps the weeds cut from along the highways and he sees that the markers are repainted and kept in repair.

His most important duty, however, is to keep the road surface smooth and the bridges passable. He should keep all culverts and ditches open. No water should be allowed to stand on the surface of an earth road. Road surface defects should be repaired immediately. Generous use of a light grader and drag will accomplish this result.

Maintenance in this state can be compared best with dry farming. That means frequent cultivation in order to retain the moisture in the ground. Frequent dragging will keep a light emulsion on the surface of the road. It also serves to keep the traffic moving over all parts of the road instead of over one line, which soon results in ruts.

New Highway Over Midland Roadbed

(Continued from page 7)

will be utilized from Howbert to Hartsell, where the road will connect with the present highway to Fairplay. This link of the road is out in open country and practically all on embankment, with a few bridges which do not wash. It is of easy grade and will save about four miles over the present route.

A survey is now being made of the road between Lake George and Divide with a view of using this section of the right-of-way for a highway.

The farmers of the region are highly in favor of the latter project, because it will afford them an easy grade for the hauling of their products to market. Owners of trucks say it will enable them to haul twice the amount of tonnage they are now carrying.

Of late years the Divide region has developed into a large lettuce center. During the past season several hundred crates of mountain lettuce were harvested in that section and marketed at fancy prices. Incidentally it is the home of Richard Quinn, one of the lettuce "kings" of Colorado.

The distance between Divide and Lake George is 13½ miles over the proposed railroad route, and is slightly shorter than by the present highway, which has several steep grades.

BIDS RECEIVED DURING OCTOBER, 1922

PROJ. NO.	LOCATION	COUNTY	LENGTH MILES	TYPE	LOW BIDDER	PRICE BID
F.A.P. 173	St. Chas. River, So. of Pueblo	Pueblo	83 ft. span	Conc. Girder Bridge	J. R. Donaghy	$24,649.95
F.A.P. 190	Dillon-Kremmling	Summit	1.643 mi.	Grad. and Bridge	Colo. Br. & Const. Co.	36,504.33
F.A.P. 216-A	Kansas State line to Holly and N. W.	Prowers	5.377 mi.	Gravel Surf.	W. A. Colt & Son	52,607.32
S.P. 655	W. of Bergen Park	Jefferson	18 ft. span	Conc. Bridge	T. J. Hostetter	2,479.50
F.A.P. 210-A	DeBeque Grand Valley	Garfield	5.302 mi.	Gravel Surf.	F. L. Hoffman	52,209.03
F.A.P. 215	San Juan River Pagosa Springs	Archuleta	125 ft. span	Steel Truss Bridge	Plains Const. Co.	30,260.65
F.A.P. 225	Aurora, East	Adams and Arapahoe	1.003 mi.	Conc. Paving	W. F. Pigg & Son	30,647.90

PROJECTS BEING ADVERTISED FOR BIDS

PROJ. NO.	LOCATION	COUNTY	LENGTH	TYPE	BIDS TO BE OPENED
F.A.P. 116-A	Colo. Spgs.-Breed	El Paso	4.185 mi.	Conc. paving	Nov. 10, 1922

PROJECTS WHICH HAVE BEEN SUBMITTED TO THE B. P. R. BUT NOT YET ADVERTISED

PROJ. NO.	LOCATION	COUNTY	LENGTH	TYPE
F.A.P. 168-B	Northwest of Lamar	Prowers	3.286 mi.	Gravel Surfacing
F.A.P. 211	Meeker-Craig	Rio Blanco	1.679 mi.	Gravel Surfacing
F.A.P. 218-B	West of Lamar	Bent	3.489 mi.	Gravel Surfacing

PROJECTS FOR WHICH PLANS ARE BEING PREPARED

PROJ. NO.	LOCATION	COUNTY	LENGTH	TYPE
F.A.P. 125	Sapinero, West	Gunnison	2.819 mi.	Grad. and Steel Arch Bridge
F.A.P. 157	Buena Vista to Otero Lake	Chaffee	14.082 mi.	Grading and Drainage
F.A.P. 159-A	Ramah-Mattison	Elbert	6.288 mi.	Sand Clay Surfacing
F.A.P. 223	Kremmling-Muddy Pass	Grand	4.9 mi.	Gravel Surfacing
F.A.P. 224	Morrison-Baileys	Park	5.621 mi.	Mountain Grading
F.A.P. 229	Pueblo-Florence	Fremont	1.756 mi.	Gravel Surfacing
F.A.P. 231	6-Mile Cr. E. of Pueblo	Pueblo	0.455 mi.	Steel Truss Br. and Approaches
S.P. 694	Lake George-Howbert	Park	11.777 mi.	Grading

THE road surface above and the culvert below have widely different requirements. Rigid materials that make a satisfactory road surface will sometimes shatter under the stresses to which a culvert is often subject.

←rigid above

The rigid road surface is favored by many engineers because it offers smooth travel to traffic, and resists the abrasive action of heavily loaded wheels.

←elastic below

An elastic culvert construction is desirable in all cases, to withstand the great pressures that may be developed by shifting or hardening soils, or by the impact of traffic.

ARMCO CULVERTS

—because of the arch-like corrugated structure of the sheet metal, have the high elasticity necessary for reliable culvert service. With this they combine the indispensable quality of *purity* of metal, that makes them unique among all constructions in rust-resistance.

Fifteen years' service has proved that "Armco Culverts Endure."

The R. Hardesty Mfg. Co.

DENVER, COLORADO.
Woods Cross, Utah. Missoula, Mont.
Pocatello, Idaho.

ARMCO
Ingot Iron

War Materials Available For Road Building

The following supplies are available for transfer to counties and municipalities in the State of Colorado for use in construction and maintenance of public roads.

Arrangements may also be made to rent equipment to contractors engaged in construction of Federal Aid and State Projects.

Requisitions should be mailed to State Highway Department, care of H. Roe, Denver, Colorado.

Description.	Price Each
Adze	$ .75
Anvils, 34-lb.	2.00
Anvils, 75-lb., each	3.75
Anvils, 90-lb., each	4.50
Asphalt, barrels	cwt. 2.00
Auto jacks	1.50
Axe heads	.35
Axe handles	.45
Axe handles, short	.35
Axe, fire	.45
Axes, Hunters, each	.35
Bars, wrecking, 18-in.	.30
Bars, wrecking, 24-in.	.50
Bars, wrecking, 36-in.	.75
Bars, pinch, 60-in.	1.00
Bars, digging, 8-ft.	1.50
Belting rub, 2-in.	ft. .20
Belting rub, 2½-in.	ft. .20
Blox, Double Tack, 3-in.	1.50
Blox, Double Steel, 8-in.	3.50
Blox, Single Snatch, 4-in.	1.50
Blox, Single Snatch, 6-in.	1.75
Blox, Single Snatch, 10-in.	3.50
Blox, Single Snatch, 14-in.	7.50
Braces, Ratchet, 8-in.	1.00
Brooms, Stable	1.00
Cans, Galv. Iron, 20-gallon, each	.75
Cans, Galv. Iron, 30-gallon, each	1.00
Canvas water buckets	.25
Carts, Dump, 2-wheel (4 in stock), each	125.00
Carts, Water, 150-gallon tank (4 in stock), each	115.00
Chain, Skid, ⅜x20¾-in.	.21
Chain, Spoke Clamps	.17
Chain, Eyes Disc Wheels	.14
Caps, Blasting	per 100 .50
Cutters, Cold	.25
Chisel, Sq. Point	.20
Cable, Steel, ⅝-in.	ft. .06
Cable, Steel, ¾-in.	ft. .08
Carts, Concrete, 2-wheel	12.00
Carbide, ½-lb. cans	.05
Chests, Tool, Steel	7.50
Cots, folding canvas	1.75
Covers, Mattress, 3′x6′x6″	1.50
Double Trees, Steel (5 in stock), each	.50
Drills, Rock, 30-in.	1.00
Drills, Rock, 44-in.	1.50
Exploders, Hand Fuse	18.00
Feed Bags, Canvas, each	.25
Feed Boxes, Galv. 11-in.x14-in., ea.	.35
Feed Troughs, wood, 8-in.x10-in.x 46-in., each	1.75
Fuse	Per M 5.00
Forges, portable	12.00
Globes, Lantern	.08
Grindstones, Ball Bearing, price	2.50
Hatchets, Claw	.35
Halter Ropes, each	.15
Hammers, Rivet, ¾-lb.	.35
Hammers, Jack, BCR, 430	75.00
Hammers, Sledge, 10-lb. no handle	.80
Hammers, Spike	.75
Hammers, Cross Pein, 3½-lb.	$0.45
Hammers, Cross Pein, 4-lb.	.45
Hammers, Cross Pein, light	.35
Hammers, Stone	.35
Hammers, Ball Pein, 2½-lb.	.45
Handles, Hatchet	.10
Handles, Mach. Hammer, 10-in.	.10
Handles, Mach. Hammer, 14-in.	.10
Handles, Mach. Hammer, 16-in.	.10
Handles, Mach. Hammer, 18-in.	.10
Hammers, Farriers	.25
Hammer, sledge, per lb.	.08
Handles, Pick	.15
Handles, D Handle Shovel	.15
Handles, Long, Shovel	.15
Hardies, B. S.	.20
Harness, Wheel	set 15.00
Harness, Cart	12.00
Hasps and Staples, 4-in., each	.05
Hinges, 4-in. strap, pair	.05
Hinges, 6-in. strap, pair	.10
Hinges, 5-in. T., pair	.10
Hose, Disch, 2-in., 25-ft. lengths	ft. .15
Horse Rasps, each	.25
I-Beams, 10″x20′, each	13.50
Beams, I, 3¼-in.x 6-in. x 15 ft.	lb. .02¼
Lanterns	.50
Lanterns, Folding	.50
Mattox, Trench	.25
Mattox, Pick	.45
Nails, 10d to 60d	keg 3.50
Nippers, Farriers	.30
Oil, Leather	gal. .50
Oil, Neatsfoot (100-pt. case)	pt. .10
Oil, Spica	pt. .05
Paper, Roofing	roll 1.50
Paulins, large	20.00
Pipe, Iron, 1¼-in.	.07
Pipe, Iron, 2½-in.	.18
Pipe, Iron, 3-in.	.20
Pipe, Iron, 4-in.	.25
Post Hole Diggers	1.50
Points, Pick	.45
Pumps, Gould Rotary	10.00
Pumps, Blackmere Hand	6.00
Pumps, Hand Piston	4.50
Engine & Pump Novo Gas	125.00
Engine, Hill Centrifugal	850.00
Posts, Fence, Angle Iron	.25
Rakes, road, 14-tooth, each	.50
Ranges, Field, 4-hole	10.00
Ranges, Field, 2-hole	7.00
Rope, ½-in.	lb. .08
Rope, ⅝-in.	.08
Rope, ¾-in.	.08
Saddle Bags, leather, 2 pocket	1.50
Saw Outfits, Portable	150.00
Saws, Hand, 26-in., Cross Cut, 7 pt.	.50
Saws, Hand, 26-in., Cross Cut, 8 pt.	.50
Saws, 6-ft. Cross Cut	1.50
Scales, Platform, weight 115 lbs., capacity 300 lbs., each	20.00
Shovels, S. H., Rd. Point	.45
Shovels, L. H., Rd. Point	.45
Spades, S. H.	.45
Spades, L. H.	.45
Shovels, Iron Handle, Rd. Pt.	.45
Shovels, D. H., Sq. Pt.	.45
Spikes, Wire, 7-in., kegs	3.50
Spikes, Wire, 8-in., kegs	3.50
Spikes, Wire, 9-in., kegs	3.50
Spring Auto Repair Kits	1.25
Staples, Assorted	3.50
Stoves, Sibley	1.50
Steel Rd. Chrome 1⅛-in.	lb. .03¼
Tarpaulins, 5x6	2.00
Tarpaulins, Escort Wagon	5.00
Tarpaulins, 17x30	20.00
Tents, pyramid, 120 lb., with covers	12.00
Tents, new, heavy, with poles, 14x 16x5	$30.00
Tents, 16x20x5	37.50
Tents, 16x24x5	43.50
Tents, 8x10x4	16.00
Tents, 10x12x4	19.75
Tents, 12x14x4	24.00
Tents, 16 ft. x 16 ft. x 36 in.	12.00
Tires, Solid, 38x5	28.00
Tires, Solid, 40x10	55.00
Casings, Motorcycle, 28x3	3.50
Tires, Q. D., 34x3½	16.00
Tires, Q. D., 34x4	16.00
Tires, Q. D., 34x6	22.50
Tires, Q. D., 36x5	25.00
Tires, Q. D., 36x6	27.50
Tiles, Q. D., 36x7	32.00
Tires, Q. D., 37x2½	18.00
Tires, Q. D., 37x6	28.00
Tires, Q. D., 39x5	30.00
Tires, Q. D., 34x4½, U. S. Cord	10.00
Tools, Cement Finishers	2.00
Tongs, B. S., Bolt 22-in.	.35
Tongs, B. S., Assorted	.35
Tongs, B. S. Clincher	.30
Tongs, B. S. Clincher, 14-in.	.30
Tongs, B. S. Clincher, 16-in.	.35
Tubes, Inner, Motorcycle, 28x3	.75
Vises, Bench, 4-in.	4.50
Vises, Bench, 4¼-in.	4.50
Vises, B. S., Small A	4.50
Vises, B. S., 5-in.	5.50
Vises, Pipe	5.00
Wire, Barbed, 40-rod	spool 1.40
Wheelbarrows	4.00
Wrench, Monkey, 10-in.	.30
Wrenches, Stilson, 18 in.	1.50
Wheels, Front, Escort Wagon	1.50
Wheels, Rear, Escort Wagon	1.50

TOOK IT FOR AN OFFER.

At a race meeting last season a man was charging $1.00 for parking space for cars. When space began to be at a premium, he raised the price to $1.50, and later to $2.00. It happened that the first car to approach after the second raise in price was a 1914 Ford touring car, and as a warning to the driver, the man shouted out, "Two Dollars." The driver, mistaking this for a bid, quickly replied, "It's yours."

A small quantity of crushed stone spread along the shoulders of newly-constructed concrete paved roads will minimize the danger of accidents from skidding. Motorists declare that the soft ground is dangerous, especially at night when drivers are apt to become confused when passing one another, and run off the pavement.

A total of 220,000 automobiles and trucks were built in the United States during the first two months of 1922. This is an increase of 200 per cent over the output for the same period in 1921.

Forty per cent of all the automobiles in the world are owned west of the Mississippi river and Denver is the center of trade area. Automobile tires made in Denver can be laid down in Akron, Ohio, the world's largest tire center, for less than they can be manufactured there.

