

all vehicles, so should be avoided whenever possible. These can often be eliminated by giving a high crown to the road, good side ditches, and a good smooth surface. Care must be taken to keep all side ditches in such condition that water will not be allowed to remain in them. They must be kept free from weeds and rubbish and have sufficient capacity and grade to carry quickly away the water reaching them under conditions of maximum flow.

In order to ensure a good, smooth, dry surface to the road, one will not have much difficulty after the drainage has been properly carried out. This can be done most economically and successfully by the systematic use of the log drag. It is needless here to go fully into the construction or the use of the drag, as it would be old news to you. However, as this method is the most important in the maintenance of a clay road it will, perhaps, not be out of place to impress on you a few of the most important points connected therewith.

First of all, the drag should be made of light material, preferably cedar or pine, so that it can be easily drawn by one team of horses, and frequently. Remember that the drag is not blessed with brains, and if these are not possessed by the operator one can hardly expect good results. Remember, also, that the road drag will not do the work of a grader.

Drag the surface of the road after each rain storm, not when the road is too soft, but while it is still moist. The man in charge will be the best judge as to the correct time to use it on account of his previous experience of the different characters of the soil. The material moved by the drag in planing off tops of ridges and rough places, should be smeared in a thin, even coat over the surface, fill up hollows and ruts and help to keep a good crown.

Do not attempt to move more earth than is absolutely necessary. The driver should ride, and by so doing he will be able, after a little practice, to manipulate the drag successfully by moving his position backwards or forwards.

A few hours of labor spent at the right time will often save serious destruction which may take much time and money to repair.

All railway companies adopt a strict system of maintenance to take care of their roadbed, bridges, culverts, etc., and as they have proved it good business to them, it surely will apply to the same extent or even more so in highway work.

There are several methods of operation which could be adopted to advantage, one of which I might mention. In case a township has not entered on a county road system, then the council should appoint a road superintendent who must be an experienced and responsible man who will take charge of, and be responsible for, the upkeep of all the roads. His appointment must be permanent, the same as the township clerk and treasurer.

The roads in the township should be divided off into sections of 3 to 5 miles and a man should be engaged for the season to take care of each of these sections.

Often farmers or people residing along the road will be willing to undertake this work. It will not take up the whole of a man's time and as the most efficient work on an earth road should be done just after a rainfall, which is usually a time when the farmer is less able to work to advantage on his farm and when he can often more easily spare a team which could operate the log drag, or do any necessary grading required.

These section men should be provided with rakes, shovels, axes, picks, wheelbarrows, bush scythes, and tool box, and last, but not least, a road drag.

The duties of the men will be to restore the proper shape over the grade, give the surface a good floating, so as to keep it smooth, and not allow any ruts or rough places to form. This can better be accomplished by the drag after every rainfall and when the dirt is about the consistency of putty. Besides this, he must fill up all holes with the same kind of material as the existing road surface, and not on any account with gravel or stone. The men will be expected to put in one or two days each month on the repairs to culverts, bridges, ditches and under-drainage. They must also keep down the brush and weeds, trim all trees, break through the snow in winter, erect snow fences and in general keep the road up to the required standard of the road superintendent and to his entire satisfaction.

It will be difficult to arrange a detailed set of requirements necessary for the maintenance and suitable for every section, as each one may be varied considerably by local conditions.

The road superintendent will have sole control of the section men with regard to road work. He will be expected to visit and inspect their districts periodically and thoroughly study conditions together, so that he will be in a position to advise and guide the council from time to time.

If an inexperienced man is engaged as superintendent, too much must not be expected from him for the first year, but as in all businesses, success is largely dependent on the choice of a capable man in charge.

In placing responsibility on him, he must be given full authority with regard to hiring or discharging men and teams. He must advise the council, the council will decide the work to be done, but the doing of the work will be entirely in his hands.

If statute labor is retained in the township the pathmasters will take the place of the section man previously mentioned.

The road superintendent should acquaint himself with the best methods of constructing and maintaining all classes of road and by knowing how to operate graders, crushers, rollers and all other road-building machinery, so that if at any time he is called upon to improve the earth or clay road surface he will be in a position to undertake the work.

He shall be required to keep an accurate record of all the men employed and work done, so as to be able to furnish the council whenever required with pay-sheets, accounts and vouchers, and be in such a position as to be able to show in detail the character, location and cost of each separate piece of work undertaken, whether for grading, ditching, tiling, dragging, culverts, or other work connected with the care of a road.

## NEW ZEALAND IRON AND STEEL ENTERPRISE.

A company has recently been formed in New Zealand, with a capital of £70,000 (about \$340,000), with the object of producing iron and steel from magnetic and titaniferous iron sand, of which there is a large deposit on the coast at Taranaki, near New Plymouth, North Island. Works are being erected at New Plymouth. The present intention is to install a furnace capable of dealing with 70 tons of iron sand weekly, but plans have been drawn up for the installation at a later date of an additional furnace capable of dealing with 200 tons weekly. The company claims that pig iron can be produced from these iron sands at a cost not exceeding £3 (\$14.60) a ton. The production of steel is also contemplated, and it is intended later to form a new company to carry out this development. Meanwhile, the company will proceed with the production of pig iron for foundry purposes.