

ARKANSAS HIGHWAYS

The Official Magazine of the Arkansas
State Highway Department, Little Rock



SALINE RIVER BRIDGE NEAR WARREN

Vol. 7

AUG. • 1930

No. 8



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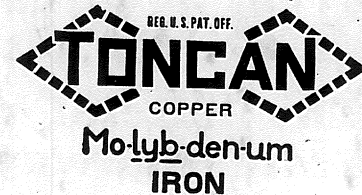
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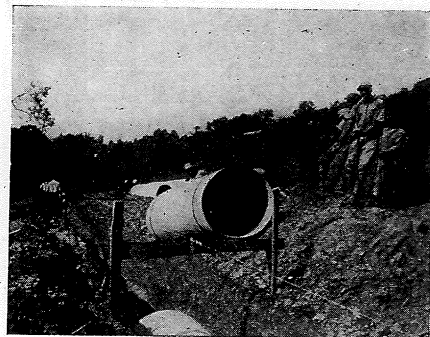
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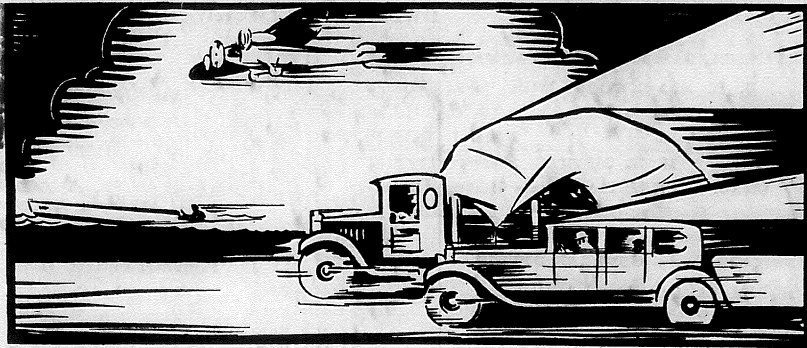
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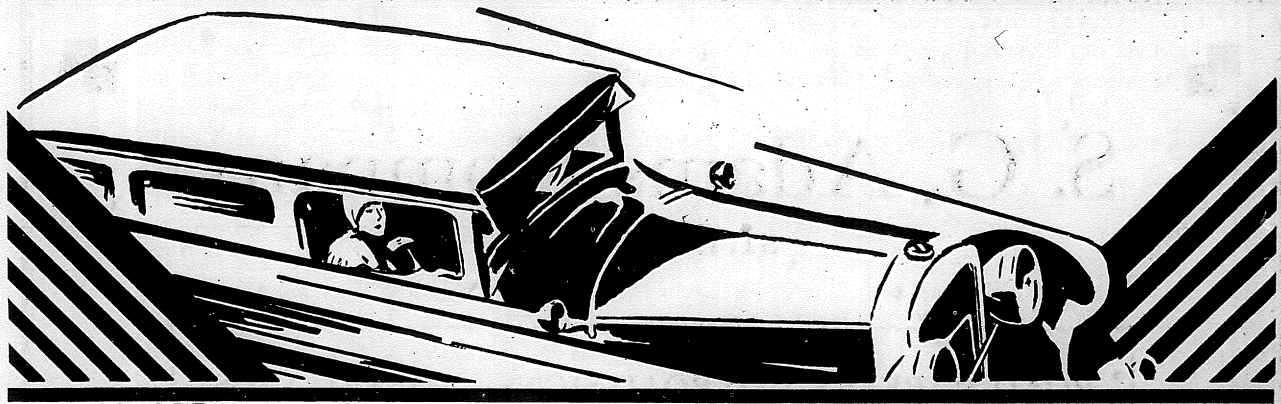
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ARKANSAS HIGHWAYS

*Official Monthly
Magazine*



*State Highway
Department*

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VOL. VII

AUGUST, 1930

No. 8

ARKANSAS BRIDGE COSTS LOW

By N. B. Garver, Bridge Engineer

In the Spring of 1928, a general survey was made of the bridges on the 8,500 miles of roads on the State Highway System. In this survey it was found that there were approximately 362,000 lineal feet or 70 miles of bridges. This is, as far as our information is available, more feet of bridge per mile of road than in any other State. It is about two and one-half times that of Illinois.

Since January 1, 1927, the State Highway Commission has completed, or has under construction a total of 976 bridges, of 20 feet or more in length with a total length of 181,391 feet which will cost a total sum of approximately \$17,955,000. From the above figures it can readily be seen that bridging the streams on Arkansas Highways is no small matter, and that there still remains a large number of bridges to be built.

The bridges built are of high class, permanent type. No one type is adapted to all conditions, so several types have been used.

Economy has been a primary consideration. This involves several factors such as: first cost; cost of maintenance; durability; amount and character of traffic; character of stream; character of foundations.

Judging from data which has been made available by the United States Bureau of Public Roads, Arkansas is building bridges of the various types at less cost than most of the other States. The following information is evidence of this fact:

Treated timber pile trestles with timber floors, 22 projects in eleven States. Average cost per square foot of roadway.....	\$2.26
Average cost for five projects in Arkansas.....	1.51
Concrete pile trestles with concrete decks, 17 projects in eight States. Average cost per square foot of roadway.....	\$3.56
Average cost for four projects in Arkansas.....	2.55
Concrete deck girders on concrete piers and abutments, 73 projects in 25 States. Average cost per square foot of roadway.....	\$5.14
Average cost for eleven projects in Arkansas.....	4.55

The above cost figures should be a source of satisfaction to those interested in Arkansas' road and bridge program.

Contractors To Use Home Labor

Highway Board Seeks to Relieve Unemployment Situation in State

The Arkansas Highway Commission adopted a resolution at its mid-monthly meeting in July, instructing C. S. Christian, Chief Engineer, to require contractors to use home labor and Arkansas materials whenever practicable in carrying out road and bridge construction contracts.

It will be the policy of the commission, it was announced, not to award contracts for grading, graveling, asphaltting, building timber bridges and doing other work that may be performed by State forces.