During the last four years 2,020 miles of all classes of roads have been built in Colorado. Of this new roadway 105 miles is in concrete paving.

OUR COVER PICTURE

The view on this month's issue of Colorado Highways was taken on Berthoud Pass, which forms a link in Victory Highway. It shows one of the remarkable switchbacks on the eastern side of the pass. Tourist visitors find this one of the most beautiful drives in the state. A tremendous increase of traffic was noted on the road this year. Work on the road to Spruce Lodge on the west side of the pass is nearly completed. On the east side another project six miles in length is now under way. Photo by courtesy of the Denver Tourist Bureau.

New Road to Mesa Verde Park

(Continued from page 3)

John F. Green, resident engineer of Monte Vista, is in charge of the state and county work, which it is estimated will cost approximately $49,000. The government is expending $131,000 on its project.

In the surveying party which has been employed in laying out the road, are: William Blackstone, George Fitzmorris, Robert Wallace, H. O. Lemon, Walter Wilson and W. M. McLeod.

Within a radius of a few miles from the top of the pass are at least 180 lakes, all well stocked with trout. The new road also passes a short distance from the famous Conejos Rainbow Trout Lodge.

A vast area of mountain scenery is brought to the view of the traveler from the road, including the lofty Conejos peaks, reaching an elevation over 12,000 feet.

The soil in this region is shale, which gives the roadway a good, solid foundation, comparatively free from mud. This will make the road safe for travel in rainy weather. Records of the weather bureau show that the road can be used about eight months in the year.

The dirt movers employed on the project have encountered considerable heavy work, due to a large amount of boulder material. This was harder to move than had it been solid granite which could have been blasted away with less difficulty.

Nearly all of the work being done by Contractor O'Neill has been in heavy rock. Reports indicate, however, that he is making splendid progress with his section of the work.

A long stretch of the Wolf Creek Pass road also has been improved by State Highway forces this year. On the east side of the pass a steam shovel has been working all summer. At present the shovel is at the top of the pass, and will be moved down the other side next spring.

This work which has been under the supervision of the Maintenance Division has consisted of widening and smoothing up the surface of the road. Several narrow and dangerous turns have been eliminated.

For several years the Wolf Creek Pass road has borne the brunt of the heavy auto traffic going into Durango and the Mesa Verde Park, and it is calculated that the Cumbres Pass road when completed will relieve the congestion on Wolf Creek, besides providing another scenic route across the southern part of the state.

Appropriations will probably be made in the next highway budget for the completion of both roads, which are considered commercially valuable to the sections which they will serve.

Already there is considerable farming carried on along the southerly route, and with the completion of the road now under construction, it is expected that this section will show a large increase in population within the next few years.

Lack of good roads is said to have been the only drawback to the section up to the present time.

At all entrances to the State of Colorado signs are erected on the highways informing automobile operators concerning provisions of our state motor vehicle laws, and carefully displaying speed limits and traffic rules. These signs were posted under direction of the state motor vehicle department.

Contracts have been let by the State Highway Department for the construction of 1143 miles of new roads to be completed in 1922.

The average cost of common labor employed in building roads is now 25 to 30 cents an hour, according to figures compiled by the Bureau of Public Roads. This average was reached from costs on Federal Aid road projects.

Road Builders Equipment

Galion Brings Out New Washer Plant

In order to meet the more stringent requirements of highway engineers throughout the country in the matter of sand and gravel used in concrete work, a new portable plant is to be brought out by the Galion Iron Works, according to word just received by H. W. Moore & Co., Colorado distributors.

The new outfit which is sold at a very low price as compared with the cost of the old-style stationary screening plants, will be combined with a sand and gravel washer.

This is the first plant of its kind put upon the market and it is quite a step forward in the way of road building equipment. The plant is portable and can be moved on the job with ease and at low cost.

The fact that highway engineers are demanding greater care in the mixture of concrete materials and are becoming more particular on all paving projects, prompted the Galion people to combine their screening plant and washer in one unit.

Denver Firms Plan For Stock Show

Plans are being made by H. P. Wilson & Co. for a pretentious display of road equipment at the annual Denver Stock Show to be held in January. One of the features of their exhibit will be a Holt tractor and Austin-Western grader outfit.

During the past year this concern has added several new lines of contractor's equipment to their stock, and a few of these will be included in their display.

They will keep open-house to fair visitors at their general offices located at Seventeenth and Blake streets.

This will also be true of the other road machinery houses in Denver. A cordial invitation is going out to all road builders in the state to make themselves at home with the equipment men while visiting the show.

Editor's Note:
This column is to be a regular feature of future issues of Colorado Highways. Here will be found the latest news on machinery and equipment used in road building, and other items on modern methods of earth moving. Contributions to the column should reach our office not later than the 20th of the month preceding publication.

Mounts Concrete Mixer on Motor Truck Chassis

When Mr. Stanley Carman, masonry contractor of Wodmere, Long Lsland, had a little difficulty in the transportation of his concrete mixer, he hit upon the idea of mounting it on his FWD truck. He also mounted 10-inch steel flanges on the front wheels of his truck and 12-inch flanges on the rear wheels. These he claims enable his truck to go over soft ground which is frequently encountered in going onto many jobs.

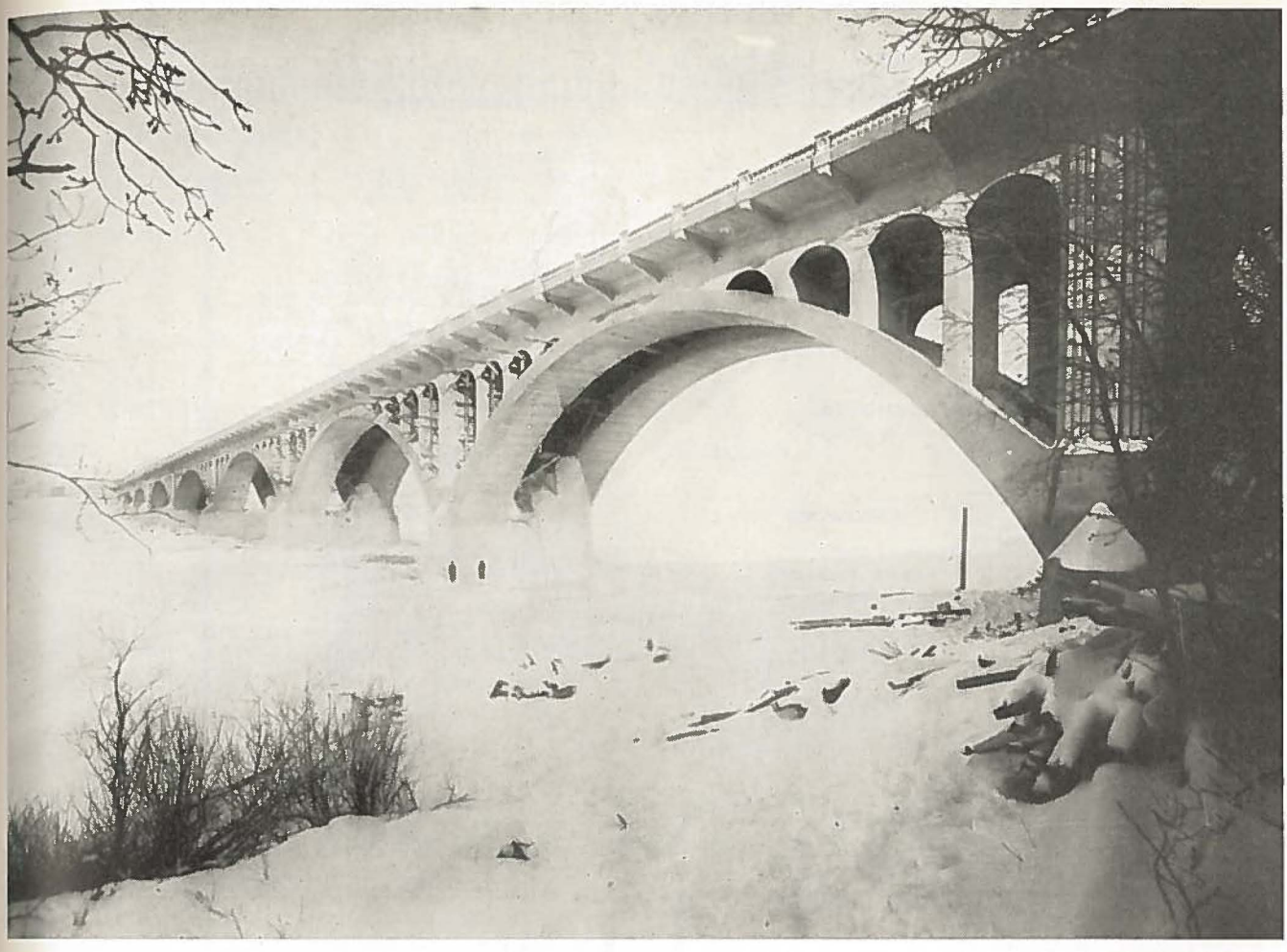
When Mr. Carman is ready to move his mixer from one job to the next, he merely cranks the truck and away he goes. The motor truck cuts down the moving time between jobs considerably and facilitates the placing of equipment in just the location where it can be used to the best advantage on the job.

Galion Catalog Describes Steam and Motor Rollers

The complete line of Galion motor and steam road rollers is intimately and intelligently described in the new catalog of The Galion Iron Works and Manufacturing Company, which has just come from the press.

Scarifier-Grader Used On Loveland Job

A new departure in road grading has been made by F. C. Dreher, contractor, on the paving north of Loveland. For this work he recently purchased an Adams Leaning Wheel Grader-Scarifier. He reports that his cost for making the sub-grade has been held to a minimum, and the work has proved satisfactory in every way. A number of these same machines are being used by some of the cities and counties in the state on maintenance work.



CONCRETE BRIDGES FAVORED FOR HEAVY MOTOR TRAFFIC

Picture above shows the highway bridge over the Saskatchewan river at Saskatoon, Canada, constructed by the Saskatchewan Highway Commission at a cost of $450,000. There are ten spans of 25 to 150 feet. Roadway, 63 feet.

SAFETY--economy--durability. ---these are qualities found in well-designed, substantial concrete bridges.

—low maintenance cost reduces the tax bill.

—it is a fact that there is a countrywide preference for highway structures built of concrete.

—hundreds of them have been completed thruout the country this past summer.

"CONCRETE FOR BEAUTY AND PERMANENCE"

STATE HIGHWAY DEPARTMENT

Combined Statement---Highway Fund and Bond Fund November 1, 1922

RECEIPTS

U. S. Government	$1,163,760.41	
One Mill Levy	1,437,327.69	
Motor Vehicle License	458,443.93	
Internal Improvement	120,300.00	
Gasoline Tax	272,736.11	
Counties and Miscellaneous	746,883.47	
Cancelled Voucher	1.40	$4,199,453.01
1921 Bond Fund, Balance 12-1-21	$1,720,384.06	
1922 Bond Fund, (Sale 6-1-22)	3,000,000.00	
Premium, 1922 Bonds	151,257.00	4,871,641.06
Total Receipts		$9,071,094.07

DISBURSEMENTS

Overdrafts, 12-1-21		$438,209.57
Administration:		
Administration	$ 58,152.19	
Administration Roads	90,388.50	$148,540.69
*Project Charges		57,987.19
Construction:		
Federal Aid Projects	$2,123,460.69	
State Projects	1,067,070.42	
County Bond Projects	1,244,579.58	$4,435,110.69
Maintenance		$ 587,151.32
Property and Equipment		145,181.94
Total Disbursements.		$5,812,181.40

BALANCES

Highway Fund:		
State Treasurer		$814,363.32
Bond Fund:		
Federal Aid	$1,064,216.69	
Counties	1,229,075.66	
Premium	151,257.00	$2,444,549.35
Total Balances		$3,258,912.67
		$9,071,094.07

* Engineering charged to Administration, later to be charged to projects.

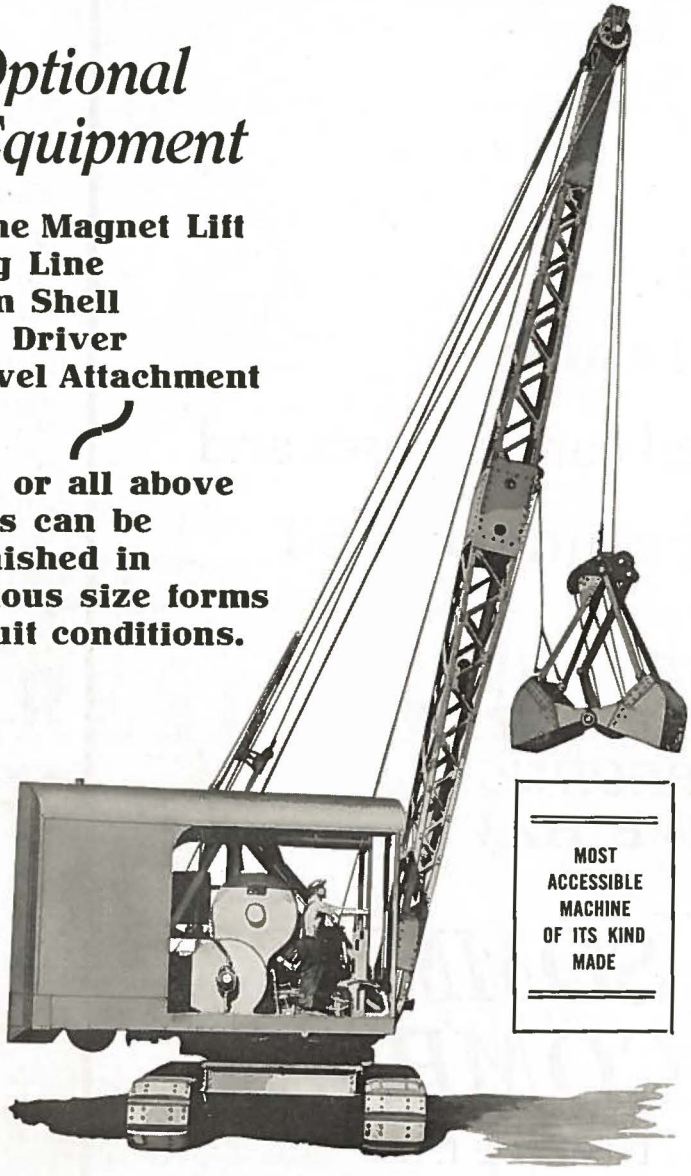
Koehring Crane Excavator

HEAVY DUTY

Optional Equipment

Crane Magnet Lift
Drag Line
Clam Shell
Pile Driver
Shovel Attachment

Any or all above units can be furnished in various size forms to suit conditions.



