

they usually cost. The lengths considered include only the roads accepted or under construction.

For comparison the figures relating to the Routes Nationales have been reproduced, and also some for the Routes Departmentales.

The total length of French roads is nearly 372,000 miles, and their total cost may be considered roughly as more than \$1,500,000,000. The difference between these 372,000 miles and the total of 428,000 previously given,

results from the omission from Table III. of the 56,240 miles which have only been designed. There are also about 155,000 miles of farm roads, with or without ditches, metaled roadway, and maintenance.

The annual maintenance of the 372,000 miles of regular roads requires nearly \$45,500,000, the share of the Central Government being \$6,500,000 and that of the 86 Departments nearly \$39,000,000. This shows a contribution of about one dollar per head of population.

Table III.—Usual Cost of French Roads.

Classes.	Total length, in miles.	Av. Width, in yards.		Approximate cost of:			Annual maintenance.		
		Ditches included.	Ditches excluded.	Building.					
				Total expense.	Per mile.	Per square yard, ditches included.	Total expense.	Per mile.	Per square yard, ditches excluded.
Routes Nationales	23,800	20	15½	\$ 300,000,000	\$12,600	\$0.36	\$ 6,500,000	\$270	\$0.0099
Routes Departmentales ...	8,100	14	11	63,000,000	7,750	0.32	1,500,000	185	0.0095
Chemins Vicinaux de Grande									
Communication	107,300	10¾	8½	665,000,000	6,200	0.33	16,900,000	157	0.0105
D'Interet Commun	47,500	10	7½	178,000,000	3,750	0.21	6,000,000	126	0.0095
Ordinaires	184,700	9	6½	457,000,000	2,470	0.16	14,500,000	78	0.0068
Totals	371,700	\$1,663,000,000	\$45,400,000

PRIME MOVERS.

In the proceedings of the American Institute of Electrical Engineers appears a paper, entitled "The Present Status of Prime Movers," to be read on June 25th at the 31st annual convention of the Institute in Detroit. This paper, by H. G. Stott, R. J. S. Pigott and W. S. Gorsuch, deals with the present status of heat engines and hydrographic turbines in commercial use at the present time for the conversion of the energy found in fuel and water into mechanical power for the production of electric energy. The paper compares the various types as to relative importance, capacity, efficiency, weight, cost and economy. The prime movers are divided as follows: (1) reciprocating steam engine, (2) steam turbine, (3) gas engine, (4) oil engine, (5) hydrographic turbine. Each is dealt with separately and illustrated by curves showing the above characteristics. At the conclusion of the paper a section devoted to finance and economics also contains a number of curves, which show the investment and fuel costs of the different heat engine units, on the basis of percentage of normal full-load rating of machines.

The Waterworks Department of the City of London, Ont., has a total of 2,115 water meters now in use, 451 of which were installed during 1913 and 376 in 1912.

The city of Toronto will shortly submit to its ratepayers a by-law to permit the acquiring of \$300,000 for the purpose of purchasing motor buses to serve outlying districts. Full and detailed information regarding the proposal is now being acquired prior to placing the matter before the people.

The new Lake Shore line of the C.P.R. will be in readiness for passenger traffic on June 29. A freight business is being tentatively carried on. This new line will give practically a new route between Montreal and Toronto, and will greatly facilitate in handling the traffic, passenger and freight, which passes through this territory. The work was commenced about two years ago, and entailed a cost of nearly twelve millions of dollars.

FIRE DAMAGE TO STEEL BRIDGES.

Serious damage to several steel viaducts in the lumber district of Cleveland, Ohio, was due to a fire which swept over approximately 15 acres, destroying about 15,000,000 ft. of lumber. These two viaducts, in their condition as a result of the conflagration, have provided a subject of interesting discussion for engineers. One of them, the Central Viaduct, built for the city in 1887-88, is 2,835 ft. in length, and consists of pin-connected Pratt deck trusses, with a through steel truss river span. Under it ran a railway viaduct, built in 1905-06. It is about 3,000 ft. long, and consists of a roller lift, a through plate-girder, and several deck plate-girders.

As a result of the fire about 500 ft. of the latter viaduct was seriously affected. The foundation piers were badly disintegrated and many of the steel members distorted and buckled, although no part of it fell.

The Central Viaduct received more serious injury, in that about 270 ft. of it at a point where it was approximately 90 ft. above the ground, broke away and fell across the railway viaduct.

A report from New York shows that the unfilled tonnage of the United States Steel Corporation on May 31 totalled 3,998,160 tons, a decrease of 278,908 tons over April.

The Pitt Meadows Oil Company, Vancouver, B.C., whose properties are about 25 miles from Vancouver, has secured oil leases on land in that district totalling 1,920 acres, and has also taken over a well formerly owned by a Vancouver syndicate, comprising, among others, W. I. Paterson, Dr. Robert Telford and T. F. Paterson.

The city of Calgary has under construction this year about 150,000 sq. yds. of asphaltic concrete pavement, about 3,000 sq. yds. of stone block, and about 800 sq. yds. of vitrified brick. These figures are in addition to those which were published in *The Canadian Engineer* for May 21st, 1914, which issue contained a summary of the present season's paving work throughout Canada.