

purposes on our weak country roads. On good grades the use of trailers with broad-flanged wheels is to be recommended. The tip-truck in its various forms is now almost universal on highway-construction. End-tip trucks with regulating-doors at the back are often used to spread stone in a uniform layer directly on the road. A very successful machine for small work is a Ford 1-ton truck fitted with a roll-over body, made by the Easton Car and Construction Company of New York.

Loading-machines.—Portable loading-machines are very greatly used in America for loading trucks from stock piles. They save considerable labour and time. Many insignificant coal-dealers use these machines.

Portable Compressors.—A portable compressed-air drilling outfit is found on practically every small quarry job one sees in America. Portable compressors are also now used in all big cities in England and America for breaking up city pavements.

Road-rollers.—Road-rollers are used much more extensively in other countries than in New Zealand. For example, in Essex County, in England, there is a roller to every thirty miles of road. In New Zealand there is only about one roller to every hundred miles of main highway, and only one to about every thousand miles of road. The small rollers now being built by the Austin Company in America, and Barford and Perkins in England, are most useful implements for light construction. A number of the latter were used for the construction of the roads in the Exhibition at Wembley. I was much impressed with the work that is accomplished on gravel roads in America with these small machines. They are used not only for rolling, but also for shaping a road-surface. For finishing off a subgrade they are very convenient. Tandem quick-reverse rollers are almost universally used for the higher types of bituminous construction.

Bituminous Spraying Plant.—There is a very great difference between the plant used in America and the plant used in England. In America the bituminous materials are handled in bulk in railroad tank cars holding 10,000 gallons each and fitted with internal steam-piping for heating purposes. The bitumen is transferred to large motor-truck distributors, which spray the road-surface at a great rate. In England the bituminous materials are usually distributed in barrels alongside the road, and small spraying-machines similar to those seen in New Zealand are used in great numbers. The American method is no doubt considerably cheaper, but is only possible where bitumen or tar is available in bulk.

Gravel and Chip Distributors.—I saw a number of these machines working in England, and where a large programme of surfacing is to be carried out they are to be recommended.

Asphalt Plants.—The most common asphalt-mixing plants to be seen in the United States are those manufactured by Cummer and Son, Barber Asphalt Paving Company, and the Austin Company. The following is a simple description of the operation of a typical machine:—

“At one end is placed a continuous elevator of the belt-and-bucket type, into which broken stone, sand, or other mineral matter is fed from nearby storage piles. The elevator discharges into a cylindrical metal drum set over a firebox. As the drum revolves the aggregate passes through and is dried and heated by meeting the hot gases from the furnace which discharge through the drum. The hot aggregate is then lifted by means of an elevator to a hot storage-bin, sometimes being first screened into different sizes. The bin discharges into a measuring-box on the mixing-platform, where operators are stationed to proportion and handle the mix. Here the proper quantities of hot aggregate and asphalt are weighed out for each batch to be mixed. The asphalt is heated in kettles, and here, if too hard, it is also fluxed to proper consistency. It is forced through pipes to a weighing-bucket on the mixing-platform. The mixer is set so as to discharge directly into wagons or trucks below the platform, and usually consists of an iron box equipped with a double set of blades revolving on two horizontal shafts extending through the box. The mixer is first charged with the mineral aggregate, including limestone dust or Portland-cement filler, if any is to be used. After preliminary mixing, the hot asphalt is added, and mixing continued for one or two minutes until every particle is uniformly coated. The mix is then dumped into a truck and another batch prepared.”

Concrete-paving Machines.—These machines have been well developed in America. I saw several American machines working in England. A very large gang is required to attend on them, but their output is enormous, 1,200 square yards of 8 in. pavement per ten-hour day not being uncommon. I have seen as many as forty men attending on one mixer. This number includes the road-finishing gang.

Water-spraying Motor-trucks.—These are now very frequently used not only in England and America but also on the Continent. I saw many machines fitted with the sprays in front. The driver thus is given excellent control.

Fordson Tractors.—These tractors are becoming very popular abroad, particularly where good road-surfaces exist. They are invaluable in such places as timber-yards and on wharves. In America I saw some fitted with a small hoisting-winch in front. On one job the winch was being used to assist negroes to push their concrete carts up a short grade.

Turntables for Motor-trucks.—These are frequently used in the United States. There are several makes on the market which can be operated by one man. For mountain-road work they are extremely useful.

Graders, Scoops, &c.—There are innumerable types of graders, scoops, trench-excavators, drag-excavators, &c., on the market in the United States which are peculiar to the country. Many are of very light design and are only used for a short period and then scrapped.

TRAFFIC CENSUS.

The traffic census is daily assuming greater and greater importance in the highway engineering world. No real study of any highway problem can be made without its assistance. Traffic statistics form the basis of all economic investigations, and the importance of having such information to hand cannot be too greatly stressed.