These steps were taken to partially relieve the unemployment situation and to afford farmers whose crops have been destroyed or cut short by the drouth an opportunity to use their teams profitably in road construction work.

The commission instructed the chief engineer to enforce the requirement that contractors use home labor and materials by cancelling the last 25 per cent of work covered by contracts, if the contractors fail to comply with the request.

PENALTY IS PROVIDED

It was explained that under the State Highway specifications, the commission may cut off or add to a project, work equal to 25 per cent of the original contract. This is necessary to permit the commission to change location, grade, height of fills, etc., and frequently has been used to increase the height of earth dumps after

floods had demonstrated that the original height was insufficient.

Under the home labor plan, when a contractor declines to follow requirements of the commission, 25 per cent of his contract will be cut-off and the project will be finished with State forces, it was said.

The resolution said it has been the policy of the department to contract practically all new construction work on the theory that when an individual took a contract on competitive bids, he would be interested in profits and losses, and, therefore, could perform the work more economically than the department. It was said that if the department should engage in heavy construction work, it would be necessary to purchase large quantities of equipment, such as steam shovels, air drills, drag lines, trucks, tractors, paving equipment, etc.

This method has not been followed because it was believed to be to the best interest of the State and the department to hold the number of employees to the minimum, but during the past few weeks, it was said, because of the acute drouth conditions the department increased the amount of work being done by State forces by putting all available equipment into full use. Some new equipment has been bought and certain types of heavy equipment have been rented and placed in operation under supervision of department engineers.

PREFERENCE TO LOCAL LABOR

It always has been the policy of the commission to request contractors to give preference to local labor and teams and to purchase material and equipment produced in Arkansas whenever possible, Chairman Dwight H. Blackwood said.

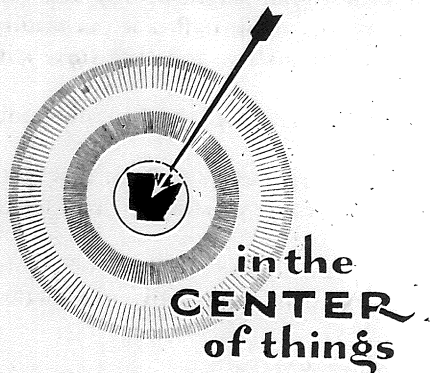
Since no statute exists covering the situation, some contractors have failed to observe the commission's request regarding employees, but it is believed that under the commission's new policy of taking over projects when they are 75 per cent completed, if its suggestion regarding home labor and materials have not been followed, will result in all contractors using home labor, except for a skeleton organization of skilled employees.

It was said that light construction work, such as grading, gravel surfacing, asphaltic retread work, timber bridges, etc., will be done by State forces during the remainder of the present fiscal year, which will end next March 1. All concrete pavement and bridge work and heavy grading, requiring use of steam shovels and drag lines, will be contracted as heretofore, it was said.

TEN CONTRACTS GIVEN

The Highway Commission yesterday awarded contracts for construction of four road and six bridge projects in nine counties. More than 100 bids were submitted on the ten projects, but contracts were awarded to the low bidder in all except two cases, in which the contract was given to the second low bidder. Contract bids totaled \$600,267.26.

The largest project calls for seven miles of pavement on the Paragould-Hopkins bridge road in Greene County. The job was awarded to J. P. McNulty of Pine Bluff for \$130,732.55.



Contractors operating in the Lower Mississippi River Valley profit because of the central location of the Home Accident Insurance Company. From Little Rock, in the very heart of the Mid-South, they secure interested service, backed by a broad knowledge of local conditions, which has attracted an ever-growing number of customers.

*We Invite You to Get in Touch With Our
Local Representative on Your Next Project*

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The bridge projects included 2,746 feet of concrete, steel and timber bridges and more than 6,000 feet of earth embankment approaches. Road work included 13 miles of grading and drainage structures and 12 miles of concrete paving.

CONSTRUCTION PROJECTS

Job No. 343, six miles of grading and drainage structures on the Murfreesboro-Nashville road, Highway No. 27, Pike County. George W. Nickels & Son, Hot Springs, \$57,497.28.

Job No. 3147, approximately 463 lineal feet of steel bridge over the Sulphur River, on Texarkana-Louisiana State line road, Highway 71, Miller County. Kochtitzky & Johnson, England, \$103,484.79.

Job No. 5126, five miles of concrete pavement on Bald Knob-Judsonia road, Highway 67, White County. Grady Garms, Little Rock, \$73,391.86.

Job No. 698, approximately 814 lineal feet of reinforced concrete bridges and 2,506 feet of earth embankment approaches on the Sheridan-Fordyce road, Highway 167, Grant County. D. F. Jones Construction Company, Fayetteville, \$51,770.48.

Job No. 8138, approximately 437 lineal feet of steel and concrete bridges and 2,506 feet of earth embankment approaches on the Danville-Magazine road, Highway 10, Yell County. Fred Luttjohann, Topeka, Kan., \$42,054.00.

Job 8139, approximately 553 feet of concrete bridges and 567 feet of earth embankment approaches on the

Booneville-Blue Mountain road, Highway 10, Logan County. Fred Luttjohann, Topeka, Kan., \$51,459.59.

Job 8140, approximately 201 feet of concrete deck girder bridge over Greenbrier creek on Clarksville-East road, Highway 64, Johnson County. Rye Bros., Russellville, \$13,067.59.

Job 10167, seven miles of concrete pavement on the Paragould-Hopkins bridge road, Highway 25. J. P. McNulty, Pine Bluff, \$130,732.55.

Job 5128, approximately 278 feet of timber and steel bridges and 451 feet of earth embankment approaches on the Salem-Ash Flat road, Highway 12, Fulton County. J. B. Beaver, Benton, \$10,860.66.

Job 850, seven miles of grading and drainage structures on the Chismville-Booneville road, Highway 23, Logan County. George W. Nichols & Son, Hot Springs \$65,807.56.

