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Home Course
In
Road Making

Final Article.—Road Maintenance and Repair.

By **LOGAN WALLER PAGE,**
Director Office of Public Roads,
United States Department
of Agriculture.

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THERE is no phase of the subject of road improvement so important and which is so often neglected as that of maintenance. Roads may be constructed in a most scientific manner and out of the best materials available, but unless they are properly maintained they will sooner or later go to pieces. On the other hand, roads may be never so poor, but with systematic repair and maintenance they may be rendered passable at all seasons of the year for ordinary traffic. No road has ever been so well constructed that it did not need to be maintained. Even the tremendously massive roads of the Romans have almost disappeared, largely for lack of maintenance.

The terms maintenance and repair are very frequently used as synonyms, but there is a wide distinction between these two operations. To maintain a road means to keep it always in good condition, while to repair it means to make it good only occasionally. In

turning on the opposite side. Unless the road is already in good condition it should be dragged after every heavy rain, when the mud is in such condition as to puddle well and will not adhere too much to the drag. A few trips over the road will give the operator a clew as to the best time to drag. Drag at all seasons of the year, but do not drag a dry road. If a road is dragged immediately before a cold spell the road will freeze smooth.

Always drag a little toward the center with the aim of keeping the slope of the crown about an inch to the foot. If the drag cuts too much shorten the hitch or change your position on the drag. The best results from dragging are obtained only by repeated applications. A good system of dragging is that which is practiced in Kansas and Iowa, where road authorities are authorized to let contracts to farmers for dragging the roads abutting on their lands.

In the maintenance of hard roads, such as gravel and macadam, different methods must be pursued. The causes of wear on hard roads are the weather, the wheels of vehicles and horses' shoes. The weather acts to some extent directly on the materials, but to a much greater degree indirectly. Frost is one of the most active of the destructive agencies. The expansion and contraction caused by frost sometimes lead to a general disintegration of the surface. This is especially true where clay is used as a binder and where the road surface is porous or the drainage poor. When such a road thaws out after a hard frost the macadam will practically be a layer of loose stones, into which the traffic will cut, forming ruts. Frost has but little if any effect on a dry, well kept road.

Look after the drainage very carefully in the fall and be sure that the surface is as nearly waterproof as possible, so that the road will go into the winter dry and not full of water. Violent rains often wash out the binder and sometimes the smaller stones as well, leaving the surface both rough and porous. The amount of material lost from the road by this means is often larger than the toll exacted by traffic.

The following hints may be found useful in the maintenance and repair of gravel and macadam roads:

Never allow a rut or hole to remain on the road, but fill it at once with chips from the stone heap. When the road is built the contractor should be required to place at least 100 tons of surface material and screenings at a convenient place for each mile of road constructed. Always use chips for patching and for all repairs during the summer months.

Never put fresh stones on the road if by cross picking and making the surface can be kept in the proper condition and cross section. The rake is the most useful tool used in road maintenance. Large patches of stone should not be moved over the whole width of the road at one time. The bulk of all repairs should be made before Christmas, so that the road will go through the winter in good condition.

In moderately dry weather always pick up the old surface into ridges six inches apart and remove all large and projecting stones before applying new material. Never apply stones more than one stone deep, but add a second layer when the first is worn in if one layer is not sufficient. Never crack stones on the road, for if you do a smooth surface will be out of the question. Never leave the stones in ridges.

All large stones, blocks of wood and other obstructions used for diverting traffic should be removed at nightfall, or the consequences may be serious. Never put a stone on the road for repairing purposes that will not pass freely in every direction through a two inch ring. Smaller stones should be used for patching. Macadam's advice was that no stone should be placed in a macadam road which the workman could not get in his mouth. Traprock, granite and other hard stone should be broken finer for repair work than the limestones and other softer rocks.

Use screenings if possible for binding together newly laid material. Road sweepings, horse droppings, sods and other rubbish when used for this purpose will ruin the best road ever constructed. Water worn or rounded stones

CARETAKER MAINTAINING A STATE HIGHWAY IN CONSTRUCTION.

other words, repair sets in after maintenance fails to keep the road in proper condition.

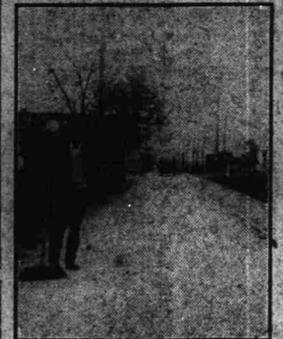
No state or community has ever built or kept in repair a system of first class improved roads under the personal service of labor tax system. In fact, this system is not applicable to any class of road construction or maintenance, not even to earth roads. Its principles are unsound, its operations unjust, its practice wasteful, and the results obtained under it are unsatisfactory in every particular.

Doubtless the best system of maintenance is that which provides for the permanent employment of skilled laborers or caretakers who may have charge of particular sections of road or who may be assigned to any part of the county where the work is most needed. Men employed in this way become experts in their particular line of work, and if they make mistakes one year they are pretty apt to correct them the next; but, under the labor tax system, these mistakes are repeated from time to time. If one man is employed to look after a particular stretch of road or to do a particular class of work he will soon learn to take pride and interest in his work.

While it would be manifestly impossible to adopt this system throughout the entire country on account of limited resources and sparse population, still it is believed that there are many places where it might be used with great success. It would be difficult to find a county which is so poor that it could not afford to employ continuously eight or ten laborers and three or four teams to maintain and repair its roads. There are many counties, however, which could well afford to employ ten times such a force. That such a plan would be more effective than the labor tax system would appear to be self evident.

Of all our roads the earth roads are probably the most neglected. Experience has shown that by proper maintenance earth roads may be transformed into something better than elongated mudholes. The first and last commandment in the maintenance of earth roads is to keep the surface well drained. Water is the great enemy to our clay or soil roads and must be removed immediately or much mud and very bad roads are the result. To insure good drainage the ditches must be attended to and obstructions removed and a smooth, raised crown of the road maintained. For this purpose the split log drag or some similar device is very useful and at the same time inexpensive. The drag can be used on a sand-clay or gravel road just as effectively as on an earth road.

The following points should be borne in mind in dragging an earth, gravel or sand-clay road: The drag should be light and should be hauled over the road at an angle of about forty-five degrees in such a way that only a small amount of earth is pushed to the center of the road. The driver should ride on the drag and never drive faster than a walk. The dragging should begin on the side of the road, or wheel track,



CARETAKER WHO MAINTAINS FIVE MILES OF ROAD IN ALLEGHENY COUNTY, PA. THREE ARE HELD BY HIM IN HIS COUNTY.

should not be used for repairs, as they will not bind. Never allow dust or mud to lie on the surface of a macadam or gravel road, for either of these will increase the cost of maintenance.

The middle of the road should always be maintained a little higher than the sides so that the rains may run into the side gutters at once. Water tables, culverts, gotters and ditches should never be allowed to clog up. The caretaker or patrolman should always be on his road, particularly in wet weather, and should fill up at once with fine stone or screenings any holes or ruts where the water may lie.

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