ELECTRICAL EQUIPMENT OF THE HIGHEST OFFICE BUILDING IN THE WORLD.

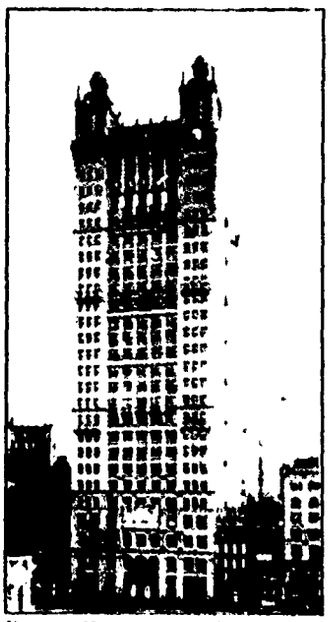

FIG. 1 EXTERIOR OF PARK ROW OFFICE BUILDING, NEW YORK CITY

Among the forest of lofty structures upon the lower end of Manhattan Island, the Park Row Syndicate Building stands out prominently. This mammoth office building is opposite the New York post office, and adjoins the city hall square, and marks an important centre of the city. The construction of this building, which has recently been completed, offers to the engineer, architect, and builder many points of interest. The most modern developments of art and science in each branch of work have been applied to the equipment, and characterize this building as an advance upon previous structures. The first illustration gives an idea of the number of stories and the consequent immense number of persons to be accommodated and transported. The building is somewhat irregular in plan, having a frontage of 104 feet on Park Row, and extends backward a distance of 178 feet. There are 26 stories from the ground level to the main roof, five stories in each tower, and one small story in each dome. In addition, there is a basement and sub-cellar below ground, making a total of 34 stories in all. The height of the building is 424 feet. Pile foundations are used throughout, the total weight of the building being computed at about 65,000 tons.

The building contains nearly 1,000 offices, each of which is finished in hard wood, is steam heated, electric lighted, and supplied with hot and cold water. All the offices are connected by telephones, with an information bureau at the entrance to the building, and have a messenger call box. It is estimated that the building has accommodation for 4,000 persons, and will contain this number when all the offices are let.

The Westinghouse Electric & Manufacturing Company supplied the electrical equipment, including the generators, boosters and switchboard, an account of which will be given in this article. The other branches of construction were designed and carried out so that the building should be second to none in point of equipment. The boiler room is in the center of the sub-cellar, east of the generating plant, and contains three water tube boilers, aggregating 900 h.p. The main steam pipes are designed to carry a continuous working pressure of 130 pounds to the square inch. Each boiler is provided with separators to insure the delivery of dry steam to the engines. Exhaust fans, operated by electric motors, retain the temperature of the boiler and engine rooms at a low point. From the boiler room steam is taken to heat the system of offices. In zero weather 70 degrees will be maintained by direct low pressure, or exhaust steam radiators, operated by a 16 inch main in the basement. This main is cross-connected with the exhaust from the engine and pumps. The condensation from the heating system is returned to the boilers by pumps.

In the sub-basement the three boilers are installed near the centre, between the columns. The engine and generator room is partitioned off, and in front of these, running under the pavement, is a part used for the storage battery. Coal is brought to the building through an alley and shot into the bunkers. Along one side of the sub-basement a railway track is built for conveying coal from the storage rooms to the boilers, and for carrying ashes to the sidewalk lifts in front of the building.

The engine and generator room contains five steam engines, direct connected to Westinghouse generators. Four of the engines are tandem compound. They are operated as non-condensing compound engines. It is expected that with a steam pressure of 130 pounds they will show a much better steam economy than simple engines. The fifth engine has a single cylinder, and operates a booster in connection with the storage battery.