Fair Trade

An illusionist performing in a Northern town put a woman into a box from which there was no apparent outlet and shut the lid. When he opened it again there was nothing inside but a couple of rabbits.

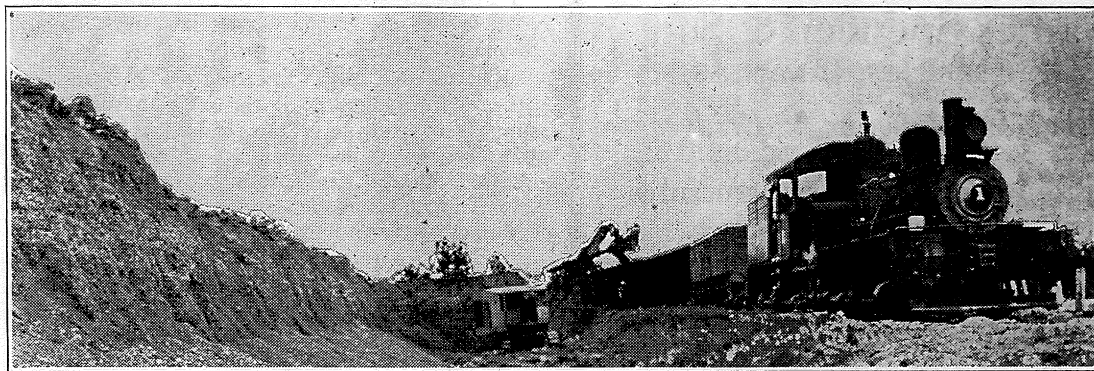
After the performance a Scotsman went to the illusionist and asked him if he could perform the same trick if his (the Scotsman's) wife were to get into the box.

"Why yes," answered the illusionist. "But are you anxious to get rid of your wife?"

"Weel," answered the Scot, "it's no sae much that, but wee Wullie got 'me tae promise him two rabbits for his birthday!"—*Sporting and Dramatic.*

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Federal Fund Not Available At Once

Several Months May Be Required, Says Highway Engineer

If the routine procedure is followed in releasing the \$2,174,786 in federal highway funds allotted to Arkansas recently by Secretary of Agriculture Hyde, it probably will be several months before the money actually is available to help pay for roads in Arkansas, according to State Highway Engineer C. S. Christian.

The money will have to be matched by State funds and can be used only on roads on the federal aid highway system, Mr. Christian said. It can be used only to pay for work done by contract and will be paid only after the federal government has approved the location of the road, or bridges, specifications, type of construction and all details pertaining to the project. Ordinarily it requires from six months to a year to obtain federal approval of given project, Mr. Christian said. He said he did not know what roads the commission will select for application of the advance allotment of federal funds. Allotments already have been made for the principle projects now under construction, such as several links on highways 167, 67 and 70.

Mr. Christian said the most effective relief that could be given Arkansas would be immediate payment of \$1,800,000 appropriated two years ago to reimburse the State Highway fund for money used to rebuild roads following the 1927 flood. He said more than 60,000 photostat reproductions of vouchers have been sent to the United States Bureau of roads to substantiate the

State's claim for refund of money spent repairing and rebuilding roads damaged or destroyed by the flood.

When this refund is made available by the federal government it will be paid directly into the State Highway fund and may be used by the commission to carry on construction work independent of federal aid regulations, it was said. Immediate payment of this refund would permit the commission to increase its work done by State forces and would result in employment of hundreds of men and teams to do light grading, graveling and other types of work not required to be done under contract, it was said.

It was announced several months ago that the federal government will not release the flood damage refund money until all claims have been submitted and approved, but Mr. Christian said yesterday he understood that federal authorities have agreed to release payments on claims which have been completed.

Efforts to reach Chairman Dwight H. Blackwood and other members of the Highway Commission were unsuccessful, and it is not known what plans the commission will make to take advantage of the release of federal aid funds which ordinarily would not become available until next January.

MOTOR CAR DEPRECIATION DUE TO POOR ROADS

One of the greatest costs the motor owner faces is that of depreciation. Aside from bad driving, which includes undue ripping of gears and bumping into telephone poles and other peoples' cars, the road surface over which the car is driven has most to do with its premature death.

Replacement and repairing of broken springs and other disrupted parts of the car's anatomy cost sizeable sums, and strangely, rare indeed is the motor owner who reckons these charges as tolls collected by bad roads. Modern automobiles are well built and certainly most breakage cannot be rightfully charged to ordinary wear and tear.

It was once said of Missouri that their cars lasted but that the normal automobile life-time because of the sun-baked rutty roads. Missouri at present has 1,660 miles of concrete so cars operating for the most part over the State highway system now approach a full span of service.

The normal life of a car depends upon the treatment given it by its owner, which indirectly has to do with the highways over which he drives. An extra year of service may be squeezed out of a rattle-trap, just as it can be done with an old pair of shoes. However, there is one difference and that is in regard to public safety.

Good road building, through which car costs are cut considerably, is dependent upon the motorists' attitude toward financing measures. Checking up on the imposts levied by bad roads may reveal to the car owner that he could well afford to pay several times the amount of current motor taxes and still be on the long side of the deal.—*Good Roads.*

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"Helping to write the Martineau Law in indelible characters across the Arkansas landscape."

Highway Systems Lack Uniformity

Wide Difference Shown in Methods of Raising and Spending Road Funds

Although highway engineering practices have been standardized in the last two decades, and traffic laws are also tending towards uniformity, there is no semblance of uniformity or standardization in highway administration or in the collection and distribution of highway revenues. This is the conclusion to be reached from a report made to the administration committee of the American Association of State Highway Officials by its Chairman, C. M. Babcock of Minnesota. The committee met this week in Chicago.

Twenty-seven States refund part of the license and auto taxes to the counties or other local units and twenty-one use all of these funds for the State highway systems.

Refunds in most cases are from the gas tax. Out of gross revenues estimated at \$430,000,000, a total of \$94,000,000 is returned to the counties, townships or cities and towns. In most States where a refund is made, it is equal to a one cent gas tax, but in one State the counties get 3 cents out of a 5 cent gas tax.

