Volume 23 Toronto, August 1, 1912

Contents of this issue on page 253

The Canadian Engineer

An Engineering Weekly

THE HIGH TENSION TRANSMISSION SYSTEM OF THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

SECOND ARTICLE.

Insulators.—Suspension-type insulators are employed exclusively on the high-tension system. The specifications called for an insulator capable of withstanding an electric strain of 330,000 volts (three times normal) dry, 220,000 volts (twice normal) under a precipitation of ⅛ inch of water a minute at an angle of 45 degrees and a mechanical longitudinal stress of 8,000 pounds. The strain insulators employed to take up the horizontal strain on the cable were required to withstand a tensile load of 10,000 pounds without injury.

A number of insulator factories were visited before these specifications were prepared. Data was collected regarding methods of manufacture, and the facilities of the various manufacturers were investigated for producing insulators of the required quality in sufficient quantities. The data secured from the insulator tests carried out at the different factories was so varied that the commission decided to make independent comparative tests under similar conditions on the various types and three complete sample insulators called for with each tender.

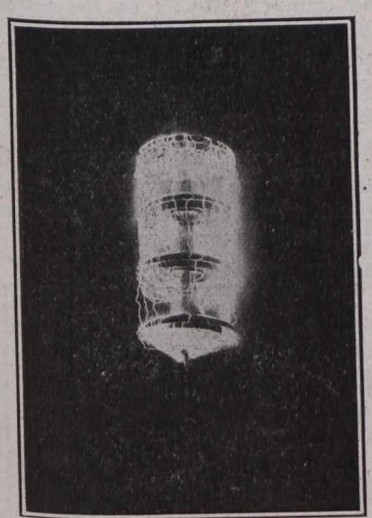

Fig. 12.—Insulators Under Test.

The insulator tests were made in the transformer station of the Ontario Power Company at Niagara Falls, Ontario. This company courteously offered the commission the use of all necessary apparatus, machinery and power, and during the tests assisted the engineers of the commission. The 330,000-volt dry test (Fig. 12) was performed in all cases. However, the 220,000-volt rain test constituted the real test of efficiency. The water was applied through a series of spray nozzles directed toward the insulators at an angle of 45 degrees. The flow was adjusted to give a precipitation of at least ⅛ inch a minute, which was called for in the specifications. The nozzles were arranged to subject all insulators to exactly the same conditions. These tests were performed in absolute darkness, and a large number of photographs were taken to compare the more or less vivid luminous display due to leakage and flash-over. The mechanical strength of the sample insulators was also investigated and a large number of tests were performed to ascertain the ultimate breaking loads.

All tests were made entirely independent of the prices submitted in the various tenders, and the question of cost was not considered until after the final selection had been made, based on the above tests. As an evidence of the thoroughness of the tests and inspection of quality of manufacture, it may be mentioned that during the year and a half that the system has been in operation no interruptions have occurred through mechanical or electrical insulator trouble. An insulator of American manufacture was finally chosen after a few alterations in design had been made at the recommendation of the commission's engineers. The suspension type of insulator consisted of eight sections with a ball and socket connection, as shown in Fig. 13. The strain type consisted of ten reinforced sections with similar connections. These insulators were shipped assembled in crates to various railway sidings, and from there transported by team to the railway sites. The eight-section suspension-type insulators were used on standard towers. The ten-section strain type insulators were used on the line anchor, corner and long-span towers, and all special towers at railway, transmission line and navigable water-way crossings.

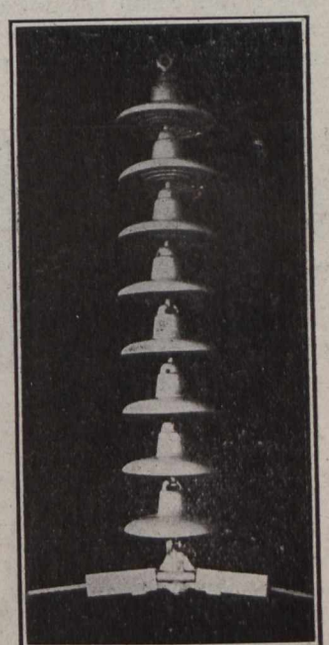

Fig. 13.—Standard High Tension Suspension Insulator.

The suspension type insulators weigh, assembled, about 100 pounds, and have an over-all length of 5 feet 2 inches, including the clamp. They are attached to the tower dross-