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estimated that 10 per cent of the total production was not reported in 1912 and 25 per cent was not reported in 1911 and previous years. The total output would hence be 24,133 for 1912, as against 13,319 for 1911 and 12,968 for previous years, making a total output up to and including 1912 of 50,420. The estimate for 1913, based on the report of 170 companies, plus 10 per cent, is 56,744, which represents a growth of considerably more than two hundred per cent. The mean average price of all commercial vehicles produced in 1912 was \$1,957.37. The average price of gasoline cars was \$1,868.95 and of electric vehicles, \$2,465.18. The average price of gas trucks in 1911 was \$2,079.16, and in all preceding years combined \$1,955.70, while the average price of all electric cars in 1911 was \$2,759.66, and of all preceding years \$3,369.72.

Motor Truck Researches at the Massachusetts Institute of Technology.

To the Editor of the SCIENTIFIC AMERICAN: Remarks by Mr. John Ritchie, Jr., in the March 29th issue of the SCIENTIFIC AMERICAN have been noted by the writer.

We believe that the motor truck researches being conducted by the Massachusetts Institute of Technology are very thorough and sincere, but as Mr. Ritchie states that the bulk of the support for conducting these experiments and tests was furnished by electrical interests, we are inclined to believe that that was why the electrical figures appear so favorable.

We do know that there are over 400 Pierce-Arrow trucks in daily operation in various parts of the country, and none of them costs more per mile to operate than stated in the table published in your February 22nd issue. There are seventy of these trucks under the writer's personal supervision in this vicinity, and they all operate for less cost than mentioned in this table.

If the Massachusetts Institute of Technology were experimenting with old trucks or with new inefficient trucks, the high figures they get for gasoline trucks would be accounted for.

From the actual work done by Pierce-Arrow trucks in this vicinity, the tire cost per mile averages less than 5 cents.

ROBERT C. REID,
Manager Truck Department,
Harrolds Motor Car Company.

Overloading the Motor

By John R. Eustis

THAT will send a motor truck to the repair shop quicker than overloading. Over-speeding is about equally hard on the vehicle, but a driver can always know when he is exceeding the safe limit in this respect, while overloading is often done unconsciously.

The reason for this is that few operators know accurately the weights of the commodities which they transport on their vehicles. When horses were used this knowledge was unnecessary, for the behavior of a team always shows whether the load is too heavy for it.

A motor truck, on the other hand, will move a load a ton or more in excess of its rated capacity without showing the terrific strain to which it is being subjected. This strain will soon tell, however, and frequent trips to the repair shop inevitably follow.

To avoid overloading of motor trucks or any other type of commercial vehicle it is necessary to know the weight of each package or unit that is loaded on it. In some cases weighing platforms on which the loaded truck can be run are available, but then the tendency would be to "let her go this time," rather than remove part of the load.

There is, of course, always a margin of safety over the rated capacity of a motor truck, but it is not advisable to take advantage of it, and when unusually rough streets and steep grades are to be encountered, it is best to keep the weight under the rated capacity.

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