Refunds of license fees to the counties amounted to only \$10,932,000 out of gross receipts of approximately \$347,000,000. In one State, however, 87 per cent of the license receipts go to the counties.

Refunds of gas taxes to buyers using gasoline for agricultural, industrial and other non-highway purposes show just as wide variance. Several States make no

refunds, while in others the refunds run from 1-3 of one per cent to 30 per cent.

There is no uniformity in administrative control or classification of roads. Twenty-two States have no township road systems and six States have no county systems. In two States all road building outside the incorporated towns and cities is handled by the State Highway Departments.

Total mileage of rural roads of all classes is given at 2,317,648, of which 384,961 is reported as improved. The total mileage in the State trunk highway system is 273,111, of which 84,871 are paved, 92,104 surfaced with gravel or other low-type materials, and 96,136 unimproved. Thirty-one per cent of the trunk routes are paved in the average State, as compared to 16 per cent in Minnesota.

Total revenues available this year for road building in the States, counties and townships are reported as \$1,182,416,387, of which \$710,329,315 or 60 per cent is available for the trunk highway systems. This figure does not include federal aid.

Where the Shoe Pinches

"My wife has run away with a man in my car!

"Good heavens! Not in your new car?"

—Keystone Motorist.

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Road Engineers Study Effect of Action of Frost on Highway

Highway engineers find that heaving of soils because of freezing, or frost action, and the subsequent loss of soil stability due to thawing, is one of their big problems, says the Bureau of Public Roads, U. S. Department of Agriculture.

Frost action, which sometimes results in road-surface failures, may be caused by the gradual expansion of freezing water; by the instantaneous freezing of super-cooled water when the pressure productive of super-cooling is removed; by the contraction and expansion of ice or frozen soil as the result of temperature changes; and by the growth of ice layers in moist or wet freezing soils. Failures of road surfaces may be due to a combination of any of these phenomena.

The particular manner in which frost action shows itself depends upon several variables, such as the direction of heat radiation, the size of the soil particle; and the quantity of water involved. The vertical action is usually called "heaving," and the horizontal, is termed "thrust" by engineers.

Frost action is revealed in many different ways. Ira B. Mullis, associate engineer of the bureau, in an article in the June issue of "Public Roads," cites several instances of remarkable frost action.

One of the cases described is that of ice heaves or mounds common on frozen rivers in Alaska. With the beginning of freezing weather, ice forms along the banks of streams and becomes firmly attached to the soil and rocks. When the ice sheet becomes continuous from bank to bank and gradually grows thicker, the flow channel becomes correspondingly smaller. Under these conditions, the water beneath is likely to be compressed until the force causes the surface ice to heave at the weaker areas.

Water frequently spouts through the fissures which often form about these heaves, and flooding and freezing continue throughout the winter or until the volume of water is reduced so that it is contained beneath the ice. These pressures sometimes become so great that water is forced out and into the banks between rock strata or into other openings where it quickly freezes.

A bank of sod, boulders, and clay on the edge of a lake, thrown up during the winter by ice thrust, is another phenomenon described. The bank was about 4 feet high, about 11 feet wide at the base, and about 4

feet wide at the top. In one place where a tree of considerable size grew, both the bank and the tree were raised to a height of 8 feet by a frost heave. Boulders were rammed into the bank in many places so that they presented much the appearance of plums in a pudding. Where the bank was vertical, it was raised and turned over by the ice shove, and trees, 12 inches and more in diameter, were dislodged and moved.

Among the more common frost phenomena are the crystals that protrude like needles from the surfaces of clay roads and fields after a heavy frost. Clay soils contain pores of different capillary or tube-like dimensions. These pores hold water particles. The water particles in the pores of the larger capillary dimensions freeze at, or slightly below, normal freezing temperature, whereas those in the pores of the smaller capillaries resist freezing until the temperature is reduced to a point lower than normal. The larger particles of water, when freezing, draw to themselves the unfrozen water of the pores in the finer capillaries, thus producing ice crystals. With continued freezing temperature, the original ice crystals increase in size as long as they are supplied with water particles drawn up through the fine capillaries from the ground water supply. The expanded frozen water in the crystals occupies a larger space than it did in the liquid state; hence these crystals, in their continual growth, form fissures in the soil and cause frost boils in road surfaces.

Another phenomenon is the thin ice skin that forms on water in small depressions. If one punctures the ice skin he often finds that the depression no longer contains much water. This is because the water was drawn from under the ice sheets by the formation of ice crystals in the adjoining soil pores.

GAS TAX COLLECTIONS

Gasoline tax collections in July totaled \$598,181, compared with \$559,691.99 in June, it was announced at the State Revenue Department Taxes collected from other sources by that department in July were listed as follows: Severance tax, \$54,283.86; motor vehicle tax, \$7,319.87; inheritance tax, \$4,312.30; toll bridges and ferries, \$1,666.23; income tax, \$131,753.18; cigar and cigarette tax and licenses, \$14,333.81; malt tax, \$3,468.48; total, \$815,315.

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Development of the State Highway System of the State of Arkansas

By W. W. Zass, Engineer of Construction

EDITOR'S NOTE: The following narrative was written as the contribution of the State of Arkansas toward a "History of Road Building in the United States," being compiled by the American Association of State Highway Officials and the Bureau of Public Roads. The complete history will probably be edited and published during the next twelve months' period.

In contemplating the system of State highways now existent in Arkansas it is interesting to trace the gradual changes in theory and practice evidenced by our legislation through the period in which the motor vehicle has evolutionized into a predominant factor in the field of transportation.

Although it cannot be stated definitely when the present era of road improvement first began in this State, a study of highway legislation indicates that such period was probably initiated during the decade 1910 to 1920, as we find that the motor vehicle was first recognized and defined in Arkansas statutes during the year 1911. This legislation provided for the registration of motor vehicles, a penalty for non-registration, and a maximum speed limit. The registration fee was fixed at \$5.00 per vehicle and was payable to the Secretary of State. The initial step in placing road building upon a recognized basis was also made the same year through an act supplementing the general road laws of Arkansas, making provisions for the appointment of county engineers, with direct supervision over all public roads of the county.

