

KEEPING UP HIGHWAYS

Government Bureau's Sound Advice on Road Drainage.

REMOVE ALL WATER QUICKLY.

That on Surface and Underground as Well—Center of Highway Should Be Raised—Size of Tiles and Laying Them Matters of Importance.

The United States office of public roads in Washington sent out the following bulletin regarding the proper manner of road drainage:

With an average of 27,000 tons of water falling in the form of rain on each mile of public road in the United States annually, it is scarcely to be marveled at that the ten commandments of the road builder can be summed up succinctly in the word "drainage." The saying has truth for a basis, as good drainage is the primary requisite for all roads. Even in sand roads this holds true, for there "good drainage" means such as will safely remove the storm water without erosion or gullying and still retain the surface moisture.

To obtain good drainage one must take into consideration both the surface water and the underground water. The surface water must be removed quickly and completely and without subjecting the road to excessive scour or erosion. For this reason the center of the road should be raised, and the slope toward the side ditches should be from one-half to one inch to each foot distance, or so that the water will run freely to the side ditches and not flow down the road or remain in puddles on the roadway. The side ditches should be of ample size to care for the severest storms, with a fall of not less than six inches to each hundred feet. Frequent, ample cross drains should be constructed and every opportunity taken to get the water away from the road as quickly as possible. Any road along which you see water standing in the side ditches or on which puddles of water have collected or which has been badly gullied and eroded by the rains has poor drainage and is in need of immediate attention. In fact, earth roads nearly always require a little attention after each rain.

The split log drag is essentially a tool to maintain good drainage on our



A ROAD THAT DRAINAGE WOULD IMPROVE. earth roads and should be used after each rain. On a heavy clay or gumbo soil the drag when properly used tends to puddle the road surface, keep it free from ruts, dense, smooth and hard, thus securing the best surface drainage possible.

But in many places the underground water is too near the surface and must be removed before a good road will be possible. This means that some form of subdrainage must be resorted to, usually tile drains or clay or concrete. Water from whatever source must be got rid of effectively. As water in freezing expands one-eighth its volume, the road heaves out of shape, and when the ice melts the road disappears beneath the rising tide of mud constantly fed by rains, melting snows and underground springs.

In seepy and boggy places the subdrainage in order to be fully effective should lower the water level to not less than three feet below the road surface. If tiles are used they should be carefully laid, true to grade. Most failures in the drainage can be attributed to carelessness in laying or too flat grade. Tile less than four inches in diameter should rarely be used, nor should a grade of less than six inches to the hundred feet be used unless absolutely necessary. In a very dense soil it is always advisable to cover the tile to at least a depth of six to twelve inches with a coarse sand or fine gravel. Care should always be taken to procure a free outlet for the drains and to protect the outlet with a concrete bulkhead or catch basin, which can always be kept clean and the outlet free.

The kind of tile to be used depends on local conditions. Concrete tile if properly made is quite as good as clay tile. Which kind to use is entirely a local question of dollars and cents. If concrete tile can be made more cheaply than clay tile can be had, use concrete; if not, use clay tile.

Convict Labor in Building of Roads.

At a recent meeting of the national good roads board, held in New York city, Senator C. T. Lassar of Virginia outlined the method of building roads with convicts in the Old Dominion. C. Gordon Neff, the chairman of the board, has decided to make a canvass of the entire United States to find out which states employ convicts in the building of roads. This will be followed up later with an effort to get other states to use convict labor in road building. There is a general movement to abolish convict labor in lines of the industry where it interferes with organized labor, but in no section of the country does organized labor object to the use of convicts in the building of good roads.

ROAD WORK IN ENGLAND.

Method of Maintaining Highways and Filling Up Soft Spots.

