The engine is equipped with a forced lubrication system and the oil which is all contained in the crank case is pumped after passing through a filter by a valveless pump which is direct-connected to the engine crank shaft.

The oil is forced through the main bearings then through the drilled crank shaft to the crank end and passes up the hollow connecting rod also to the wrist or gudgeon pin. The piston depends on its lubrication from the oil thrown off the crank webs. The lubricating oil pressure can be regulated very finely either by the shifting valve on the suction side of the pump or by the by-pass valve fitted to the outside of the engine main casting. A relief valve is connected on the delivery side of the lubricating oil pump as a safeguard and is adjusted to approximately 20 pounds pressure, which is quite sufficient for satisfactory working.

The fuel pump is such that there is a separate piston to deliver oil to each cylinder, although they have a common suction, with separate and distinct suction valves. These suction valves are adjustable and one cylinder can be cut out if so desired when the load permits, by opening up a by-pass valve between the two delivery valves of that pump which supplies that particular cylinder.

The governor, which is mounted on a vertical shaft, controls the speed of the engine by timing the closing of the suction valves of the fuel pump so that the actual quantity of fuel delivered to the cylinder is sufficient for the load. It is also fitted with an oil dashpot to ensure good regulation. The fuel oil flows to the engine from two 50-gallon tanks placed above the fuel pump. These tanks in turn are fed by a head tank of 100-gallon capacity, which is mounted on a bracket close to the roof of the engine room and easily accessible by means of a walkway constructed and attached to the truss roof of the engine room.

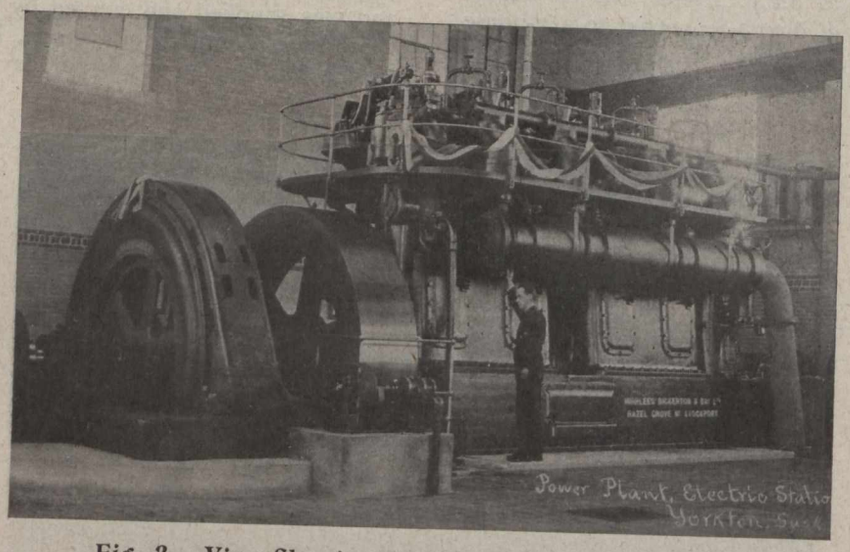

Fig. 2.—View Showing Complete Power Unit, Yorkton.

The fuel oil, which is delivered on a spur adjacent to the main building, is pumped to two large storage tanks situated in the grounds adjacent to the engine room, by a single-acting Paul pump driven through worm gear by a 2-h.p., 3-phase, 550-volt, 60-cycle Westinghouse motor. The fuel oil is pumped from these storage tanks to the head tank in the engine room, when required, by the same pump.

An overflow pipe is connected to the head tank in the engine room and is led back to the storage reservoirs outside the building so that there is no possibility of overflowing the head tanks in the engine room.

Compressed Air Equipment.—The compressed air equipment of the Diesel engine is one of the most important features connected with its operation, as the use of crude oil in this type of engine depends entirely on air at high pressure being available for spraying the crude oil into the cylinders. The air pressure required for satisfactory operation varies from 520 lbs. to 1,000 lbs. per square inch. This is arranged for by the use of storage receivers and blast bottle of solid drawn steel, working in conjunction with a specially designed air compressor.

The compressor is driven by an overhung crank on the end of the main crank shaft. It is of the 2-stage type fitted with silent type renewable disc valves and having intercoolers to cool the air at each stage of the compression.

Air is delivered to the blast bottle and from it, when desired, to the storage receivers as well as to the engine. The receivers, being for starting purposes, are always kept fully charged to approximately 900 lbs. per square inch. The starting receivers are piped to the starting valves of two cylinders and when the engine has gained sufficient speed by means of the compressed air injected, the fuel oil is then injected and the starting air automatically cut off at the same time. The engine then comes into normal operation as the compression temperature in the cylinders is sufficient to ignite the fuel oil.

Water-cooling Apparatus.—The water-cooling apparatus for the cylinder water jackets is located outside the main building. It consists of an open reservoir 50 ft. by 35 ft. by 8 ft. deep, constructed of reinforced concrete and waterproofed throughout with Pudlo concrete. Provision will be made later for a distributer on the outlet pipe from the engine when the additional units are installed. A 4-inch suction pipe connects the cooling tank to a 3-inch rotary pump. This pump is driven off the main shaft by means of a belt. In addition to the cylinder jackets, the exhaust pipes, valves, lubricating oil-coolers and air compressor are all cooled by this system and the water is returned to the open reservoir. By this means the same water can be used with very little waste.

Generator.—The engine is direct-connected to a 400-kv.a., 2,200-volt, 3-phase, 60-cycle generator mounted on a separate bedplate. The generator is excited by an 9.5-kw., 65-volt exciter direct-connected to alternator shaft and mounted on extension of generator bedplate. The generator and exciter were manufactured by Messrs. Siemens Bros'. Dynamo Works, Limited, Stafford, Eng. Tests made after installation proved that the machine was well within the guarantee. The total weight of the engine generator and exciter is approximately 109 long tons.

Switchboard.—The switchboard supplied by the Canadian Westinghouse Company, of Hamilton, Ont., consists of 4 blue Vermont marble panels at present, 2 generator panels and 2 series tungsten lighting panels. Each generator panel is arranged so that it contains its own exciter switching equipment together with the necessary instruments, volt meter plugs, ground detector and synchronizing plugs. In addition to the synchronizing