In countries where maintenance of roads by local authorities has hitherto been the prevailing system, the modern engineering problems of road construction raised by the increased motor traffic are creating a demand for greater centralization in the belief that this will tend to greater expenditure on the roads, but in the opinion of this Congress it is not desirable that the maintenance of the roads should be vested in a central authority, but should be decentralized as far as is consistent with good administration, and that assistance should be given by the State contingent on the roads being maintained up to a prescribed standard.

In those countries where centralized systems of administration already exist, it is desirable that these systems shall be developed and perfected.

A principle that can be laid down as of universal application is, that the unit of highway administration shall be sufficiently large and command sufficient resources to employ and adequately remunerate a competent staff.

It is desirable that the engineering staff shall be organized on a national basis, and shall consist of:—

(a) Chief engineers, with powers of inspection, and report to the authority making grants.

(b) Divisional engineers in charge of administrative units.

(c) Assistant engineers, recruited by examination from engineering students who have received a practical training following upon a good general education, and an engineering education at some recognized engineering school or university. Promotion shall be by merit.

Ninth Question.—Finance of the Construction and Upkeep of Roads—Provision of Revenues.—Sub-section D decided as follows:—

1. The expenditure on the maintenance and improvement of:—

(a) The roads which serve as main routes of communication between important places in any country, or

(b) Roads which are used mainly by long distance traffic unless such expenditure is borne wholly out of the National Revenues under a system of State Administration of roads (which system is practicable and suitable in the case of some roads in some countries) should be mainly paid for out of National Revenues, whether or not such roads are locally administered and maintained, subject, where local administration prevails, to the supervision of a central government authority both as to efficiency and expenditure.

2. It is desirable to abolish, so far as possible, all tolls on public roads, but it is equitable that vehicles which, on account of their weight or weight combined with speed or any other exceptional circumstances connected with either the vehicle or use of the road, cause special damage to roads beyond the wear and tear of the ordinary traffic of any district, should be subject to special taxation, the proceeds of which should be earmarked for expenditure on roads.

3. Borrowing money for new road construction and for the periodic renewal of the surface coating of a road is consistent with sound financial principles, provided that the loan period in the case of loans for renewals, is kept well within the life of the surface coating.

HYDRO-ELECTRIC INSTALLATION, CITY OF TOKYO.

The unparalleled industrial boom Japan experienced during the last few years has brought with it an enormous increase in the demand for cheap electrical energy throughout the country and particularly in the city of Tokyo. In 1908 the Tokyo Electric Light Company completed their hydro-electric power station on the Katsura River about 100 miles from Tokyo, at this time the largest and most important power station in Japan. The total output of this plant was 27,500 H.P. developed by six Escher Wyss Francis turbines direct coupled to generators of Siemens make. One year later the company had sold the whole of the energy developed and a second plant of increased capacity had to be taken in hand. It was decided to develop a fall ten miles down stream on the same river, where 42,000 continuous horsepower could be obtained. The minimum flow of the river was measured to be 850 cubic feet per second, while the net head available varied from 368 feet to 396 feet maximum. By providing a reservoir of sufficient storage capacity the plant could deal with a peak load of 50,000 H.P.

With a total capacity of 75,000 H.P., not including the power required by the auxiliaries, this new installation is again the greatest power plant in Japan, comprising six main turbines of the same make, each of 12,500 H.P., including the oil pressure plant as well as the distributing piping with the necessary gate valves.

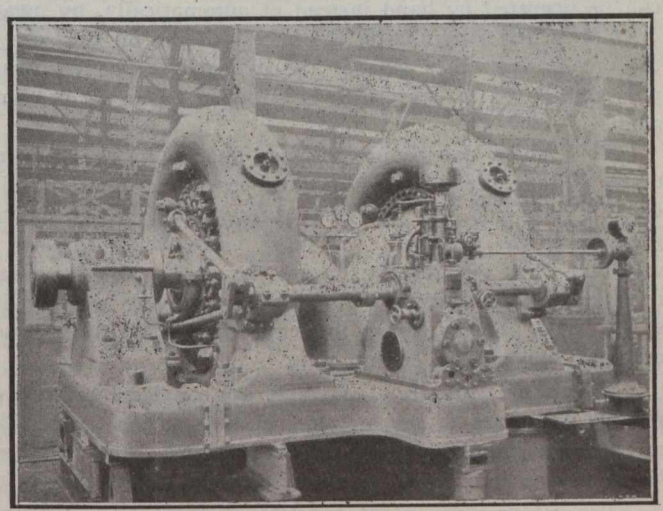

Fig. 1.—Turbines Used in Tokyo Hydro-Electric Plant on the Katsura River.

Regarding the layout of the plant it may be mentioned that the water is brought through a tunnel to the forebay and from there in six parallel pipelines of 700 feet length and 6 feet diameter to the turbines. Each turbine has its own pipeline, the exciter turbines being fed by a seventh pipe of smaller diameter.

The main turbines are arranged in two groups, each consisting of three units on both sides of the switchboard. The distributing pipes and valves are on the lower floor, thus leaving the engine room proper free and allowing for easy access and attendance. For the transformers and connections a second building is provided. The pipeline for each main turbine is connected by means of a conical pipe to a gate valve of 4 feet 7 inches diameter operated hydraulically by pressure water taken from the penstock. A cast steel Y piece and bend connect the turbines to the main gate valves.