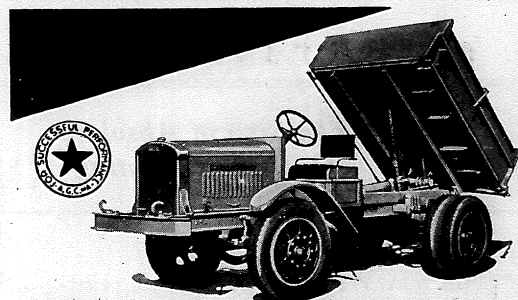
Few counties availed themselves of this privilege however and with increased demands for highway facilities, the need of a State Department in charge of such activities became apparent, and in 1912 the State Highway Department was created. The newly-created department was affiliated with the Department of State Lands and the affiliation termed the Department of State Lands, Highways and Improvements. Although this act improved existing conditions and was a further step toward the ultimate goal, it provided for no direct control and designated no system of highways upon which improvements would be concentrated. It is, however, probably the basic structure on which our present highway law is formulated, and provided for a State Highway Commission of three members, as well as for a State highway engineer. It further provided that the department should collect, prepare and disseminate information relative to roads, highways, drainage, levees and other public improvements; that it should prepare plans and specifications for such improvements; that it should aid and advise in the formation and management of road improvement districts, and should distribute available funds for construction of public roads, bridges and other improvements. The newly created department was also charged with the registration of motor vehicles and the collection of fees therefor. The registration fee was raised from \$5.00 to \$10.00 per vehicle, one-half of which was returned to the county and one-half credited to the Highway Improvement Fund.

The demand for adequate highways continued to grow more insistent, and a means was sought whereby

additional funds could be obtained for such improvement. Constitutional limitations prohibited the issuance of State or county bonds, and it therefore became necessary to provide legislation of such character as to allow local communities the privilege of organizing for the construction of improvements and assessing the cost against the property benefited. This need found its expression in 1915 through an act authorizing the formation of road improvement districts, specifying the procedure to be followed and limiting the assessment of benefits at 30 per cent of the total assessed valuation of the real property included in the boundaries of any district.

A further impetus to road building activities was received in 1916 through the passing of a congressional act familiarly known as the Federal Aid Road Act. This act was approved July 11, 1916, and provided for the participation of the Federal Government in road building under the direction of the Secretary of Agriculture, and appropriated funds for such participation.

The provisions of the Federal Aid Road Act, above cited, were such that the State of Arkansas could not avail itself of its share of the apportionment without the aid of additional legislation. Such legislation was enacted by the 1917 session of the State Legislature. This act assented to the provisions of the Federal Aid Act and authorized the State Highway Department to



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enter into the necessary agreements with the United States Government. It designated all public roads in the State, excluding streets and roads within the corporate limits of any town or city of the first or second class, as State roads and eligible to aid from State and Federal funds.

It should be noted that no legislation, either Federal or State, had yet been enacted providing for a trunk-line system of State highways, or that the State had contemplated providing revenue for the construction of such a system other than by taxing real property lying adjacent to the road to be improved. The chaotic condition in which highway activities were plunged in the interim existing between the years 1917 and 1921 magnified the lack of such a system, as during this period large numbers of road improvement districts, covering hundreds of miles of work and involving huge expenditures, were created and built to no general connected plan. The public was awakened to the fact that no unified results were being achieved in spite of the enormous expenditures involved, and considerable dissatisfaction was evidenced in this regard as well as to the method of financing, in that adjacent real property was assessed the greater share of the entire amount of the cost of such improvement.

The latter condition was alleviated to a certain extent through legislation enacted in 1921. This legislation provided for a revised and increased schedule of fees for the registration of motor vehicles, and that 70 per cent of the funds so obtained were to be returned to the respective counties in which they were derived, to be expended for road construction and maintenance, and the

remaining 30 per cent placed to the credit of the Highway Improvement Fund for the purpose of aiding in the construction and maintenance of highways and of matching Federal aid funds for the construction of highways. It also provided for a tax on motor vehicle fuel in the amount of one cent per gallon, one-half of such receipts to be returned to the county and the balance credited to the Highway Improvement Fund.

Five years of operation under the Federal Aid Act of 1916 indicated to the Federal authorities that this act, with its subsequent amendments, was too loosely drawn, in that it allowed aid in the construction of practically any road which might tend to develop the country, whether or not it was purely local in character, and did not provide definitely and specifically for a correlated and unified system of highways in the several States. Consequently the Federal Aid Act of 1916 was amended in 1921 by an act cited as the Federal Highway Act, and approved November 9, 1921. This act was much more restrictive in character and provided for a road system, national in scope, to consist of a definite connected system of highways in each State, limited in extent to seven per cent of the actual public road mileage of that State. It further provided that all future Federal aid apportionments were to be expended upon such a system; that all construction should be under the direct supervision of the State Highway Department and that maintenance of such highways would be carried on in a systematic manner and with State funds.

Although the situation relative to highway development had grown more acute during the preceding biennial period, the regular session of the 1923 Legislature, convened in January of that year, enacted no measures toward relief; in fact, all constructive legislation referring to such development was obstructed, and as no appropriations for the succeeding biennial period were made, the department of necessity ceased activities at the close of the fiscal period, June 30, 1923. This condition, coupled with the need of complying with the Federal Highway Act of 1921, if the State were to participate in the benefits of Federal aid, led to the call for an extra session of the Legislature in the latter part of 1923. Various differences were ironed out and the desired results were achieved through the enactment of the necessary legislation.