Koehring Standards *and* Quality

Including latest designs incorporated in its construction

95% of all castings, or 55% of entire weight of machine—high carbon annealed steel.

Made in two sizes, No. 2 and No. 3. A few of the salient features: Selective control system of levers. Steers by power. Double band friction clutches thruout machine. Spur gear friction drive. Double drum boom hoist. Large roller path, 6 rollers. External gear rack. Three traction speeds.

⅛ M. P. H., ⅞ M. P. H., 1⅜ M. P. H. Extra fast line speed, 200 ft. per min. for crane, or grab-bucket work. High tractive effect. Heavy duty slow speed engine—air starter. Koehring Mixers and Pavers (none better).

Climbs 30% grade

H. P. WILSON & CO.

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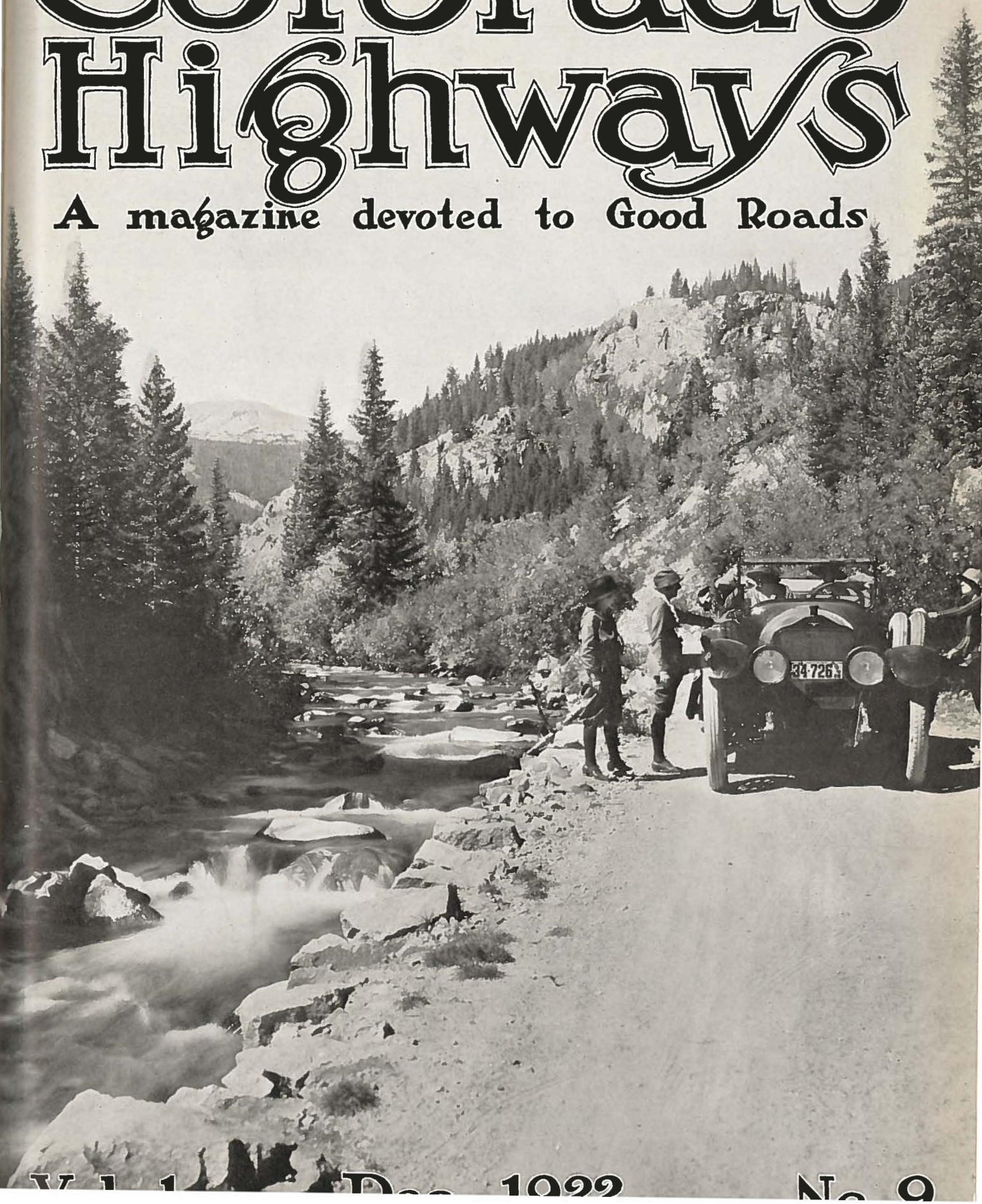
Distributors for every type of earth moving machinery. All selected lines.

THE BRADFORD-ROBINSON PTG. CO., DENVER

Colorado Highways

A magazine devoted to Good Roads



Vol. 1 Dec. 1922 No. 9

H.W. MOORE & CO.

1751-61 WAZEE STREET

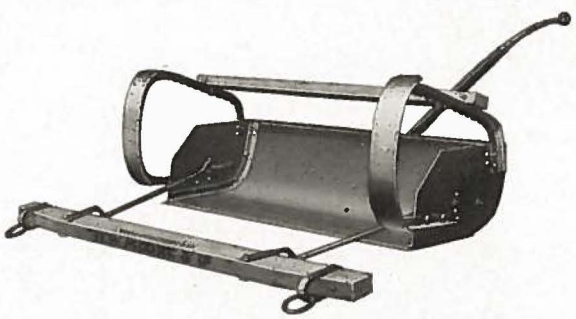
DENVER, COLO.

The Largest and Oldest House of its Kind in the Territory.

Rock Crushers
Tracklayers
Tractors
Graders
Pavers
Rollers
Steam Shovels
Draglines, Etc., Etc.

Moore Special Fresnos

The strongest, best made, best balanced Fresno built.



"$1,000,000 D. S. O. Highway", meaning the Durango-Silverton-Ouray Highway. During the year one mile of the most difficult kind of road was blasted from solid granite between Ouray and Silverton. Other work on the same road is now under construction. When completed this will form one of the most picturesque mountain drives in the entire west. A big part of the work is expected to be ready for traffic by the end of the 1923 construction season. In this work the department has had the cooperation of the counties and the government.

Another link consisting of one mile was added to the Littleton-Colorado Springs paving, the concrete now reaching to a point opposite Wolhurst Farm. At this juncture it is planned to go under the railroad tracks and extend the paving to a point a short distance north of Sedalia during the coming season.

With the work completed during the past year there is now a ribbon of concrete extending from Denver to a point about three miles north of Brighton, and several links of paving have been laid on the North and South Highway between Denver and Fort Collins.

By the end of 1926 it is expected that the gaps now existing in the paving between these points will be closed. Also it is expected that there will be only about forty of the seventy-five miles between Denver and Colorado Springs left to be paved.

There was six and three-quarter miles of paving completed on the Brighton road during 1922. Two miles of this was laid south of Greeley to La Salle. There was also two and one-half miles of concrete paving laid south of Sterling, and one and one-third miles of paving finished between Grand Junction and Palisades.

In all there were 43 Federal Aid projects completed by the department during the past year. Besides these the department has co-operated with the Bureau of Public Roads in the construction of several mountain pass roads. It has likewise co-operated with the U. S. Forest Service in the construction of roads leading into the national forests, where a score or more of new recreational areas have been made available to the public.

The following is a list of the Federal Aid projects completed in 1922:

F. A. Project No. 2—Sixty-four miles of crushed rock surfacing in Huerfano and Las Animas counties, starting at a point two miles south of Pueblo County line, and running through Trinidad to the New Mexico state line. This project has been in course of construction since 1919. It is the longest Federal Aid Project so far completed in Colorado.

F. A. Project 7B—Four miles of graded road in Montrose County, east and west through Naturita.

F. A. Project No. 28—Two miles of graded road north of Dillon in Summit County.

F. A. Project No. 36—One mile of concrete pavement south of Longmont in Boulder County.

F. A. Project No. 51—Eight and three-quarter miles of sand clay surfacing north of Cheyenne Wells in Cheyenne County.

F. A. Project No. 54—Five miles of graded road east of Buena Vista in Chaffee County.

F. A. Project No. 55—Five and one-third miles of sand clay surfacing east of Peyton in El Paso County.

F. A. Project No. 58—Three miles of gravel surfacing in Prowers County north and west of Granada.

F. A. Project No. 59—Ten miles of gravel surfacing in Bent County, east of Las Animas to Hasty.

F. A. Project No. 65—One mile of graded road in Ouray County between Ouray and Silverton.

F. A. Project No. 71-A—Five miles of gravel surfacing in La Plata County, west of Durango.

F. A. Project No. 75—Six and three-quarter miles of graded road in Grand County, north of Kremmling.

F. A. Project No. 130—One mile of concrete paving south of Littleton in Arapahoe and Douglas Counties.

F. A. Project No. 131—One mile of concrete paving in Adams and Arapahoe Counties through the town of Aurora.

F. A. Project No. 137—One-half mile of concrete paving south of Arvada in Jefferson County.

F. A. Project No. 142—Two and one-half miles of concrete paving south of Sterling in Logan County.

F. A. Project No. 146—Two miles of concrete paving south of Greeley to La Salle in Weld County.

F. A. Project No. 148—Four and three-quarter miles of concrete paving north and south of the town of Brighton in Weld County.

F. A. Project No. 162—One and one-third miles of concrete paving east of Manitou in El Paso County.

F. A. Project No. 178—Steel bridge at Monte Vista in Rio Grande County.

F. A. Project No. 180—Two miles of graded road and bridge south of Fort Garland in Costilla County.

F. A. Project No. 182—Three and one-third miles of graded road in Eagle County north of Red Cliff.

F. A. Project No. 183—One and one-third miles of concrete paving between Grand Junction and Palisades in Mesa County.

F. A. Project No. 188—Three miles of gravel surfacing east of Craig in Moffat County.

F. A. Project No. 189—Five and one-half miles of gravel surfacing east of Hayden in Routt County.

The following is a list of projects under contract, showing percentage of completion:

F. A. Project No. 7-C—Ten and one-half miles of graded road, between Naturita and Norwood, in Montrose County, 15 per cent complete.

F. A. Project No. 29—Two miles of graded road through Turkey Creek Canon in Jefferson County; 98 per cent complete.

F. A. Project No. 30—One mile of concrete paving east of Morrison in Jefferson County; 40 per cent complete.

F. A. Project No. 71-B—Three and one-half miles of gravel surfacing west of Durango in La Plata County; 10 per cent complete.

F. A. Project No. 119-B—Seven and one-half miles of crushed rock surfacing between Saguache and Cochetopa Pass in Saguache County; 10 per cent complete.

F. A. Project No. 129—Four and one-half miles of concrete paving on Federal Boulevard, north of Denver, in Adams County; 70 per cent complete. This is a section of the paving now open to traffic from Denver to Broomfield. Work uncompleted consists of constructing shoulders and drainage culverts.

F. A. Project No. 133—Four and a quarter miles of concrete paving on Federal Boulevard, north of Denver, in Adams County; 90 per cent complete.

F. A. Project No. 136—Five and one-half miles of graded road through Turkey Creek in Jefferson County, northeast of Conifer; 95 per cent complete.

F. A. Project No. 139—Four miles of concrete paving between Loveland and Fort Collins, in Larimer County; 55 per cent complete.

F. A. Project No. 161—Steel span bridge over Fountain Creek at Buttes, in El Paso County; 80 per cent complete.

F. A. Project No. 163—Steel truss bridge over St. Charles River, east of Pueblo, in Pueblo County; 40 per cent complete.

F. A. Project No. 165—Nine and one-third miles of gravel surfacing between Canon City and Florence, in Fremont County; 40 per cent complete.

F. A. Project No. 166—Two miles of concrete paving between La Junta and Swink connecting with F. A. P. No. 96, in Otero County; 60 per cent complete.

F. A. Project No. 168-A—Five and one half miles of gravel surfacing, Granada west to Carlton, in Prowers County; 20 per cent complete.

F. A. Project No. 169—Steel truss bridge and approaches over the Arkansas River at Las Animas, in Bent County; 95 per cent complete.

F. A. Project No. 171—Six and one-half miles of gravel surfacing northwest of the town of Delta, in Delta County; 85 per cent complete.

F. A. Project No. 172—Three miles of gravel surfacing east of Sapinero, in Gunnison County; 85 per cent complete.

F. A. Project No. 173—Concrete bridge over St. Charles River south of Pueblo, in Pueblo County; 15 per cent complete.

F. A. Project No. 174—Three miles of graded road between Silverton and Ouray, in Ouray County; 70 per cent complete.

F. A. Project No. 208-A—Three miles of gravel surfacing between Grand Junction and Palisades in Mesa County; 50 per cent complete.

F. A. Project No. 209—Four and one-quarter miles of gravel surfacing between Grand Junction and Fruita, in Mesa County; 20 per cent complete.

F. A. Project No. 210-A—Five and one-

(Continued on page 20)

OUR COVER PICTURE

A bit of picturesque scenery on the Clear Creek Canon road above Idaho Springs is pictured on the cover page of Colorado Highways this month. When the Holy Cross Trail, which is now surveyed, is completed, this road will form a link in one of the most attractive automobile drives in the State.

Las Animas Bridge Open to Travel

Elaborate Ceremonies Mark Completion of Magnificent Steel Highway Bridge Over the Arkansas River at Las Animas—Forms Important Link in World-Famous Santa Fe Trail

BY R. S. DU BOIS

ON December 2nd, the new steel bridge over the Arkansas river at Las Animas was formally opened to traffic. The opening was under the auspices of the Las Animas Board of Trade. The dedication was handled by the Auxiliary of the American Legion.