It may interest many to learn how road maintenance is carried out in Great Britain and Ireland. All roads and bridges are under the direct charge of the county surveyor, who is in all cases a qualified civil engineer, with assistants under him to see to the detail work. He divides the roads of the county into sections, as seems best to him, for maintenance purposes. These several sections are advertised locally in the newspapers and by other means, and bids are invited for their maintenance for six or twelve months, says James Johnston of Douglas county, Neb., in the Breeder's Gazette of Chicago. These bids are opened on a certain day by a board of county commissioners, assisted by the county surveyor. The lowest bidder gets the work, but no bid is accepted until the successful bidder puts up a bond signed by two solvent sureties that the work will be performed. Should the contractor fail to do the work the county surveyor can have it done and sue the bondsmen for the work and costs. All bidders for this work have specifications of the work to be done on the several sections of road. How long the section is, how many tons of metal are to be broken and put on, cleaning, keeping the water tables clear and the grass off the road—all these are specified, so that he knows exactly what he has to do. The matter of putting on the metal is looked after very closely indeed. The contractor has to put all the material on the roadside. The surveyor or his assistant comes and measures it and then marks it with slaked lime, so that it cannot be interfered with until it is put on the road. Farmers are always the contractors for this work. The roads everywhere are always in good condition. There are many soft spots over there—bog and low lands, with rain every day and sometimes twenty-four hours at a time—but the heaviest autos can spin along the bog roads and in the rainiest weather with no damage to the road.

They have no difficulty with the soft bottoms in Ireland. They simply throw in rock, and the softer the spot the bigger the rocks, until they make it a hard spot and then put the small stuff on top. A mistake will surely be made if bricks are thrown into soft spots. They are simply no good for the purpose intended.

It is to be hoped that the people of the United States will stop spending time and wasting money in shoveling dirt into the soft spots, but will go to work like men of business and build roads.

NEW KIND OF ROAD MATERIAL.

Salt and Alkali Scale From Boilers Used in Parts of Kansas.

The farmers in central Kansas as well as the people in the towns have been interested in good roads for several years, and in Ellsworth and its vicinity one can see almost any kind of a made road.

At one or two places in Ellsworth county there are short roads where treatment has been given similar to the pavement on Douglas avenue in Ellsworth. Here there are two blocks that fool four-fifths of the visitors to the town. The treatment of this street was commenced about two or three years ago, consisting of coarse and fine cinders in layers, then a covering surface of salt and alkali scale.

The water in this country is very hard, and in all the steam boilers at the salt mills and other factories a sort of alkali forms which must be removed frequently, and this, with the salt and alkali scale that forms in the salt pans, is used on Douglas avenue. It forms a hard crust and makes a most excellent street. It is a success on the most busy thoroughfare of Ellsworth, and if the supply was not so limited the farmers would use it for the rural roads and more of the streets of Ellsworth would be paved with it. The salt and alkali crust on Douglas avenue is now about three inches thick, and this lies on three inches of coarse cinders and three inches of fine cinders. It makes a pretty street, in appearance being like an asphalt pavement before it becomes dirty.

Cost of Oiling Roads.

A recently published report of the Boston park commission is interesting. In 1906 twelve miles of road were treated with oil to keep down the dust, and the result was so satisfactory that in 1907 the whole extent of more than forty miles was treated in this way. Mr. Putnam, the engineer, has carefully calculated the cost, and he says that the annual cost of sprinkling a thirty foot roadway was \$489 a mile, whereas the cost of oiling the same roadway thirty feet wide was \$375. In addition to laying the dust, the asphaltum in the oil had a binding effect on the surface of the road and very materially lessened the cost for repairs. The oil is put on in an emulsion in which fifteen pounds of soap dissolved in fifty gallons of water are mixed with a hundred gallons of crude oil, the whole being agitated to the proper point of emulsion, and then 150 gallons of this are mixed with 450 gallons of water and sprinkled on the roads. The plan has given the very best satisfaction in Boston and might be tried elsewhere with correspondingly satisfactory results.

A Move For Good Roads.

Nearly 1,000,000 voters of Pennsylvania have signed petitions asking the state legislature to start the movement which in 1913 will give a bond issue of \$50,000,000 for building good roads. The sum of \$5,000,000 will be asked for to begin immediate work.

A DOUBLE COMBINATION TREASURE BOX.

By ELBERT T. BENTLEY.