This legislation was quite constructive in character and formed a new basis for highway administration in this State. A definite system of State roads, comprising about 10 per cent of the public road mileage of the State, was designated and established as the State Highway System, and provisions made for the organization of an adequate State Highway Department, headed by a commission composed of five members, one elective and four appointive, with direct control of construction and maintenance activities placed in the hands of such commission. The schedule of fees for the registration of motor vehicles was revised and increased and the motor vehicle fuel tax raised from one cent per gallon to four cents per gallon, and a tax of ten cents per gallon placed on motor oil. It further provided that the funds derived from such fees be credited to a special fund to be known as the State Highway Fund, and from the revenue so obtained the sum of \$3,000,000 would be allotted annually to the several counties to apply on road improvement district bonds and to county highway improvement funds. It also prohibited road improvement



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districts organized subsequent to the act from issuing bonds in excess of 50 per cent of the cost of the improvement.

The theory of taxation for financing road development grew more progressive with the increased use of the motor vehicle, and the inequality of assessing adjacent real property for highway improvements for either a whole or part of the cost of such improvement became more generally recognized. The equity of placing the burden of the tax on the user of the highway also became more evident. The increased use of the motor vehicle also created a demand for more and better roads, and for the rapid and comprehensive program desired it was apparent that current revenues must be supplemented by additional funds. The result of a thorough study of the proposition was the passing of an act by the regular session of the 1927 Legislature, amending the road laws passed by the special session of 1923. The act essentially provided for a rapid development of the State system as well as relieving real property from assessments for such development.

Under the provisions of the Act the State assumed obligations, both as to principal and interest, of road improvement districts maturing on and after January 1, 1927. New construction was authorized in the amount of \$13,000,000 annually for a period of four years, and in a similar amount thereafter as the annual obligations of the road improvement district bonds assumed, funds for such construction being obtained through the issuance of State notes, and a parity system of road development adopted among the several counties. To aid in the development of county roads, the act further provided for an annual return to the counties in the approximate amount of \$1,500,000.

The tax on motor oil as provided by the Acts of 1923 proved both difficult and expensive to collect and the new road laws of 1927 repealed this tax, but in order to obtain equivalent revenue the tax on motor vehicle fuel was raised from four cents to five cents per gallon.

The 1927 Legislature enacted several other statutes pertinent to highway development, principal among them being an act providing for the use of Arkansas materials and personnel in the construction and maintenance of State highways; an act authorizing the construction of toll bridges by the State Highway Commission, such bridges to become free bridges with the collection of sufficient revenue to pay the cost of construction; an act authorizing the exercise of the State's right of eminent domain in the obtaining of land for right-of-way, for securing building materials and for other purposes; and an act providing for aid to permanent improvements to continuations of State highways within the corporate limits of towns and cities of the first and second class in the amount of 50 per cent of the cost of such improvement.

With over a year in operation under the provisions of the Acts of 1927, it became evident that the highway system could be developed at a rate faster than originally contemplated, and that a material increase could be made in the annual program without increasing the expenses of administration or unstabilizing prices through augmenting the volume of construction. During the same period it became apparent that, while the program was generally popular and was being exe-

cuted in conformity to public approval, the State Highway Commission was being embarrassed and handicapped in the execution of the work through the filing of suits by various individuals attacking the validity of the act. The question of construction of toll bridges by private corporations across major waterways also received considerable agitation through this same period.

An extra session of the Legislature convened in the fall of 1928 to consider these questions. The result was the enactment of additional legislation providing for an annual bond issue in the amount of \$18,000,000 per year for the three-year period, 1928 to 1930, inclusive, in lieu of the \$13,000,000 program per year previously authorized; that suits affecting the administration of the State highway laws should be brought only at the seat of government, in Pulaski County, and further provided that the plaintiff be required to execute a good and sufficient bond to the State and conditioned to pay all damages to the State if the suit proved not well founded. It also provided for an additional return to the counties for the fiscal year 1928 of \$565,000 for the improvement and repair of county roads; for converting bridges built by improvement districts into State toll bridges; for the issuance of State toll bridge bonds to facilitate the building of toll bridges on State highways and prohibited the granting of franchises for privately owned toll bridges on State roads.

The regular session of the Legislature convening in January, 1929, considered additional problems relative to the efficient administration and development of the State Highway System. The result was a recodification of existing highway statutes and provided for the

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separation of the State Highway Department from the office heretofore designated as the Department of State Lands, Highways and Improvements and created the State Highway Commission as a separate body. It made the office of all members of the State Highway Commission appointive through the Governor and provided that all moneys, from whatever source, accruing for the use of public roads in the State should be placed in a common fund known as the State Highway Fund. Additional acts provided that the sum returned to the counties for local highway development be increased to \$1,800,000 per annum for each of the years 1929 and 1930, for the auditing of State Highway records by certified public accountants, for the creation and operation of a State road patrol and for the manner of condemnation of property by the State Highway Commission for right-of-way and other uses.

A resume of the foregoing discussion would indicate that the development of the Arkansas State Highway Department could be considered as progressing through three distinct eras or periods. The first period covering the interim subsequent to the creation of the Department in 1912, wherein the policies and needs of such a department became to be felt and defined. The second period covering the interim subsequent to the designation of a State Highway System in 1923, wherein the demands for improvement indicated the need of a rational method of financing. And the third and present period entered into during the year 1927, with the public fully awakened to the potential possibilities of a development program properly financed and the results to be obtained through a Highway Department operating under legislation sufficiently broad in scope to allow a full range of activities.

With the common acceptance that a tax or toll on the motor vehicle is the equitable method of financing the improvement of public highways in lieu of a tax on income, real, or personal property we are now entering into a fourth period of road development as to the apportionment of funds so received among the various subdivisions of the State employed in road construction and maintenance, namely the State Highway Commission in the development of the State Highway System, the county in the development of local or farm to market roads and the municipality in the improvement of city streets. The apportionment of funds to all such agencies has merit, the pertinent question being the amount of allocation to each. In considering this question the magnitude and difficulty of the development of

our State highway system as well as the amount of annual revenue obtained from the tax or toll on the motor vehicle must be regarded and this can best be obtained by a comparison with other States. Of the forty-eight States in the Union, Arkansas is twenty-fifth in area, twenty-fifth in population and thirty-third in motor vehicle registration, while the State Highway System in Arkansas, embracing 8,467 miles of road, is the tenth largest in the United States. Although Arkansas may be considered as average in area and population, it is far below average in motor vehicle registration and annual revenue, and far above average in the size of the State Highway System.