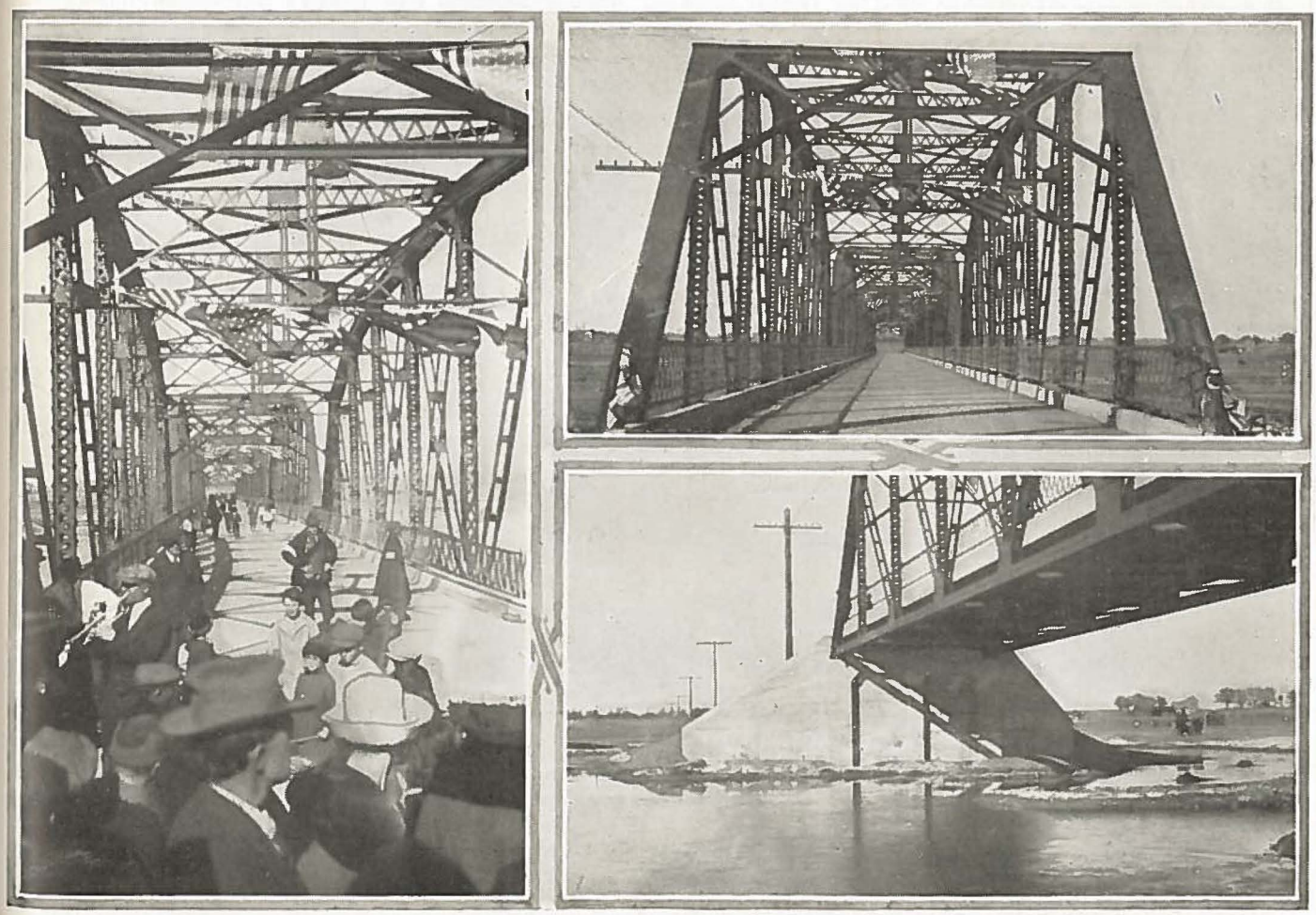
The weather was very auspicious, the day being clear and warm. At ten o'clock the parade assembled in town. There was a band, all the school children with flags and a large number of automobiles with people from the town and nearby points. All the stores were closed, to permit the people to attend the ceremony.

The first thing on the program was the dedication. There was a pretty girl and a bottle, 'n everything. When the bottle was broken, something fizzed. The bridge was dedicated "The State Highway Bridge of Las Animas." Mr. J. L. Thompson, chairman of the Board of County Commissioners, was the master of ceremonies. The first speaker was Mr. Lambright, the county attorney. He gave a resumé of the history of the bridges in Bent County, starting with the first one, built over the Arkansas River in 1867 by Dick Wooten, as part of his toll road, which was later used by the Santa Fe Railroad as a right-of-way when it extended its lines into New Mexico. This was near La Junta, which was in Bent county as it was originally organized. He also stated that the steel bridge which the new structure was replacing, had been the first steel bridge over the Arkansas in the county, and had been built 32 years ago. It is interesting to know that part of it which was not destroyed by the flood of 1921, has been re-erected at Caddoa as part of one of the County Highways, and is therefore still serving the requirements of the county.

It had been planned that Fred H. Bullen, president of the company which built the new bridge, should next address the crowd, but he found that it would not be possible for him to reach town in time. The State Highway Department was represented by R. S. Du Bois, bridge engineer; James Bell, division engineer, and J. C. Webber, inspector, each of whom gave short addresses. Letters were then read from Major L. D. Blauvelt and Governor Shoup regretting their inability to be present, and congratulating the town and county and state on the completion of a bridge which should give long and satisfactory service. The bridge was then formally opened to traffic by cutting of the rope which had previously blocked it. The parade went across, swung around and passed back to town. A special chicken dinner was served; in the afternoon there was a free football game, and in the evening a dance. The town extended itself to show that it appreciated this new structure, which was built as a Federal Aid Project with money from the Federal Government, the State Highway Fund, and county forces.

The bridge consists of five steel trusses, each 150 feet long. The steelwork is placed high enough in the air that a flood even like that of 1921 could

(Continued on page 16)



Three views of the new highway bridge across the Arkansas River at Las Animas, which was dedicated and opened to travel on December 2

Colorado Highways
"BETTER ROADS"

Published Monthly by
COLORADO STATE HIGHWAY DEPARTMENT
Denver, Colorado.

Address all communications to State Highway Department, attention M. W. Bennett, Editor.

Owing to the necessarily limited edition of this publication, it will be impossible to distribute it free to any persons or institutions other than the state and county officials actually engaged in the planning or construction of highways, instructors in highway engineering, newspapers and periodicals, and civic associations. Others desiring to obtain Colorado Highways can do so by sending 10 cents for each number desired. Associations desiring to distribute the magazine can obtain it at cost in lots of from 500 copies up.

Subscription Price, $1.00 per year.

EDITORIAL COMMENT

In 1904 there was 96,000 motor vehicles registered in the United States. Today this figure has jumped to 10,620,000.

Expenditures for roads totaled $59,527,000 in 1904. This sum compares with $720,000,000 spent on roads this year.

The percentage of increase in highway expenditures was 1110 per cent, while the increase in motor vehicles was 10,920 per cent during the same period.

These figures give some idea of the problems faced by road engineers throughout the country. The increase in the number of vehicles shows plainly why some of our roads do not last as long as some people think they should.

The traffic is so great that oftentimes the surface of the road goes to pieces under the terrific strain. Some of these roads were constructed to carry the traffic of twenty years ago.

Where we had ten or fifteen vehicles per day twenty years ago passing over a given highway, today we find anywhere from 500 to 1,000 motor vehicles traveling over the same road. And where the speed was 8 or 10 miles per hour in former years, now the speed of the vehicle is from 25 to 35 miles per hour.

This is one reason why we find some of the best engineering brains in the country engaged in working out highway problems.

In the old days when the roads became clogged with mud, folks stayed at home. Time was not important.

But it's different today. The world is now on wheels. Good weather or bad, the business of the nation must move. Time is counted in dollars and cents. A bad road today is an economic waste, while the good road brings big dividends to the community which it serves.

The value of good roads is so well known today that it needs no advocates. Our biggest problem is one of finances and construction. The demand for motor highways has become a major national issue.

The last decade has witnessed a complete evolution in highway transport. Road engineers have experienced great difficulty in keeping abreast of the times. Thousands of miles of dirt, gravel and cement roads have been completed in the last decade, yet the end is not in sight.

In 1909 there was only 98 miles of concrete roads in the entire country. Since then there has been constructed a total of 31,824 miles of concrete paving, including the paving completed in 1922.

Future highways are going to be built with an eye to beauty and practicability.

Roads with easy curves bordered with grassy slopes and stately trees.

Engineers who have been busy constructing high-class, serviceable roads, are beginning to look to the future a bit.

The modern road builder is giving thought to what will be best for the traffic in years to come.

Likewise we find highway engineers of today giving weight to the shortest, practicable route to a given point. In the future we will find roads radiating from the larger cities like spokes in a wheel.

When the railroads of this country were building they took the shortest and easiest routes. They never went into the hills for any other reason than to shorten distance.

The roads of today will be used as the foundation for the heavy traffic roads of tomorrow.

And the engineer who gives consideration to these things now is the man who is going to provide future generations with highways to be proud of.

War Equipment Reduces Road Costs

Highly Efficient System For Distribution Of Government Supplies To Counties Is Maintained By State Highway Department

IN carrying out the extraordinary road program in Colorado during the past year it has been necessary to handle an unusually large amount of supplies of all kinds. As a result of the extra demands of roadbuilders all over the State the Purchase and Traffic Division of the State Highway Department has been the center of much activity.

Through this division there has been thousands of dollars worth of surplus war materials cleared to the various counties. The saving in the reduced price of these materials has been tremendous, with the result that the county officials have been able to give the people a greater return on their road money in the way of increased mileage.

The past year has been the most active from the standpoint of road building and maintenance in the history of the Highway Department. More miles of roads have been improved than ever before. Likewise, more miles have been kept under maintenance. The records of the Department show that a total of 1,140 miles of all kinds of roads in the State have been improved. In addition the State has co-operated with the counties in maintaining about 4,000 miles of State highways.

Naturally it has required a highly efficient and co-operative system to furnish the large amount of supplies required to carry on this work. The distribution of the immense stores of equipment that has come to the state from the government has called for the most able management.

For instance there was distributed to the counties during 1922 a total of 143 trucks, nineteen tractors, five trailers, and large quantities of repair parts, anvils, axes, bars, tackle, hammers and handles, nails and spikes, pipe, picks, shovels, tarpaulins, tents, vises, wrenches, wheelbarrows, and various other materials too numerous to mention.

These materials have come to the State by the passage of the Kahn-Wadsworth bill, which authorized the Department of Agriculture to distribute to the various states surplus war material not needed for military purposes. These materials can be used only in the construction and maintenance of roads. The only consideration the State is required to pay is twenty per cent of the valuation set by the Secretary of Agriculture on each piece of equipment transferred. This valuation, less the freight and handling charges, is deducted from the Federal appropriation which the State receives for the construction of Federal Aid Highways.

Acquirement of these materials has enabled the State to provide the counties with the greater part of the equipment now in use on the roads. Upon receipt of the materials from the government they are stored in a large warehouse at 8090 East Colfax Avenue, Denver, from which point they are distributed to the counties.

In the distribution of trucks and tractors it has been the rule as far as possible to have these shipped direct from the army depots to the counties in order to save the counties from payment of back haul freight charges. In such cases the counties have paid freight charges themselves; in this manner the appropriation for equipment was relieved of such freight payments and was made to reach further. When trucks are received in bad repair they are put into the shop of the Highway Department adjoining the warehouse, where they are overhauled. This work is charged to the counties at actual cost.

Repairs also are made on the fleet of cars used by the field forces of the Highway Department in these shops. During the past year the mechanics in the shops

(Continued on page 20)

Showing interior of State Highway shops with a truck and two passenger cars in course of reconstruction. (Bottom) A few war trucks ready for use on Colorado roads.

Battle Mountain Road Completed

Difficult State Highway Project in Leadville District Now Open to Travel---Work in Progress More Than Two Years

BATTLE Mountain has lost its terrors for the motorist. A broad, smooth gravel surfaced highway of easy grade and long radius curves has replaced the old steep, difficult wagon road.

For years this road had laid as a heavy dread upon all who approached it from either direction. It was aptly named for it was truly a "battle" for all to get over it. Battle mountain received its name from a scrap staged on the summit more than sixty years ago between the Ute Indians and gold seekers who had moved into the section from the Leadville district.

Ever since the days of prairie schooners and buckboards this piece of road has been a bugaboo to travelers. It has been the scene of hundreds of accidents. Each summer found scores of tourist cars stalled on the steep grade. Hundreds of motorists have reached the bottom of the incline and turned back rather than attempt the long climb.

A trip over the grade was not forgotten soon. In all of these years and during the gold rush days millions of tons of traffic passed over the mountain.

At an expense of $270,000 and the removal of 75,000 cubic yards of solid rock, the State Highway Department has conquered Battle Mountain. Traffic may now go over the "hill" forgetful that the old road ever existed. It can easily be negotiated by the smallest cars. All the kinks and steep pitches have been eliminated.

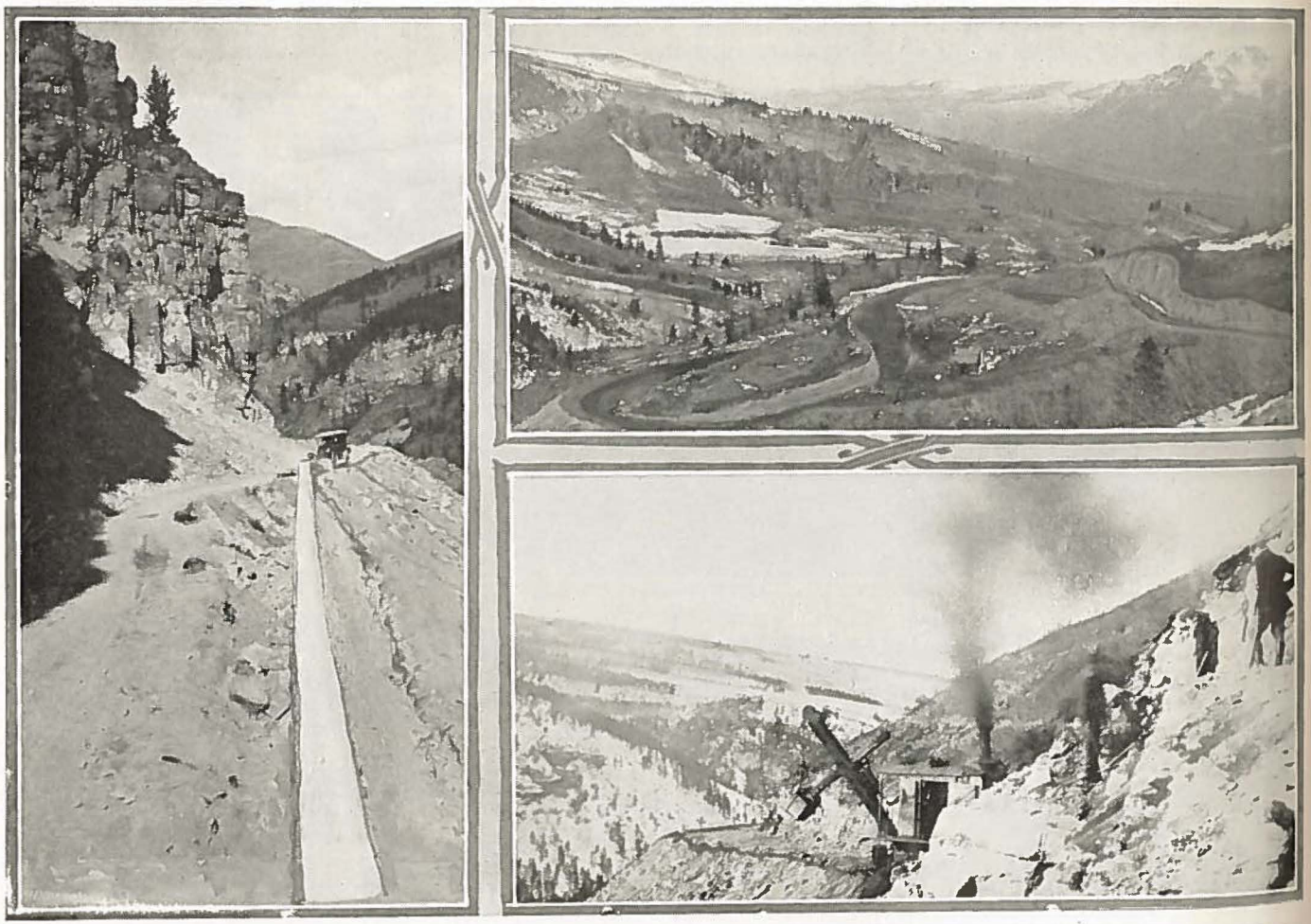
The newly completed road which was opened for traffic the middle of October after three years of construction work, averages 20 feet in width. None of the grade exceeds 6 per cent. The grade of the old road ran as high as 18 per cent. Like most of the old mining trails it went straight up and over the mountain. In the early days of the gold rush in Colorado the miners and muleteers followed the shortest route to a given point, never giving thought to grade.

