load. This test was satisfactorily passed, although considerable difficulty was at first experienced with the commutator. These difficulties have now disappeared, and the surface of the commutator leaves nothing to be desired.

reduced in pressure than it is when working on exhaust steam, the difference being from 5 to 8½ per cent.

As the high-speed generating set supplying current to the works has been thrown out of operation by the instal-

Fig. 7

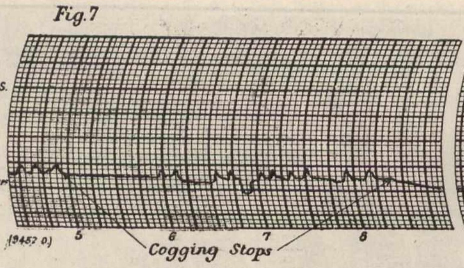


Fig. 8.

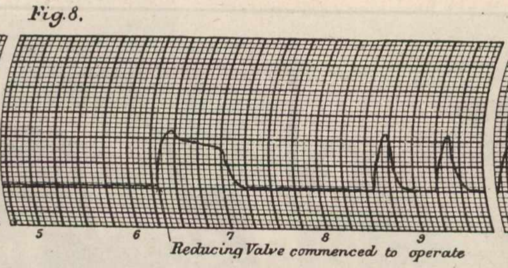
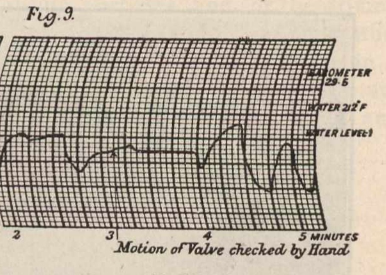


Fig. 9.



The regulation of the machine is excellent, and the speed variation of the turbine, when full load is thrown off, is not more than 5 per cent. momentarily, and the permanent variation, thanks to the Dennis compensator, is nil.

In order to render the turbine plant and the accumulator entirely independent of the working of the main engines, should the stops of the latter exceed the limit that the accumulator is designed to deal with, a special automatic live-steam reducing valve is provided. This reducing-valve has a piston, the upper side of which communicates with the accumulator, the under side being fitted with a dash-pot and spring; the tension on this spring is adjustable, and in

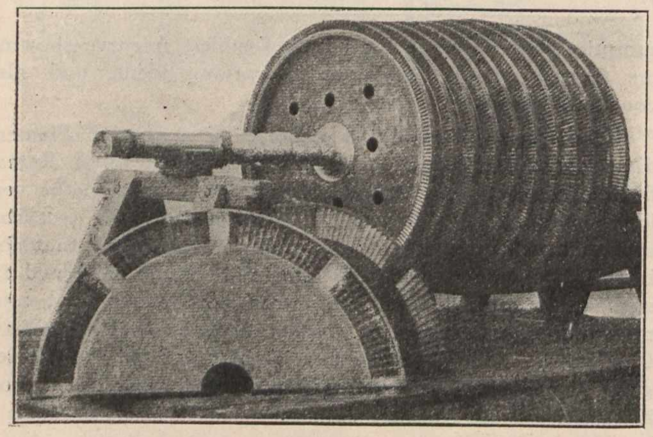
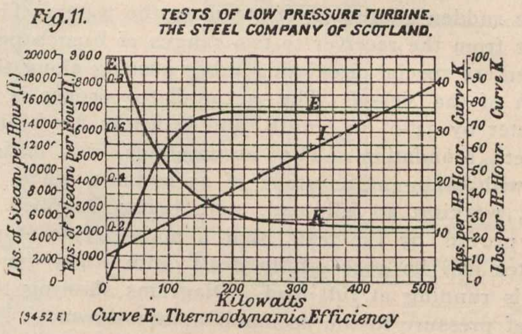


Fig. 10.

the event of the pressure in the accumulator falling below a predetermined limit, the pressure on the piston being also reduced, the spring overcomes the pressure on the piston and the latter rises, a collar on the piston-rod engages with a lever, which in turn positively opens the reducing-valve. When the pressure again comes on, the piston descends, and the live wire is shut off. As the steam is wire-drawn from boiler pressure down to atmospheric pressure in the reducing-valve without doing any work, a considerable degree of superheat is imparted to it, and actual measurements at the turbine inlet have shown that in expanding from 90 lbs. pressure down to atmosphere, 100 deg. to 110 deg. of superheat is imparted to the steam. This makes the turbine more efficient when working under live steam

lation of the turbine, no current is available for starting up the condensing plant; and as the reducing valve is shut positively in the manner described above, the turbines cannot be started without some special method of opening the reducing valve, and running the turbine to atmosphere. This is provided by a lever placed alongside the stop-valve hand-wheel, and operating the lever on the reducing-valve; this device enables the turbine to run to atmosphere until sufficient current is generated to start up the condensing plant. Then the lever is released, and the plant works at or below atmospheric pressure. As very little water was available for condensing purposes, it was decided to adopt the barometric jet type of condenser. This is shown in Fig. 1.

Fig. 11.



The exhaust-pipe from the two turbines, which are 24″ in diameter, lead to a rising main 33″ in diameter, and the steam leaving this pipe enters the condenser, where it passes through a series of fine sheets of water distributed by special trays, and flowing in the opposite direction to the steam.

Two centrifugal circulating-pumps, one for cold water injection, and the other for hot water, are provided, and are driven by a 100 Horse Power motor. A double-throw side-valve dry-air pump is provided, of the vertical type, driven through spur gear by a 35-brake Horse Power motor. To cool the condensing water a large cooling tower has been installed, with an hourly capacity of 200,000 gallons; the water is pumped by a hot-water circulating pump from the pump immediately below the condenser over this tower.

The running of the first turbo-generator installed having proved satisfactory, the Steel Company of Scotland have just placed the order for the second unit.

THE ELECTRIC FURNACE: ITS EVOLUTION THEORY AND PRACTICE

By Alfred Stansfield, D. Sc., A.R.S.M., Professor of Metallurgy in McGill University, Montreal.

Article IV.—Continued.

RESISTORS.

The materials employed as resistors determine very largely the voltage of electric furnaces, and have been referred to under that heading; but it will be convenient to consider them particularly at this point.

Three cases present themselves: (1) Arc furnaces—in which the resistor consists of the intensely heated gases and vapours in the arc. (2) Furnaces having a special resisting core, in which the heat is developed. (3) Furnaces in which the current passes through, and directly heats, the charge itself.

The arc furnaces need not be specially considered, as any gases or vapours that are ordinarily present in electric furnaces, will serve to carry the current. More furnaces belong to class (3) than to class (2); and it will obviously be more satisfactory, when possible, to pass the current through the material of the charge, instead of providing a special resistor for this purpose. The electrical conductivity of the charge will usually determine whether it can be used as a resistor of the ordinary materials found in nature, only