As the proper maintenance of completed roads requires a considerable percentage of the annual revenue it is thought fair and equitable that the existing statutes governing the distribution of Federal aid by the United States Government be revised and adjusted to the extent that the national government participate in maintenance expenditures on such completed highways as lie on the designated Federal aid road system. Under existing statutes funds received as Federal aid are devoted exclusively to construction purposes with the qualifying provision that such construction be properly maintained by the State after completion.

When a system of State highways was first definitely designated in 1923 there were 6,637 miles placed on the system, of which 7 per cent was paved, 32 per cent gravelled or of similar type, 32 per cent graded and drained and 29 per cent unimproved. The total mileage on the system has since been increased to 8,467 miles, of which at the close of 1929, 11 per cent was paved, 59 per cent gravelled or of similar type, 16 per cent graded and drained and 14 per cent unimproved.

PART OF ARKANSAS-LOUISIANA HIGHWAY OPENED

Nineteen miles of new highway between Pine Bluff and Tamo on the Arkansas-Louisiana highway has been opened to traffic. Work is under way on the remaining stretch from Tamo to Grady, according to Albert Madding, District Highway Engineer.

The original paving contract awarded to Price and Kovacevich extended only to within three-fourths of a mile of Grady, as the right-of-way had not been obtained when the contract was awarded. Since then the new road through Grady has been obtained.

A mile and three-fourths of paving in the original contract remain to be paved. The original contract will be extended to take in paving through the city of Grady.

Work on grading Highway No. 3 northeast of Watson Chapel, almost has been completed and grading will begin next week. Then it will be hard-surfaced.

Between Watson Chapel and the Cleveland-Jefferson County line, new bridges have been installed, sharp curves eliminated and other improvements made.

Budding Naturalist

Little Albert came home from school with a new book under his arm. "It's a prize, mother," he said. "A prize? What for, dear?" "For natural history. Teacher asked me how many legs an ostrich had and I said three." "But an ostrich has two legs." "I know that now, mother, but the rest of the class said four; so I was nearest."—*Boston Transcript*.

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OUR COVER PAGE

The opening to traffic on May 16, 1930, of the new highway bridge over Saline River on State Road No. 15 seven miles north of Warren marks the completion of an all-year-round route between Warren and Pine Bluff.

Before the railroad was constructed into Warren in 1882, supplies and produce for this vicinity were either barged up the Ouachita and Saline Rivers to a point near Warren and hauled overland, or hauled overland from Pine Bluff. In 1914 the county constructed a bridge over the Saline River near the present location which was in use until the opening of the new bridge. Approaches to the old structure were below high water and consequently traffic was cut off during a considerable portion of the year. In line with the commission's policy of building highways which can be used at all times regardless of high water a contract was awarded the Lakeside Bridge and Steel Company on June 19, 1929, for the construction of a new bridge over the main channel, five relief bridges, and approximately two miles of earth approaches across the bottoms.

Due to the fact that the War Department considers the Saline River at this point to be a navigable stream, it was necessary to provide a vertical clearance of 12 feet above extreme high water for use in rafting logs. This materially increased the cost of the structure but on the other hand was much cheaper than providing a swing span.

The project consisted of a bridge 1,059 feet and 6 inches long over the main channel and four relief bridges totalling 1,020 feet in length, bringing the total length of bridges to 2,079 feet 6 inches. The bridge across the main channel is composed of two 1,600-foot through-truss steel spans with concrete floor and supported by reinforced concrete piers carried well below stream bed, and reinforced concrete approach spans 35 feet long of the deck girder type. The relief bridges are composed of multiple 35-foot reinforced concrete spans of the type used for approaches on the bridge over the main channel. All bridges have a 20-foot clear roadway between curbs.

The project involved the following approximate quantities in the bridges: Concrete piling, 8,400 lineal feet; structural steel, 340,000 lbs.; reinforcing steel, 600,000 lbs.; concrete, all mixes, 3,000 cubic yards.

The total cost of the project in round figures was \$160,000.00 for the structures and \$55,000.00 for the earth approaches making a grand total of \$215,000.00 for the completed cost of the project.



Saved His Bacon

He had joined a golf club, and on his first round he hit the ball a mighty swipe which by some miracle landed it in the hole in one.

At the second tee came another miracle. Again he did the hole in one, and as the ball disappeared into the hole he turned round, white and trembling.

"Gosh!" he breathed. "I thought I'd missed it that time."—*Judge*.

Steppe By Steppe

A Russian was being led off to execution by a squad of Bolshevik soldiers one rainy morning.

"What brutes you Bolsheviks are," grumbled the doomed one, "to march me through a rain like this."

"How about us?" retorted one of the squad. "We have to march back."

Fooling Papa

Little Boy (calling father at office): "Hello, who is this?"

Father (recognizing son's voice): "The smartest man in the world."

Little Boy: "Pardon me, I got the wrong number."
—*Portland Adv. Spotlight*.

Free and Baptized

"What is your religion?" the recruit was asked. Promptly and smartly came the answer, "Militia, sir."

"No, no, I said 'religion.'"

"Oh, 'religion,' sir. I beg your pardon. I'm a plumber."—*Boston Transcript*.

Speed Hog

In days of yore, if anybody missed a stage-coach, he was content to wait two or three days for the next one. Now he lets out a squawk if he misses one second of a revolving door.—*Activities*.

Judge: "Then it's true you struck your neighbor in the eye with your fist. Have you any explanation to make?"

Oysterspuff: "Yes, your Honor. I'm so terribly nearsighted, I only wanted to beckon to him."