In the case of Battle Mountain there was no other alternative. It was either go over the crest of the mountain or not get there. So they went over. And it has been thus ever since until the completion of the present modern highway.

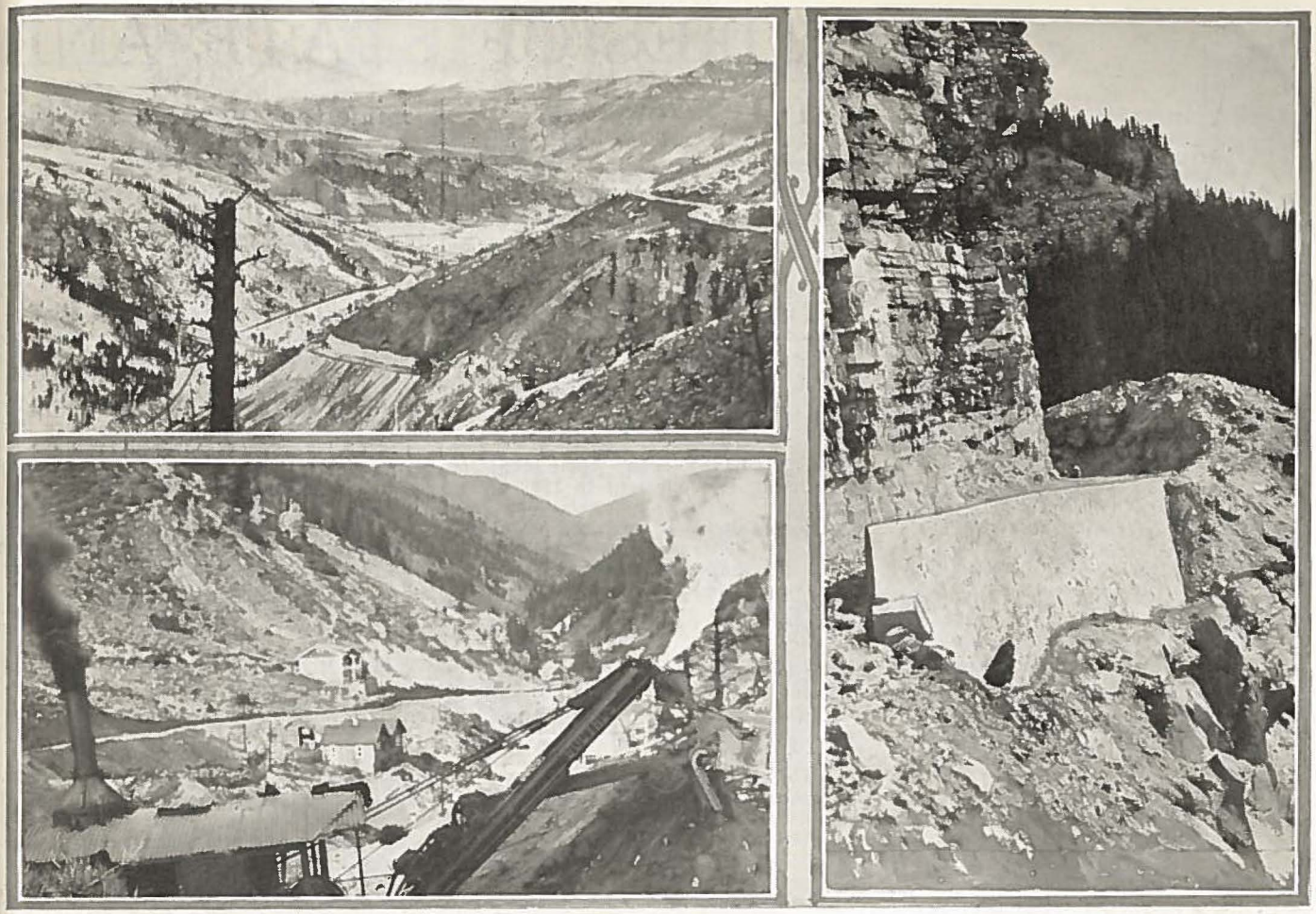
The new road is six miles in length and runs from Red Cliff to Minturn, and is located about 28 miles north of Leadville. The work was divided into two projects of three miles each. It has been under construction since early in 1920. The cost of the new highway averaged about $45,000 per mile, and stands as one of the costliest pieces of road work in the state.

It was also one of the most difficult projects ever handled by the State Highway forces. The road is located about 500 feet above the main line tracks of the Denver & Rio Grande Western Railroad running through Eagle canon. It forms a link in the Pike's Peak Ocean-to-Ocean Highway and is on the main traveled route from Denver to Glenwood Springs and the west.

Some very unusual engineering problems were encountered in the construction of the road. An engineering party spent more than three months in finding the 6 per cent line. It was finally neces-



Views of Battle Mountain road project completed by Highway forces in November. (Left) One of the numerous retaining walls. (Upper right) Double loop near Minturn, one of the governing points. (Lower right) Steam shovel at work 500 feet above railroad tracks.



A view showing old road and new road with steam shovel in action near Red Cliff. (Lower left) Steam shovel moving up grade from Gilman. (Right) Perpendicular wall at Lover's Leap, where sixteen feet of solid rock was blasted away to make road passage.

sary to construct two loops at the Minturn end of the project to develop distance for an easy grade. At another place the engineers found it expedient to follow a rim rock on a precipitous cliff for nearly a mile and around a point with a sheer drop of 400 feet to the railroad tracks. These were the control points on the project.

Blasting on the road seriously interfered with the operation of trains through the canon. The west bound track was blocked at one time for more than a month. Each charge of high explosive sent down tons of heavy rock and dirt to cover the tracks. A large steam shovel was used by the railroad to clear the right-of-way.

Some of these rocks hurled into air gained such velocity from the force of the T N T explosions that they broke the heavy railroad rails when they struck below. It was necessary to take all telegraph and telephone wires down and encase them in heavy cable. Watchmen were employed along the tracks below both night and day throughout the construction.

The topography of the country is very rugged and reaches an elevation of about 9,000 feet at the summit. The mountains are highly mineralized, nearly all colors of the rainbow being found in the metal-bearing rock. At one "horseshoe" in the road the traveler views a perpendicular wall of these stratified color bands—greens, reds, blues, yellow tints, etc.

Considerable difficulty was experienced by the contractors in getting around "Lover's Leap", one of the control points near Red Cliff. Over eight tons of explosives was used in blasting away enough of this precipitous point to get an 18-ft. roadway. At another point known as the "Hole in the Wall", it was necessary to remove all rock by hand after it had been blasted. This rock excavation proved the most serious obstacle in the project.

About 40 feet of solid rock was cleared at this point. The rock was moved about a quarter of a mile in small mine cars and dumped into a gulch. This operation, the contractors claim, increased the cost of the project about $5,000.

On the Minturn end of the project the workmen encountered heavy boulder material which proved equally as difficult to handle as the solid rock. Over 2,500 yards of retaining walls consisting of concrete rubble masonry was constructed to hold up the fills. The walls were built in order to prevent the rock and dirt in the fills from wasting down the steep mountainside. About 200 yards of retaining walls was constructed to support the two grade loops.

It was also necessary to construct walls to hold the road in place along the rim rock and around the point at Lover's Leap. On the loops space was provided for the parking of cars. The view from this point is described as one of the most inspiring in that district.

A remarkable feature in connection with the work is the fact that it was carried on without a single accident. More than 45 tons of high explosive was used. About fifty men were engaged in the work.

Particular attention was given to drainage. In this high altitude the melting snows in the spring play havoc with the surface of the roads unless adequate drainage is provided. On the Battle Mountain project the engineers installed forty corrugated metal culverts of various sizes. These were designed for the protection of the "fills" on grades, switchbacks and the walled stretches.

On the Minturn end much difficulty was experienced with rock slides. It became necessary to use a steam shovel to clear about 1,500 yards of excavation.

Two large steam shovels were used on the project. These worked from the two ends to the center. On the Red Cliff end the contractors used a Bucyrus, while an Erie was used in removing the earth and rock on the opposite side of the mountain. Satisfactory results were obtained from the use of both, although the Bucyrus was somewhat easier to handle because of its caterpillar traction.

(Continued on page 13)

ACTIVITIES OF STATE AND

State Constructs "Off Side" Detour at Broomfield

AN "off-side" graveled detour will be maintained by the State Highway Department around the construction work now under way north of Broomfield for the remainder of the winter.

This will give an easy passage and enable motorists to go straight through to Lafayette until spring, when work of paving the Broomfield "cutoff" will be started. At that time it will be necessary to close the main north and south road between Broomfield and Lafayette.

When the paving gets under way a detour through Louisville will be in order. As planned at present this detour will begin at a point just south of the railroad crossing, following the Denver & Interurban tracks west into Louisville.

Contractors are now engaged in grading the road to the top of Goodhue Hill along the Zang ranch, preparatory to paving that will be laid early next spring. It is contemplated that next summer will see this paving extended on the north to a point where the road now crosses the Burlington tracks, a short distance south of Lafayette.

An overhead "pass" will be constructed over the tracks to eliminate the railroad crossing.

Rain Musses Up Roads But Farmers Get Benefit

IT'S an ill wind, etc. That was the result of a heavy rain and snow storm which covered Larimer and Weld counties in particular and northwestern Colorado in general the middle of November.

To the motorist the rainfall was not so good, because it made dirt roads in the more remote section almost impassable. But to the farmers of that section it was a blessing.

Nearly an inch of moisture fell in the vicinity of Greeley. This assured ample moisture to carry the winter wheat which was not killed by the drought, over until spring. At the same time the beet crop was out of the ground and the moisture was welcomed by those farmers.

But the rain certainly mussed up the roads, and made them difficult for traffic for several days. Reports of stalled cars were numerous. In the more remote sections of Larimer county several motorists were compelled to seek lodging at farm houses.

Commissioner D. C. Straight of Weld county took personal charge of the work in getting the main highways in his district back into shape. The commissioners of Larimer county also were equal to the occasion with their maintenance outfits, and in a few days travel was on its way as usual.

The editor will be glad to have brief items for this column from county officials, road superintendents, maintenance overseers, and others interested in road building. Copy should reach us by the 20th of the month preceding publication.

Pueblo County Plans Big Highway Program

PLANS have been completed for further improvement in 1923 of two important highways radiating from Pueblo. One appropriation of $60,000 from the Federal Government will be spent on the Santa Fe Trail running east from Pueblo, while $25,000 will go on the Siloam road connecting Pueblo and Westcliffe, according to G. L. L. Gann, member of the State Highway Advisory Board.

It is expected that $18,000 will be available for surfacing on the north and south highway from Bragdon to the El Paso County line.

A traffic count shows that the bulk of the automobile travel coming into Colorado comes over the Santa Fe Trail. Provision is made for the spending of $60,000 on this road from the Huerfano River east to the county line.

By the end of 1923 Pueblo County will have expended a total of $408,000 on her roads, which are now looked upon as among the best in the state.

Effort Being Made to Keep Tennessee Pass Open

AN effort will be made to keep Tennessee Pass open to motor traffic this winter. At the time this goes to press Tennessee is the only pass open in the state.

Word is received to the effect that the commissioners of Eagle and Lake Counties will co-operate in keeping the pass, which is located on the main road between Leadville and Glenwood Springs, open as long as possible.

Modern road machinery recently purchased by the two counties will be used in the work. A 10-ton Holt tractor is included in the equipment to be used in the experiment. Attached to this will be a snow plow recently designed by one of the county commissioners.

In the district served by the Tennessee Pass road there are 10,000 registered automobiles, and aside from the importance of keeping the pass open the year 'round for use of local citizens, the sight-seeing attractions of the district during the winter months are unexcelled.

With the pass open, transcontinental tourists may follow the Pike's Peak Ocean-to-Ocean Highway as far as Price, Utah, and then turn south over a good winter road into Los Angeles.

Limestone Favored for Secondary Roads

SINCE 1908 the motoring public of the United States has seen the construction of some 31,000 miles of concrete roads. An ever increasing heavy highway traffic has made the laying of this pavement a necessity.

And while these roads are costly to build, yet it can easily be shown that they pay for themsevles in a short while in an indirect way. Concrete is the nearest thing to a permanent structure that has so far been discovered in the highway world.

One of the biggest problems that the highway engineer of today has to face is the finding of a material that will last longest on roads carrying only light traffic, yet of sufficient importance to the State Highway system as to require surfacing.

In search for such a material in this state, it has been found that limestone, such as abounds in certain sections, makes a splendid wearing surface. The unusual qualities of limestone as a surfacing material has been recognized by quite a number of the counties in recent years, with a result that a number of Colorado's main highways are now surfaced with limestone.

It has been found that the crushed limestone in a short time after being spread over the surface of the road pulverizes and with the first rain sets into a solid mass, affording a smooth, hard surfacing.