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"There's a letter for you in the box, Billy," said the farmer. "Somepln important, I reckon."

Billy Andrews, a young farm hand, threw down a pitchfork with which he had been tossing hay on to a wagon, went to a rural delivery box on the road and took out a letter. The printing referred to was the firm name and address of Cleaver, Cuttle & Crane, attorneys at law. The letter stated that William Henderson, Billy's uncle, had died and before his death had executed an instrument giving his nephew, who had been named for him, a farm worth \$10,000. The deed was deposited in a safety deposit company's vault in the city. The key to the box was at the attorneys' office, and Billy could have it by calling for it the next day at 3 p. m.

Obtaining leave to go to the city at the appointed time, Billy put on his store suit, took a train and in an hour was in the office of Cleaver, Cuttle & Crane. Mr. Crane received him and read him the document by which the farm was conveyed. It was a very singular paper. The box at the deposit company was one usually rented to business partners. It had a double combination lock, one-half of the combination being known to one partner and the other half to the other, so that it could only be opened when both were present. Mr. Henderson had given \$10,000 in bonds to another person, and, for the sake of economy, so said the instrument, had deposited the deed and the bonds together in one of these double combination boxes. It was specified that either party should go at the other's call to assist in opening the box. Mr. Crane had notified the other party to be at the deposit company's vaults at 4 o'clock that day.

This economical arrangement was certainly very well devised, though Mr. Henderson had not been a money saver, and it seemed singular that he should so suddenly have shown such a disposition. Mr. Crane sent a clerk with Billy to the vaults, and the young farmer was shown into a parlor and asked to wait a few minutes. He spent them wondering what the "other fellow" looked like—if he were a farmer or a city chap. While he was conjecturing the door opened and the custodian ushered in as pretty a country girl of eighteen or thereabouts as Billy had ever seen. She was Lucy Miller, the owner of the bonds.

"I will take you two," said the custodian, "to your box and show you the process of opening it."

Opening several doors composed of steel bars and several more of solid metal, he took them into a place where boxes were ranged in profusion. Turning a key in the lock of their box, the custodian opened a small, thick door and exposed a knob. He gave Billy a series of numbers and showed him how to turn the knob. Then he supplied Miss Miller with similar information. The joint owners of the box were occupied casting sly glances at each other, and it required several lessons to enable them to get at their respective treasures. When the box was finally opened each took a look at the contents. They expressed themselves satisfied, exchanged addresses and departed.

In a couple of days Lucy Miller received a note from Billy saying the whole matter had been such a surprise to him that he had not even thought to notice the location of his farm. Would she mind meeting him again at an appointed time? Of course she consented—she was obliged to consent—and four days after the first opening there was a second one. Then Lucy wrote that some one had asked her if her bonds were "registered" or "coupon," and she didn't know. She would like him to help her unlock the box.

During the second week of the joint ownership the box was opened four times. On the fourth Billy told the custodian that he needn't trouble himself to come with them to the box since they now understood the opening process perfectly. The custodian smiled and reminded Billy that he had certain unlocking to do himself. When they left the office Billy looked wistfully at a leather covered sofa in the parlor, wishing he and Lucy could sit there awhile together, but the deposit company was a place of business and nothing else. However, when Lucy wished to cut her coupons Billy was permitted to go into a little 4 by 6 compartment with her while she did the clipping.

Billy wished to take possession of his farm, but had no money for live stock or farming implements. This suggested Lucy's bonds. He couldn't steal them if he wanted to, which he didn't, for both Lucy and the custodian were present when they were open to him. Besides, what would he do on the farm alone? He wouldn't think of running it without woman's help.

One day Billy got a note from the manager of the deposit company that the partnership box had been rented for only three months and the term was about to expire. Billy and Lucy could not have it for another term for the reason that their visits to their box were so frequent that it took up too much of the custodian's time.

On receipt of this letter Billy went to the address Lucy Miller had given him, and before he left her they were married and went to live on Billy's farm.

"What a slick fellow ole Bill Henderson was!" said a neighbor. "How he did play it on them two chicks he wanted to bring together!"

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