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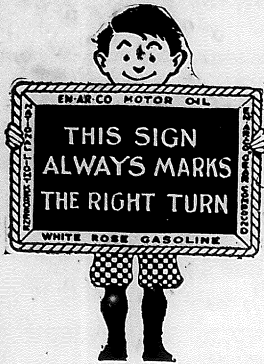
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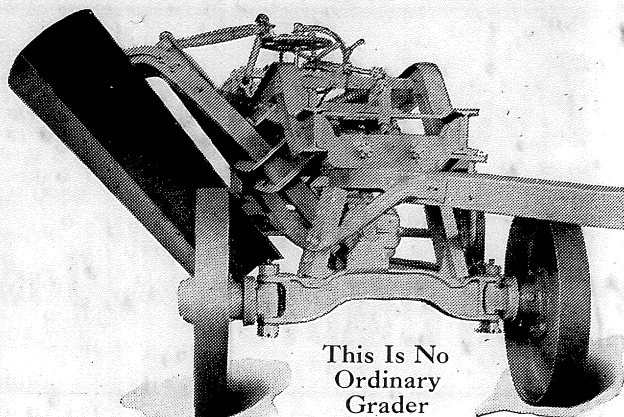
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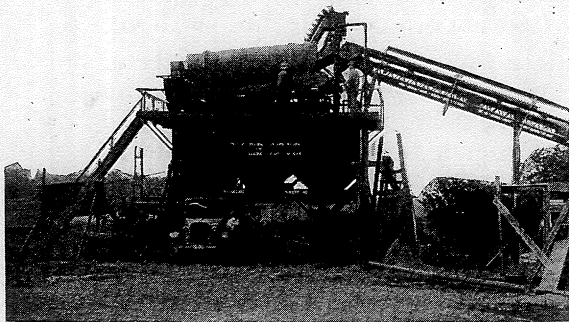
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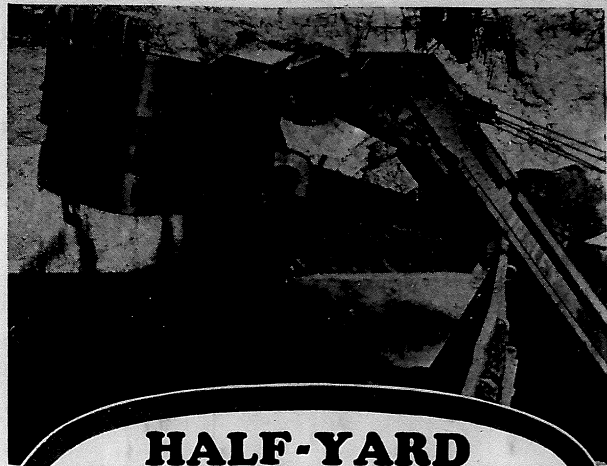
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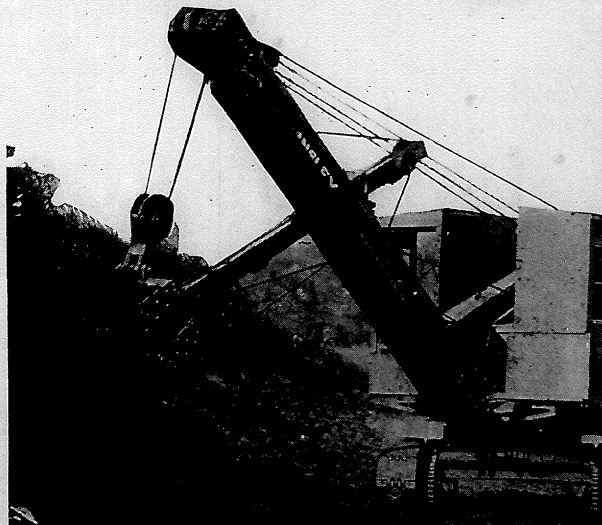
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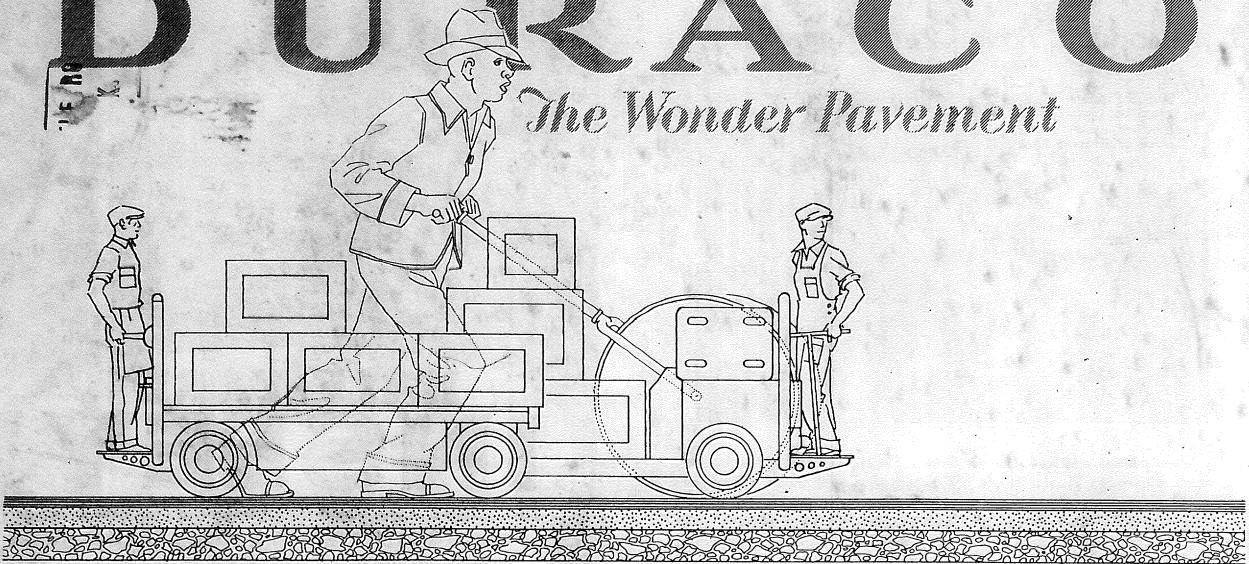
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