The electric generating plant was provided by the Westinghouse Electric & Manufacturing Company, and consists of two 200 k.w., one 100 k.w., and one 75 k.w. Westinghouse standard, compound wound generators, 120 volts. Fig. 2 shows one of the 200 k.w. generators. The additional apparatus is the 40 k.w. booster dynamo, direct connected to the smaller engine, and a 20 k.w. booster driven by a 32 h.p. electric motor. Fig. 3 illustrates the booster attached to the electric motor.

In addition to the generating plant, a storage battery has been provided, of 58 chloride accumulators. The battery insures an equalization of load, and acts as a reservoir of electrical energy for supplementing the plant in case of necessity. It also supplies current for a few lights and an elevator service for night duty. The capacity of the cells in the battery is 500 k.w. hours, and the normal discharge rate is 350 amperes for ten hours, but it is capable of discharging at five times this rate, and a momentary discharge of 2,000 amperes for periods not exceeding thirty seconds.

The booster dynamos are operated in connection with the storage battery to compensate and equalize the load fluctuations and to maintain the output of the dynamos relatively constant. The two boosters are interchangeable, to serve for varying outputs, and the dynamo portions are substantially alike. The field of the dynamo portion in both cases has a series and shunt winding, the two connected differentially. Both windings can be varied, the shunt winding being varied by a rheostat in the usual way, while the series winding is varied by a series of equalizer shunts.

The series winding of the booster dynamo is arranged so as to take either the whole or a determinate portion of the current fed from the dynamos into the power circuits, and this winding, and the e.m.f. due to it, are made responsive thereby to the conditions and fluctuations of the load on the power circuits. The shunt windings are connected across the terminals of the battery or excited from the dynamo bus-bars. The armature of the booster dynamo is connected to the battery circuit. By making the proper adjustments so as to regulate the relative effects of the

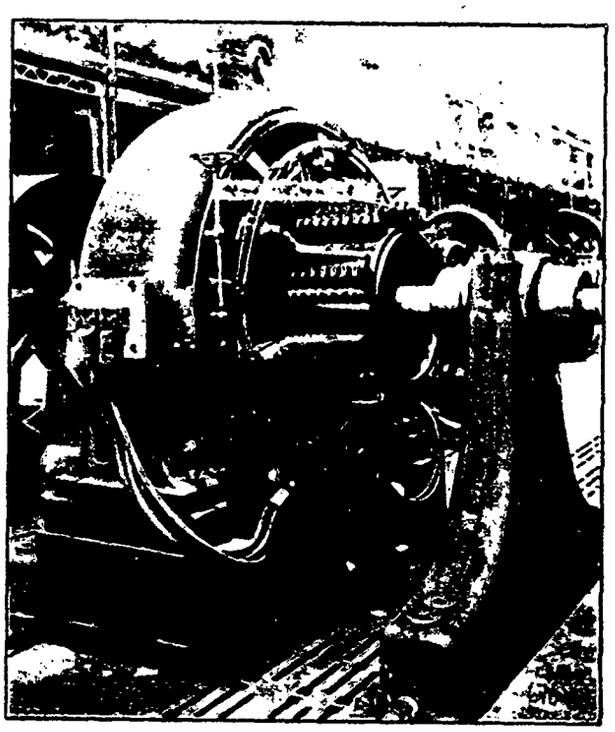

FIG. 2—ONE OF THE TWO 200 K.W. WESTINGHOUSE DIRECT CURRENT, "ENGINE TYPE" GENERATORS.—PARK ROW OFFICE BUILDING, NEW YORK CITY.

series and shunt windings according to the conditions of load, the condition of the charge of the storage battery, and the regulating effect desired, etc., it is possible to arrange the conditions so that for a certain critical current the battery e.m.f. will exactly equal that at the bus-bars. For a higher current the booster dynamo will act as a generator to supplement the e.m.f. of the battery, and make it discharge in parallel with the generators. If the working current falls below the critical value, the effect of the shunt winding predominates, and the booster dynamo will generate an e.m.f. in the opposite direction to supplement the charging effect of the generators. It is seen, therefore, that