The Road Roller.

The advantages to be derived from a road roller in the construction of a broken sone road are becoming more and more appreciated. Unless a roller is used, the stone must be spread loosely on the road, and left for traffic to consolidate. A road should be made for traffic, not by it. To leave loose gravel and stone in the roadway is neither an agreeable method of constructing a road, nor will it produce the most durable road.

The consolidation of loosely spread stone or gravel by traffic is a slow process, causing much inconvenience to travel, during which the earth of the subsoil becomes mixed with the stone. Earth intermixed with stone prevents the strong mechanical bond which clean metal will assume when the stones are wedged one against the other by a roller. The particles of earth, when wet, have a lubricating influence on the stone, and under the action of wheels the surface is more readily broken up. By the use of a roller the earth subsoil should be first thoroughly consolidated. The stone should be placed on this foundation in layers, and each layer well compacted. In this way a smooth, durable, waterproof coating of stone, free from earthy material, can be laid over a firm founda tion.

Among the benefits to be derived from the use of a roller on country roads are :

(1) A good road is at once made for vehicles.

(2) A dirt track is not made near the pitch, to avoid a pile of loose stone or gravel so that the side of the road is not cut up in such a way as to interfere with surface drainage.

(3) Traffic is not inconvenienced in the fall by being forced to drive through loose gravel or crushed stone.

(4) The gravel or stone is not forced down into the sub-soil by the wheels and feet of the horses; is not churned and mixed with the earth, and there is in this way a great saving in the amount of metal.

(5) There is a great saving in manual labor, and repairs are more easily and effectually made.

An impediment to the use of heavy rollers in a good many townships, is the insufficient strength of bridges and culverts; and, while valid in some instances, the objection is liable to exaggeration in others. Weak, wooden bridges and culverts could, in many cases, be temporarily strengthened sufficiently; while in others, they could be entirely avoided by first completing the rolling on one side, and then passing around a block or so, to commence work on the other.

There are different classes of rollers. The horse roller, weighing six or eight tons, will do fairly well if a steam roller cannot be afforded, but the horse roller is not sufficiently heavy for the best results. It has to be much longer than the steam roller. The feet of the horses, in exerting sufficient strength to move the roller, sink into and disturb the road metal, and injure the shape and quality of the roadway, while on hills it is at a disadvantage.

The steam rollers are of various weights ranging from eight to twenty tons. Rollers of fifteen tons weight are those generally used by the towns and cities of Ontario. The cost of horse rollers is usually about \$90 per ton, or from \$400 to \$600 each. Horse rollers are, however, generally so constructed that the weight may be increased by iron castings; so that a roller of five tons may be made to weigh about six. Steam rollers cost about \$3,000. For operation, a horse roller, with two teams, will cost \$6 per day. A steam roller will cost \$10 a day, including inter st and depreciation, but will do several times the amount of work done by a horse roller, so that the saving in operation is considerable.

The amount of rolling which can be done in a day varies according to the quality of metal used, the kind and amount of binder, the thickness of the layer of stone rolled, and the weight and type of roller. With broken limestone, rolled by a twelve ton steam roller, the amount of stone compacted will average between forty and fifty cubic yards in a day of ten hours.

The Stone Crusher.

The stone crusher is one of the most important of modern additions to the list of road-making machines. By their use stone can be crushed much more cheaply than by the old method of hand breaking. So far as cost is concerned, stone roads are within the reach of every municipality having suitable rock in the vicinity. In the treatment of gravel a crusher is frequently very valuable, since, if containing many large stones and boulders, it will be possible to place a crusher in the pit and pass all the gravel through.

They are principally used in the eastern part of the Province, where good stone is plentiful and gravel is scarce. In some cases an engine is purchased, and in others, the engine is rented from some one in the vicinity owning a threshing engine. A traction engine is an exceedingly valuable part of a road-making outfit, as it can be used for operating the crusher; if portable for moving it from place to place; and for operating a grading machine. Crushers are owned by numerous towns and cities in all parts of the Province. Townships owning them are: West Hawkesbury, Hallowell, Collingwood, St. Vincent, Markham, Ameliasburg, Win-chester, Thessalon, (township), Smith, chester, Thessalon, (township), Smith, Cornwall, Nattawasaga, Drummond, North Grimsby and Derby. Crushers are owned by private parties, and used for municipal purposes in Earnesttown, Rear Young and Escott, Front Leeds and Lansdowne, Beckwith, Pittsburg, Elizabethtown and

Kitley. There are also well known quarries at Amherstburg, Hagersville and other places on the Grand River, in the vicinity of Hamilton, at St. Marys, Kingston, Brockville, Ottawa and other points. The County of Hastings uses a crusher for the county roads, and the counties of Victoria and Peel have purchased a crusher which is supplied to the minor municipalities as they require it.

These machines are made after various patterns, the main division being into rotary and jaw crushers. Some of smaller size are set on wheels and may be moved readily from place to place. Others are for stationary work, in a quarry, or at a point to which stone, field boulders. etc., are brought to be broken. They are operated by steam power, a traction engine, or stationary engine, or by an electric motor, as circumstances render most advantageous. Some municipalities owning a steam roller obtain power from it, but this is apt to injure the roller.

One of the most valuable features of a crusher is that by attaching to it a rotary screen, the crushed stone may be separated into grades according to size, usually such as will pass through a three-inch ring; such as will pass a one and onehalf inch ring ; and fine chips and screenings. By placing the coarse stone in the bottom of the road, and the finest on top, a smoother and more durable road is obtained. An average cost of a crusher is \$800 or \$900, and with it stone at the crusher may be crushed for from 20 cents to 30 cents per cubic yard, according to the kind of crusher, the quality of the stone, and the facilities for handling the stone.

In municipalities where field boulders are plentiful, the property owners are very glad, as a rule, to have a means of disposing of them, especially when they can be hauled in winter time. If the stone is stored for future crushing, it should be put in piles on both sides of where the crusher is to be set up. Much can be saved by setting up a crusher so that it can be fed directly from the wagons, instead of wheeling the stone in barrows.

The broken stone should always be received into bins from the crusher, and from these, a wagon containing a quarter of a cord, can be loaded in from two to four minutes.

Bracebridge has water, light and power plants operated by the municipality with great success. Until two years ago the water and light service paid the town about \$2,000 a year. Of late the town has installed a plant which, by utilizing the local water power, has enabled it to offer electrical energy to manufacturers at \$12.50 per year per horsepower for a ten hours service. At present the yearly expenditure is \$8,000, and the cash receipts are over \$7,500. Estimating the street lighting and fire protection at slightly under \$2,000 a year, the plant yields a profit of \$1,500 a year. In addition the town has cheap power for sale.