In calling attention to the limestone roads of that section, the Bristol, Colo., Herald, writes as follows:

"The soft limestone which abounds in this region provides a road that costs but a small fraction of the cost of a concrete road. Kept up carefully for five years it is as good as concrete and perhaps better. The famous Roman roads were built of crushed limestone. The famous French roads of today are of the same material. On the streets of Bristol and on the road from Bristol to Granada you can see the value of crushed limestone. It has already cemented itself into a solid mass. The upper surface is worn to a powder which sifts down into the mass and there sets like cement, only less quickly. Every rain makes it harder. When a hole appears it is repaired in a minute by throwing in a few shovels of fine crushed limestone.

"The softer the limestone the sooner the surface powders and sets. The limestone of this locality is so soft that it can be crushed and delivered almost as cheap as gravel. It is very reasonable to believe that the future will bring a great demand for 'Bristol Limestone' for road building purposes, just as heretofore there has been a great demand for 'Portland Cement.'"

COUNTY ROAD BUILDERS

Funds Sought to Improve Road Into Nebraska

HOW to get sufficient funds to improve ten miles of road outside of the state is a problem faced by citizens of northeast Colorado. This stretch of road runs east of Julesburg into Nebraska.

Running from Denver through Fort Morgan and Sterling to Julesburg is one of the finest graveled roads in the state. But from Julesburg into the adjoining state the road runs out into almost a cow trail.

As a result the citizens of this state are losing the patronage of thousands of tourists every year who are diverted over the Lincoln Highway from Chappel, Nebr., to Cheyenne, Wyo., missing Colorado altogether. From Denver this road running northeast points like an arrow to the Lincoln Highway, and with the improvement of the road in Nebraska to the state line, a big majority of the tourists traveling over the transcontinental route would come into Colorado.

It was for the purpose of soliciting financial aid to improve this short stretch of road outside of the state that a delegation of Julesburg citizens came to Denver the latter part of November.

Members of the committee included: County Commissioner H. H. Hodges. County Road Supervisor Earl C. Hamilton, G. H. Austin, president of the Julesburg Community Club, and Finley Dye, a member of the executive board of the Community Club.

While in Denver they conferred with L. D. Blauvelt, State Highway Engineer: Arthur Dodge, manager of the Civic and Commercial Association, and Martin Rowley, president of the Hotel Men's Association.

It is estimated that $3,000 will be required to improve the road between Julesburg and Big Springs, Nebr. The citizens of Julesburg are willing to contribute their share toward this improvement, while assurance was given that Sterling and Fort Morgan would bear a part of the expense. Support in the movement was promised by the Denver business men.

"The Julesburg-Denver road," said Mr. Hamilton, "is one of the finest in Colorado. Recently the State Highway Commission has expended $100,000 to improve the stretch between Sterling and Julesburg. Maj. L. D. Blauvelt, Chief Highway Engineer of the State, informs us that he has been after the Nebraska Highway Commission for two years to get action on the link to Big Springs. Nothing has been done.

"As a result, the tourist traveling west over the Lincoln Highway out of Omaha reaches Big Springs, Neb.., and asks: 'How's the road to Denver?'

"'Rotten!' he is truthfully told. 'Better not try it. It's full of chuck holes, ruts and washouts.'

"So the tourist goes on over the Lincoln Highway through Chappell, Nebr., and into Cheyenne, Wyo., missing Colorado altogether.

"Any Colorado citizen can see the point. We lose the tourist business at Julesburg. Sterling and Fort Morgan see their fine roads to Denver empty of Eastern travel. Denver, the whole state, is the loser.

"The road to Julesburg from Denver .ust now is like a heavy forged chain," said Mr. Austin supplementing the statement of the county engineer. "Just now, it's hitched to the Lincoln Highway with a kink of bailing wire. We want to forge another link, and it's to Denver's interest to help us do it."

Major Blauvelt Remains As Highway Engineer

MAJOR L. D. BLAUVELT is now the permanent State Highway Engineer. His name was certified by Gov. O. H. Shoup to the State Civil Service Commission for permanent appointment the latter part of November.

Recently the Civil Service Commission held examinations for the position of Highway Engineer. Major Blauvelt passed the examination at the head of the list. As a result the certification by the governor was made for permanent appointment.

At the same time permanent appointment of the following Highway officials was announced: Robert H. Higgins, superintendent of maintenance; Edwin Mitchell, chief accountant; Harry Roe, superintendent of traffic and purchasing department, and Roy F. Smith, chief clerk of the department.

Major Blauvelt has announced the appointment of James D. Bell as division engineer of the fourth highway district, with headquarters in Pueblo. Mr. Bell has been acting engineer in this district for several months.

Elaborate Road Program Planned for 1923

AN elaborate road program is being planned by the county commissioners of Chaffee County for 1923. A tentative budget calls for an expenditure of $120,000 to be appropriated from county, state and government funds.

A large portion of the funds are intended for the road between Salida and Buena Vista. The sum of $2,500 is requested by Commissioner Philbin to complete work on Poncha Pass, while Commissioner Habenicht has proposed the expenditure of $10,000 on Monarch Pass between Poncha and Maysville.

Commissioner DeWitt asks for a like sum to finish up work on Trout Creek which leads into the South Park country.

The roads upon which it is proposed to spend these sums radiate to all sections of the state, and each of them are important as State Highways.

State Highway Lets Three New Road Projects

THREE road contracts totaling $92,959.24 were let the first week in December by the State Highway Department. The work includes three and a half miles of gravel surfacing on the Santa Fe Trail in Bent county, running to the Prowers county line; eleven miles of grading through Eleven Mile Canon from Lake George to Howbert, and eleven small bridges in Cheyenne county.

The gravel surfacing project in Bent county went to M. J. Kenney on a bid of $36,372.90, being a Federal Aid job.

The Levy Construction Co. was the low bidder on the Eleven Mile Canon project which consists of grading and construction of bridges to convert the old Colorado Midland Railroad bed into a modern highway.

On the latter project the following classes of work will be carried out:

1:	Clearing and Grubbing	14 acres
2:	Removing, salvaging and burning old ties	10.8 miles
3:	Excavation, common	5700 cu. yds.
4:	Excavation, solid rock	5100 cu. yds.
5:	Excavation, solid rock, tunnel	300 cu. yds.
6:	Borrow fill	14700 cu. yds.
7:	Overhaul	1000 sta. yds.
8:	Class "A" Concrete	37 cu. yds.
9:	Structural Steel	66500 lbs.
10:	Reinforcing Steel	27500 lbs.
11:	New Timber	152 M. Bd. ft.
12:	Salvaged Timber	27 M. Bd. ft.
13:	Timber Culverts	216 lin. ft.

City Pavement Urged to Connect State Road

A SCORE of citizens called upon members of the Denver city council last week and urged the immediate paving of Federal Boulevard from West Forty-fourth avenue to West Fifty-second avenue.

This would give a complete stretch of pavement from the business district of Denver north to Broomfield, a distance of over twelve miles.

Work on the state paving on Federal Boulevard is now being rushed to completion and it is expected will be opened for traffic the middle of November. The Federal Boulevard project is the longest single piece of paving work done in the state this year.

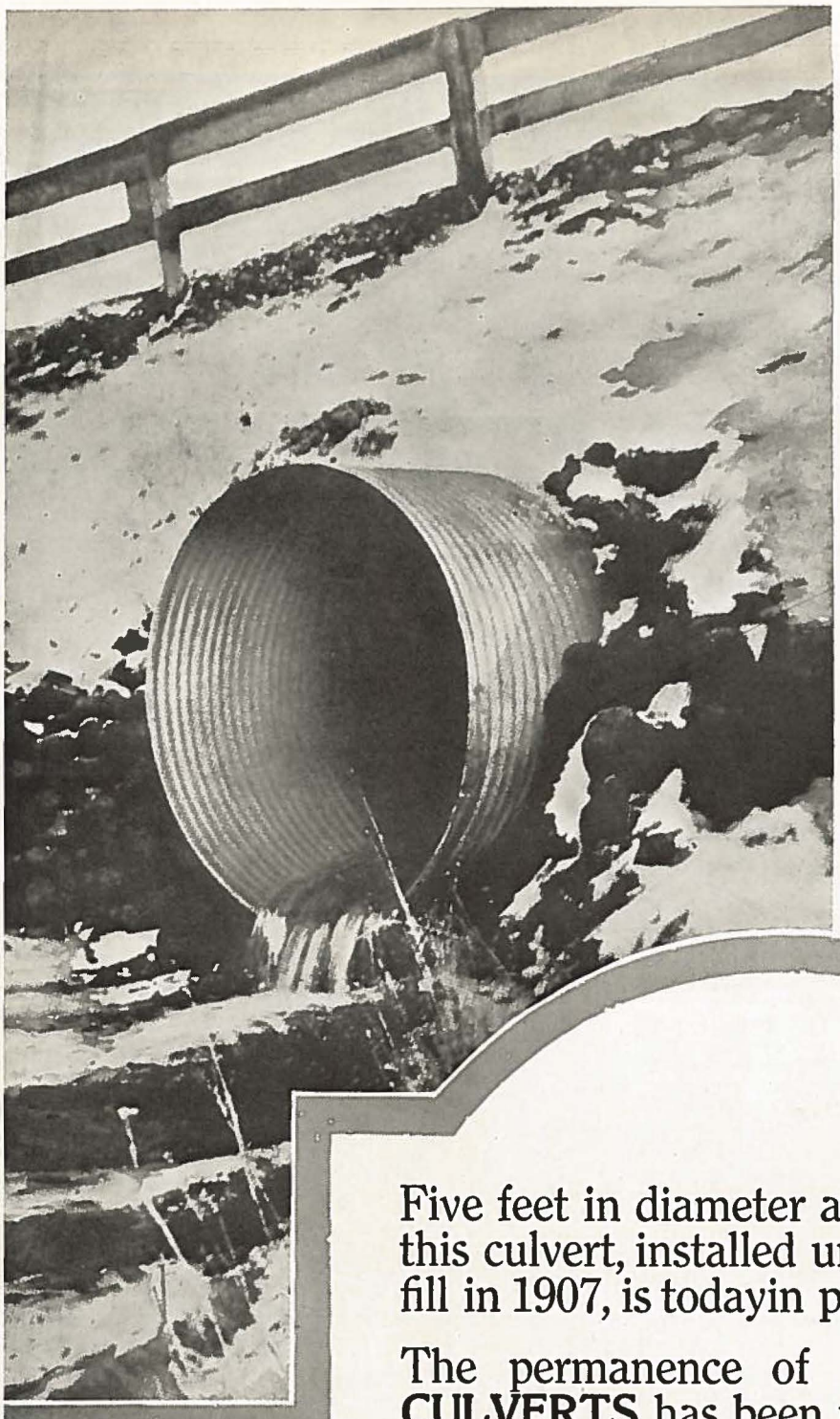
City Auditor George D. Begole is the chief booster for the paving of the eight blocks in the city on Federal Boulevard.

Plans are now being made for the State Highway Department to pave another link of the Broomfield road up Goodhue hill near the Zang farm. It is also planned to build an over-head crossing over the Burlington tracks at the foot of Goodhue hill on the north.

Specifications of the new road work call for the elimination of the "U" curve on the present route.

Views taken along foothill roads from the banks of the Platte to the Sangre De Cristo Range, via the Phantom Canon Highway, which off route and on to Westcliffe through the Hardscrabble Canon. 1. Down Sugar Creek to the Platte River, Douglas County. 2. A rich whe tom Canon. 5. Cattle grazing in the shadow of Sangre De Cristo, Custer County. 6. Approaching one of the 45 bridges in Phantom C rado's great gold district, Teller County. 9. The approach to Pike's Peak from Divide, Teller County.

...e variety of mountain scenery. It proceeds from Denver via Jarr Canon to Cripple Creek, thence to Florence via the Phantom Canon ...just out of Florence, Fremont County. 3. Picturesque red rocks near Manitou Park, Teller County. 4. A rugged cliff scene in Phan... Fremont County. 7. The famous old Bassic Mine, near Querida, Custer County. 8. On the heights above Cripple Creek, center of Colo-



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.

The permanence of **ARMCO IRON CULVERTS** has been proved by installations like this, made ten years ago or earlier, in all parts of the country.

THE R. HARDESTY MFG. CO.
DENVER, COLO.
Woods Cross, Utah **Missoula, Mont.**
Pocatello, Idaho

AMERICAN ARMCO INGOT IRON
LOOK FOR THE TRIANGLE TRADE MARK

The Armco trade mark is a guarantee of quality—their record of service—Your assurance of permanence.

Battle Mountain Road Completed

(Continued from page 7)

In some places the road is 35 feet wide and two cars can pass with ease at any point along the six miles. It is one of the most spectacular road projects completed by the state of Colorado. The survey was made in 1919 by H. L. Jenness, division engineer of the Highway Department. W. A. Whitney was the resident engineer in charge of construction.

The work became such a menace to the operation of trains through the canon, that the railroad company took the contractors and the Highway Commission into court in 1920 on a citation for contempt. Federal Judge Lewis ordered that the highway work be carried out in such a manner as not to further interfere with the running of trains.

Issuance of this order made it necessary for a large part of the work to be carried on by hand, as the highway was located almost perpendicular above the tracks and any rock thrown over the side of the road fell upon the railroad line below. Exceptionally difficult was the construction across the face of the rock cliff at "Lover's Leap" and at the "Hole in the Wall", both located on a line 500 feet above the Eagle river bed.

The completion of this road will have far reaching effect upon the development of northwestern Colorado. At Red Cliff it connects with the proposed highway to the Mt. of the Holy Cross, and with the construction of the Holy Cross Trail will form a link of a direct route from Denver to the Western slope, bringing the state capitol some 90 odd miles closer to Glenwood Springs and Grand Junction.

From a commercial standpoint these highways are of almost equal importance to the Moffat tunnel, which will provide easy railroad transportation to the northwestern territory. The highway will be of immeasurable advantage to the many productive ranches in the fertile valleys of Eagle county, and likewise will tap the vast interior region of the Holy Cross National Forest.

The country through which it passes is all highly mineralized. One of the largest zinc deposits in the world is at Gilman, where the huge plant of the Empire Zinc Company is located. The rugged scenic beauty of the entire locality is unsurpassed. It is located near the scene of the earliest gold rush in Colorado, and was settled by miners who moved into that section from the Leadville district.

During the early days Battle Mountain was the scene of innumerable accidents. There is a story of a whiskey oufit with a six-horse team going over the cliff to "eternity" while crossing the mountain during a snow storm. The whiskey was intended to replenish the stocks of Leadville saloonkeepers. But instead it "sweetened" the waters of the Eagle river.

In speaking of the project, L. D. Blauvelt, Colorado Highway Engineer, states: "Completion of the Battle Mountain project marks a distinctive step forward in the completion of Colorado's highway system. Steps have been taken to provide maintenance necessary to keep the highway in first class condition. Undoubtedly the new road will induce a great deal of development in the northwestern territory."

This is one of the largest mountain road projects opened to the public by the state. During the coming year it is expected that the equally important Durango-Silverton-Ouray highway will be completed. The latter road will cost more than $1,000,000 when completed.

DRAINAGE AS THE FUNDAMENTAL IN ROAD BUILDING.

Much has been said since the late war by the men who have returned from overseas regarding the wonderful efficiency of the French roads.

Cogitating on the subject arouses our curiosity until we find ourselves going back 2,000 years B. C., through avenues of research, to the days of the Egyptians and Romans.

The first of the great Roman roads, generally known as the "Appian Way" or "Queen of Roads," was begun by Claudius Appius about 312 B. C., and led from Rome to Capua, a distance of 360 miles, and was probably finally completed by Julius Caesar. The "Flaminian Way", the second of the great Roman roads, was begun about 220 B. C. This road crossed the river Nar about 60 miles from Rome by means of a great stone-arch bridge with a central span of 150 feet and a rise of 100 feet. After the completion of the "Flaminian Way" road building progressed very rapidly so that when Rome reached the height of her glory no less than 29 great roads radiated from her gates. Every conquered province was soon traversed with connecting roads and the entire Roman road system of main and military roads is estimated to have amounted to 50,000 miles.

With the fall of the Roman Empire its magnificent system of roads began to decay and as a result of continued neglect for thousands of years ceased to exist. Not until about the close of the Middle Ages did road building begin to revive and then not in Italy, but in England and France.

About 1775 Tresaguet, a French Road Building Engineer, introduced a system of road building and maintenance which soon became general in France. This system, by making scientific provision for proper drainage, greatly reduced the amount of material required and laid the base of what are now the much talked of French roads. This system, with slight modifications, is still in force. The State Department of Roads and Bridges which has full control of all highways is, and has been for nearly a century and a half, the chief controlling force in all road matters in France.

As travel and trade increased, the demand for improved roads became more and more insistent. Recognizing drainage as the prime factor in the stability and service of all road construction, France has solved the problem of permanent roads.

BIDS RECEIVED DURING NOVEMBER, 1922

PROJ. No.	LOCATION	COUNTY	LENGTH	TYPE	LOW BIDDER	BID PRICE
F.A.P. 116A	Colo. Springs-Breed	El Paso	4.185 mi.	Concrete Paving	Standard Engr. & Constr. Co.	$177,822.86
F.A.P. 213B	Hesperus-Mancos	La Veta and Montezuma	5.276 mi.	Gravel Surfacing	J. Ed. Hanson	64,140.10

PROJECTS BEING ADVERTISED FOR BIDS

PROJ. No.	LOCATION	COUNTY	LENGTH	TYPE	BIDS OPENED
F.A.P. 218B	Hasty-Lamar	Bent	3.489 mi.	Gravel Surfacing	Dec. 4, 1922
S.P. 694	Lake George-Howbert	Park	11.787 mi.	Grading	Dec. 4, 1922
Cheyenne County Bridges	State Highways 32 & 9s	Cheyenne		Timber Bridges	Dec. 4, 1922

PROJECTS ON WHICH PLANS HAVE BEEN SUBMITTED TO THE BUREAU OF PUBLIC ROADS BUT NOT YET ADVERTISED

PROJ. No.	LOCATION	COUNTY	LENGTH	TYPE
F.A.P. 168B	Northwest of Lamar	Prowers	3.286 mi.	Gravel Surfacing
F.A.P. 211	Meeker-Craig	Rio Blanco	1.679 mi.	Gravel Surfacing
F.A.P. 231	Six-Mile Creek near Avondale	Pueblo	.454 mi.	Gravel Surfacing and Bridge

PROJECTS FOR WHICH PLANS ARE BEING DRAFTED

PROJ. No.	LOCATION	COUNTY	LENGTH	TYPE
F.A.P. 81A	Denver-Idaho Springs	Jefferson	3.5 mi.	Grading
F.A.P. 125	Sapinero, West	Gunnison	2.819 mi.	Grading and Steel Arch Bridge
F.A.P. 157B	Northwest of Buena Vista	Chaffee	6.526 mi.	Grading
F.A.P. 159A	Ramah-Mattison	Elbert	6.288 mi.	Sand Clay Surfacing
F.A.P. 222C	Denver-Lafayette	Boulder	1.5 mi.	Concrete Pavement and R. R. Grade Separation
F.A.P. 223	Kremmling-Murphy Pass	Grand	4.9 mi.	Gravel Surfacing
F.A.P. 224	Morrison-Baileys	Park	5.621 mi.	Mountain Grading
F.A.P. 229	Pueblo-Florence	Fremont	1.756 mi.	Gravel Surfacing

Overloaded Trucks Public Menace

Noted Roadbuilder Says Trucks Carrying Overweight Should Be Banished From the Highways---Advocates Stern Measures

BY JOHN N. MACKALL,
Chairman, Maryland State Road Commission

Editor's Note—This article by Mr. Mackall was delivered in the form of an address to the National Conference on Weights and Measures at Washington, D. C. It is reproduced here because of the seeming necessity for a uniform law limiting the load a truck should carry. The article is most timely and should be read by those interested in conserving the taxpayers' money. Each year thousands of dollars are expended for road maintenance on roads that have been broken down by reason of overloaded trucks.

I AM glad of an opportunity to present to you, who are interested in the preservation of our highways, some of the experiences and some of the reflections which we have had upon a subject which we believe is of vital interest to every man, to every woman and to every child, and one which unfortunately seems to be nobody's business.

I am going to sketch briefly for you, in order that I may develop what I have to say, the highway system as it has been developed in the state of Maryland. I ask you to pardon the personal references to the highway system of Maryland. I assure you it is no choice of mine, and it is a system with which I have unfortunately had very little to do, so I can sketch that system to illustrate a point without too much personality.

We have in Maryland a total of about 15,000 miles of public roads. We have improved about 1,700 miles of that 15,000. Those of you who are quick at figures will make that to be 12 or 13 per cent. It has a portion of improved roads in percentage second to no state in the Union. The condition in which they are maintained is second to no state in the Union, and the service which they are rendering to the public is second to no state in the Union.

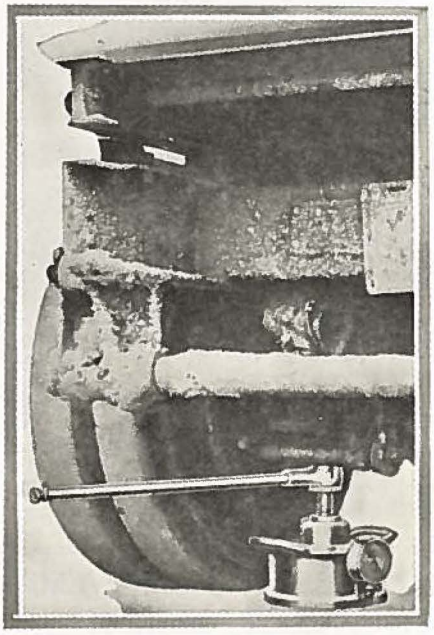
There was talk in Congress a year or two ago about a federal system of highways, to which the federal government would contribute a certain percentage of the cost. A bill was drawn providing for a maximum of 7 per cent, constituting a system of roads, of which 3 per cent was to be the primary system and 4 per cent the secondary system. I cite you that to show you that the percentage of improved roads in the United States is very, very small. Taking the approved types, the percentage is no more than 2 or at the most 3 per cent of the road mileage in the country that are improved roads. Then it simply behooves us to protect for as long a time as we can those highways which are rendering and are capable of rendering satisfactory service.

But have not we taken up and helped to carry on the propaganda put forth by the professional propagandists in believing that roads mean new roads, not old roads, not good roads, but usable roads, not serviceable roads, but new roads.

Is the public interested in the type of road you build, or the width of road you build, or the kind of road you build, except you build them a serviceable road and one that can be used every day in the year?

There are many miles of road which could, at small expense, be made to meet with specifications which are being destroyed in order that we may build more roads.

And why do we build more roads? Because we have been completely imbued with the idea that only a new road is a good road, one that has just been built. One of the largest producers of a commodity entering into so-called good roads started the slogan a few years ago, "Build the road to carry the load." You could not find fault with that. Fine! "Build the road to carry the load." What load? Any load that any unscrupulous manufacturer may want to put upon it. I heard the distinguished speaker before me speak about crooks, and it gave me an inspiration—any crook who wants to make the public pay a dollar in order that he may save a penny—any load of any size he may want to put upon the highways.



Device used in weighing truck loads on highways.

And I say to you that more dollars are being squandered in permitting big trucks to destroy serviceable roads in every year in the United States than is being put in new construction every year in the United States; and yet we say we are trying to solve it, by getting less miles of usable road at the end of every year than we had at the beginning of that year. I maintain that it is not solving it, and it can not solve it.

Solving the problem of the highways of the United States applies in the same degree to the total mileage of usable highways in the state of Maryland. So we have started out in our little way to see that the highways in Maryland shall be used by vehicles so designed, so constructed and so operated as not to do unreasonable damage to the public highways. And we have said, for the sake of argument, that a truck may not carry more than the weight for which it made an application and paid a fee, which in turn is based upon the weight of that vehicle.

Therefore, if John Jones was an honest man and paid a license for a two-ton truck, he should be assured that the people who are competing against him are not taking out a license for a four-ton truck and paying a two-ton fee. So, in common honesty, we say that the trucks shall not carry more than the weight for which application has been made and a fee has been paid.

Second, a man shall not carry a load in excess of 650 pounds per inch of width of tire.

Third, that under no consideration may any motor vehicle of any kind carry a load in excess of 20,000 pounds, five tons of load, perhaps, and five tons of dead weight.

I want to cite you a little incident. The road from Washington to Baltimore and Philadelphia during the war carried a tremendous amount of traffic, war traffic and all other kinds of trafic, but we called it all war traffic. Anyway, it carried enough traffic to destroy it, as every other highway on the Atlantic Seaboard was destroyed during the war—destroyed so nobody could use them.

The bureau of public roads, department of agriculture, made a distinterested study of the traffic that went over that road. We kept account of the traffic, the weights, one day a month for two or three years. But they took it for one month and they demonstrated that if all the loads of five tons or larger had been carried in units of three tons, and allowing the manufacturers rated efficiency for the five-ton unit over the three-ton unit, it would have cost those operators an additional $15,000, and it cost the state of Maryland the tidy sum of $600,000 to remedy the damage which was done at a saving to the operators of $15,000.

We passed the law and then we started out to enforce the law, and again they said it could not be done. I want to tell you that it is the easiest thing ever undertaken—every one of you undertake every day a more difficult task than than eliminating from the highways of this country the overloaded truck. And all you need is a little portable weighing device. Two of them together will weigh about one hundred pounds. You stick them in the back of a flivver, and you go along the road; you find a truck that is overloaded; you weigh it. If it is overloaded, then and there you take

off the amount of the overload, and then take the driver to the judge and let him tell his story. That is all you have to do —just weigh the load, take off the overload, and take him to the judge and let him tell his story.

There is the whole story of eliminating overloads on highways, by means of portable devices. We started out and we had these portable devices. The first day we obtained sixty arrests and convictions. The first week we obtained something like 150. The second week we got about fifty; the third week we got fifteen, and the fourth week we got none. Of the 130,000 vehicles in the state of Maryland today not one-hundredth of one per cent is carrying an overload at any time, simply because you have a little accurate portable weighing device that you stick under the truck and jack up the rear end and record the weight. And if it is overloaded, you have the driver tell it to the judge.

No fewer than 20,000 motor busses are operated in the congested and undeveloped areas of the principal cities of this country.

Work has been started on the $100,000 contract for the building of a new road from Empire to connect with the finished road over Berthoud Pass. Dooling Brothers were given the contract on August 5. Two steam shovels will be used in the work.

The project is 7.5 miles long.

Las Animas Bridge Open to Travel

(Continued from page 3)

not reach it. The foundations are of concrete, and extend several feet down into the bed rock, to insure that they may not be washed out. Where the river swings sharply against the bank on the south, 250 feet of concrete retaining wall has been constructed, to prevent the possibility that the river might cut a channel across. The alignment of the roadway has been shifted somewhat from its original location, so that the bridge is more nearly at right angles to the flow of the stream, and, at the same time, so that the grades and curves at each end are easier to travel over. Between the town and the bridge there has been concrete pavement constructed. On the north side, where the traffic begins to divide, some east, some west, a new gravel surfaced roadway has been built up to the highlands, with easy curves and grades.

The bridge was designed by the bridge department of the Colorado State Highway Department. The Pueblo Bridge & Construction Company contracted to build it for $105,800, the construction was supervised and inspected by the State Highway Department. The bridge is one of the larger bridges in the state, and ranks high in importance, since it is an important link of one of the most important State Highways.

In expressing his regret at not being able to attend the celebration, Governor Shoup wrote as follows:

"Please say for me to those assembled that I congratulate them upon the so necessary and so very excellent improvement in your community—a structure that, we believe, will exist and be of great use for ages. This bridge is virtually a monument to the progress in the highway development in Colorado.

"Aside from education, there is no one factor in the development of our state of more importance than is that of highway construction; and the time will soon come when not only a state, but a community as well will be judged largely by its highways.

"It has come to be understood as such a far-reaching, such an all-important economical factor in the life of the people, that it no longer calls for advocates to present its great value. The only question now is, how best to build, and how rapidly to build.

"The latter should be determined only by the amount of means available; for if the means can be found with which to carry on the work, and it were humanly possible to make every highway in Colorado the very best in a month, then it ought to be done in a month. But we must be a little more reasonable and patient than that and realize that it is going to take a long time to construct the kind of highways we want in all sections. Naturally and reasonably the main arteries must come first. The question of how best to build them is even a more important one than that of time. It is a question that has atracted the attention of not only the engineering world, but the many other scientific minds, and it is not an easy question for solution because of the revolution that is going on in the matter of motor transportation, and the constantly increasing traffic the rapid growth of our state is demanding.

"Highways cannot now be constructed in the haphazard way of the past. It will not do to spend the people's money in such a way that the cost of upkeep of the roads will mean the doubling of the original cost every few years. Instead, they must be so constructed to begin with that they will meet the hard usage and heavy demand with the least possible deterioration.

"That may mean a heavy original outlay, but experience and the best information declare that it is worth it.

"Colorado is very fortunate in having in almost every section the best of road-making material, thereby assuring a lower cost for even a superior construction. Then Colorado is also very fortunate in that she has a thoroughly organized, highly efficient Highway Department, with Major Blauvelt, one of the best highway engineers, at its head. The people have also shown their confidence in the work being done by that Department by voting it millions of dollars to be expended with equal millions from the Federal Government, in the next few years; so that we have the assurance that we will soon have many miles of as fine highway as any state in the Union.

"For all of which I most heartily congratulate those of you assembled to celebrate the opening of this great bridge, and all the state as well. And I express the hope that the bridge you are dedicating may be of continued use and benefit to all you good citizens of Bent county, and also that there may come across its safe and solid floor thousands of others who shall enjoy its safety, and look upon it as an evidence of the stable, the enduring, the worthwhile kind of work our people are doing, and will thereby come to say: 'That is the kind of people, and this is the class of a community I want to be a part of. Here I will make my home, take my full part in the mighty work of building an empire so inviting and so enduring that it shall continue for all time, a land of contentment, of joy and happiness to all its people.'

"So let us strive to build the highways and all other factors which shall benefit Colorado.

"Most cordially yours,

"O. H. SHOUP,
"Governor."

Road Builders' Equipment

Plans Completed for Good Roads Show at Chicago

ARRANGEMENTS are nearly completed for the fourteenth annual Good Roads show to be held in Chicago, January 15, 16, 17, 18 and 19, 1923. The Thirteenth American Good Roads Congress will be held at the same time.

A large delegation of Colorado engineers and contractors and machinery dealers plan to attend the big convention. The program of speakers for the congress includes a score of the leading road builders from all parts of the United States.

The display of road machinery promises to be the greatest ever staged in this country. It is a fact that new machines and methods are being developed so fast in the road construction field that it keeps the contractors on their toes to keep abreast of the times.

The show will enable road builders to see more modern machinery and new methods employed than it would be possible by several weeks of traveling. Manufacturers from all over the country will have exhibits. Space for the machinery already is taken up.

Plans as outlined insure one of the most remarkable industrial displays ever held anywhere on earth. The arrangements have been in the hands of a special Convention and Show Committee, headed by Thomas J. Wasser, president of the American Road Builders' Association; Charles M. Upham, State Highway Engineer for North Carolina; James H. MacDonald, Consulting Highway Engineer. New Haven, Conn., and J. H. Cranford of the Cranford Paving Company, Washington, D. C.

Under the arrangements made for this show, the congress will be held separate from the machinery exhibitions. All meetings of the congress will be held at the Congress Hotel, and the show as usual at the Coliseum.

This plan will obviate the necessity for shutting down the operating of the machinery, which has proved so annoying to speakers at previous conventions.

Avery Improves Road Maintaining Machine

A number of splendid improvements are noted on the 1923 Avery Road Razer which has just reached Denver. Besides a more comfortable seat for the driver, the gears of the new machine are enclosed. The latter improvement was made at the suggestion of L. L. Clinton, Colorado distributor, who found that the heavy sand out here collected on the gears and interfered with the smooth operation of the machine.

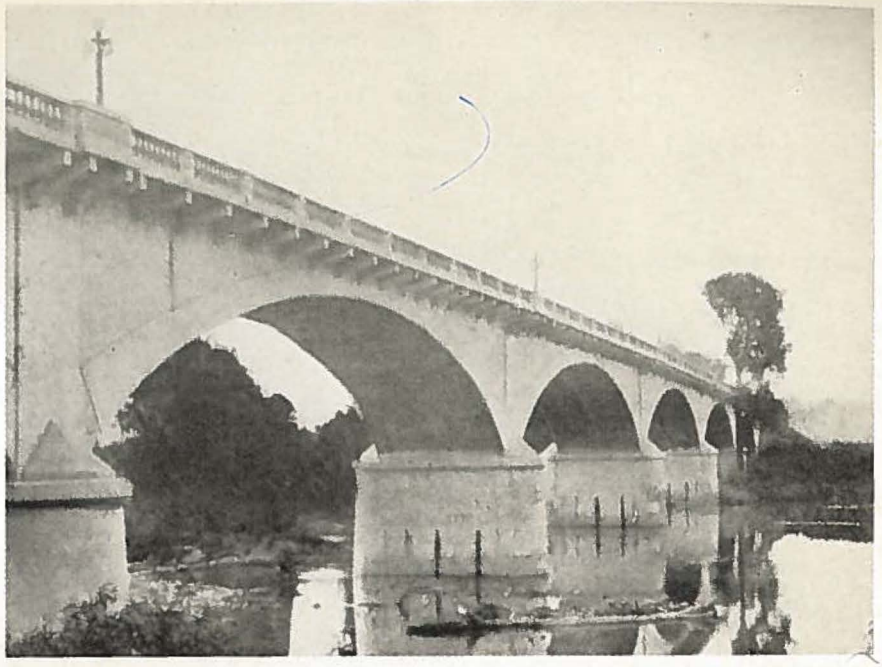
Koehring Bulletin on Crane Excavators

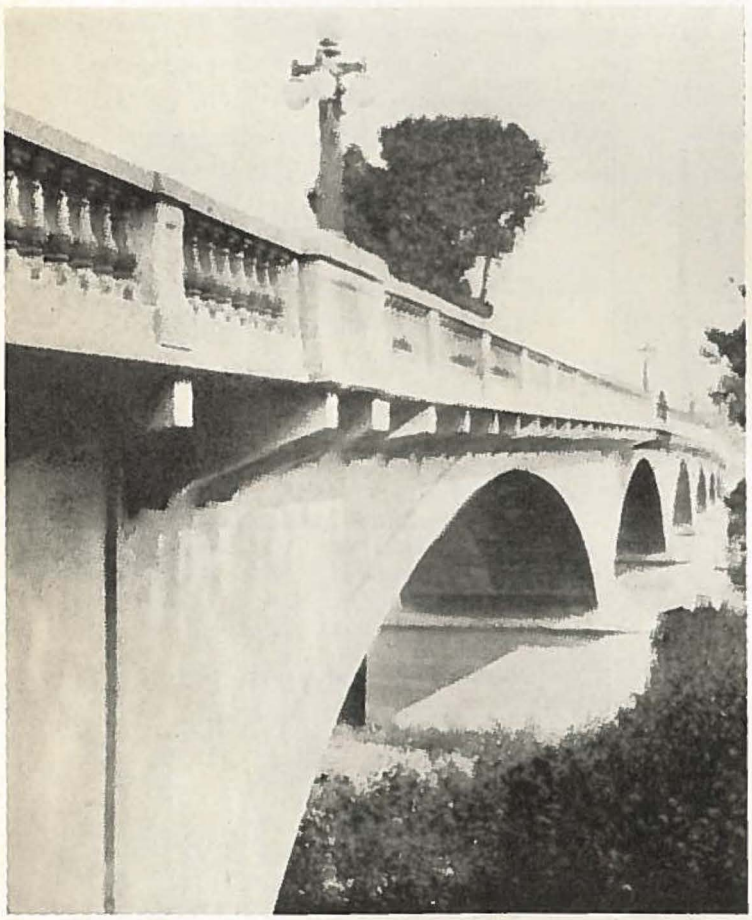
THE Koehring Company, Milwaukee, Wisconsin, have just issued two beautifully illustrated bulletins showing their crane excavators Nos. 2 and 3. Excavator No. 2 is built to operate at the greatest maximum speed. It is a heavy duty crane, built of the very best materials and equipped with a 40-ft. boom, it handles a one-yard bucket at a radius of 33 feet; its lifting capacity at a 12-ft. radius is 24,000 pounds. No. 3 excavator handles a 1½-yard bucket at a 40-ft. radius, and at 12-ft. radius has a capacity of twenty tons. It is interchangeable to dragline, clamshell, magnet, pile driver with leads, and hook and block.

Copies of the bulletin will be sent to any one interested by H. P. Wilson & Co., Denver representatives of the Koehring Company.

"CONCRETE FOR BEAUTY AND PERMANENCE"

How much more eagerly
and confidently
we accept
The Invitation of the Road
if the road
is concrete





Built to endure for generations, the bridge across the Wabash river at Attica, Ind., pictured above, will stand as a monument to the wisdom of the business men responsible for its construction.

Concrete roads and bridges have the qualities that resist wear and hard usage. The counties which have had concrete roads and bridges the longest know by experience that the people get their road money back before the roads wear out. That's why they keep on building concrete roads and bridges.

For roads, streets and bridges, concrete is the preferred material because of its adaptability, permanence and everlasting economy

MORE ROADS ARE NECESSARY, SAYS NEBRASKA FARMER.

"Roads are of such importance that they may be compared to our lives; they are both good and bad; they are smooth, even, level, wide and full; they are hilly, narrow and winding; dangerous, shadowy and bright; and they show the effect of environment and care, even as we. They are the means of our life, for over them passes the food which must keep the people of the cities alive," writes a farmer in the Nebraska Department of Public Works Monthly Report.

"Without roads, cities could not survive, and, country folk would be without many of the present necessities, comforts, and luxuries of life, which they are now able to enjoy. They are the connecting link between the city business man, the manufacturer and the farmer, dairyman, the producer of food.

"They alone make it possible for both country and city to live up to our present standard of living and they will be largely responsible for any rise which may take place in that standard.

"Who, then, can place a value on roads, and who is great enough to say what their true service to mankind is? Can any man picture a country or a land without roads?

"A good man sets an example; a good road is likewise an example; and as we have too few good men, so have we too few good roads. Only when we find a travelable road going past every farm, through every village, and city, will it be time to cease talking good roads."

War Equipment Reduces Road Costs

(Continued from page 5)

have assembled, rebuilt and repaired 146 automobiles and 90 trucks. They also have constructed one rotary snow plow; rebuilt and overhauled nine motorcycles, and four tractors. Also they repaired one steam shovel, thirteen fresnos and four graders.

These repairs have been made for the engineering and maintenance departments and for the counties.

A six-foot rotary wheel snow plow has been constructed largely from surplus war materials and has passed through a preparatory test successfully. It is expected that this snow plow will do effective work this winter.

The department acquired an Erie steam shovel by exchanging some surplus war equipment and paying the difference in cash. The shovel has done some very good work on Wolf Creek Pass during the past season.

Each of the counties in the State now has from one to ten trucks. These range from one to five tons capacity. With these materials the counties have been enabled to construct and maintain more lateral roads than their previously inadequate equipment would permit. In nearly every case the trucks were put in first-class condition by the state garage forces before they were released to the counties.

The department's garage is modern in every way. A large part of the equipment in the garage consists of materials procured from the government. It is possible to entirely assemble and rebuild automobiles and trucks without sending them out of the Highway shops.

This phase of the work is under the direction of Mr. F. J. Alvater, superintendent, who also acts as storekeeper for the supplies in the warehouse.

Road Mileage Shows Big Gain

(Continued from page 2)

third miles of gravel surfacing, south of Grand Valley toward DeBeque, in Garfield County; 10 per cent complete.

F. A. Project No. 216-A—Five and one-third miles of gravel surfacing on Santa Fe Trail, north of Granada, in Prowers County; 10 per cent complete.

F. A. Project No. 217—Three miles of concrete paving, east of Pueblo, in Pueblo County; 10 per cent complete.

F. A. Project No. 218-A—Eight and one-third miles of gravel surfacing, east of Hasty, in Bent County; 20 per cent complete.

F. A. Project No. 221—Four miles of concrete paving, north of Loveland, in Larimer County; 20 per cent complete.

F. A. Project No. 222-A—Two and three-quarter miles of concrete paving, east of Broomfield, in Adams, Boulder and Jefferson Counties; 75 per cent complete.

F. A. Project No. 222-B—One and one-half miles of concrete paving, north of Broomfield, in Boulder County; 15 per cent complete.

Protect Your Motor Against Winter Troubles

Repairs on one burned-out bearing will equal the cost of a whole year's supply of the right lubricant.

Correct lubrication is of great importance in winter. Oils not suited to your particular motor will add to your starting troubles.

We carry oils for every type of engine made from the purest Pennsylvania crude. You can't go wrong.

To get this thorough protection we suggest that you use SOMMERS MAJESTIC MOTOR OILS. You can buy it in the manner you prefer, from a quart to a five-gallon can.

Reduces carbon troubles and gives greater engine power.

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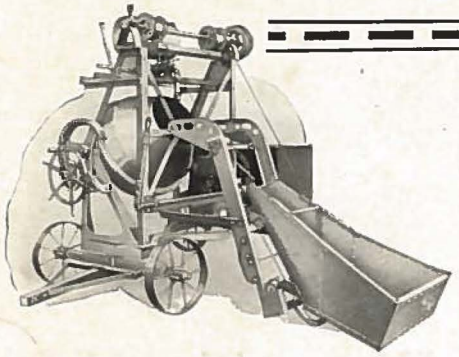

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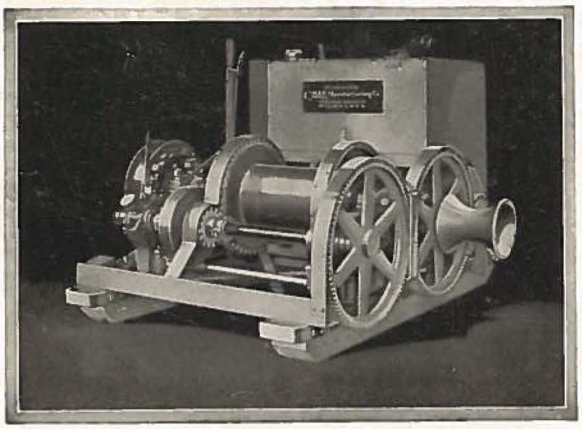

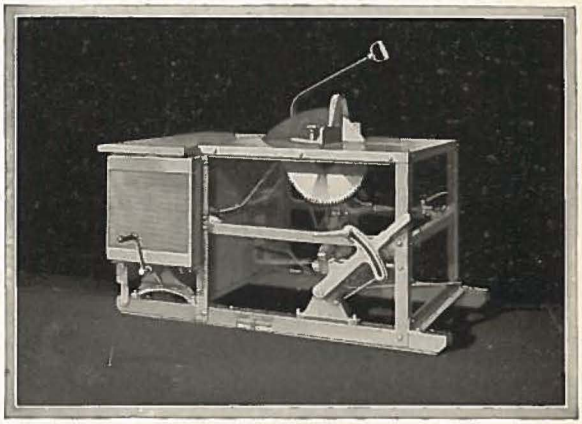

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