shafts, controls the speed of the engine by timing the closing of the suction valve of the fuel pump, so that the actual quantity of fuel oil delivered to the cylinders meets the requirements of the load.

The compressor, for supplying the air required for starting and injection purposes, is a three-stage, quadrupled compressor of the Reavell type. It is driven by an overhung crank bolted to a flange coupling on the idle end of the main crank shaft.

The compressor has two low-pressure cylinders, 12-in. diameter, one intermediate cylinder 8-in. diameter, and one high-pressure cylinder, 4-in. diameter, all with a common stroke of 7 inches, and delivers the air to any of the receivers, which are three in number, for starting, reserve-starting, and running respectively. The starting receivers are piped to starting valves on two of the engine cylinders, the other two cylinders automatically operating on oil as soon as the speed is sufficient to give the requisite compression temperature to the air for ignition of the oil spray. The engine can easily be started and run up to speed ready for the load within one minute by one man.

frames, the whole superstructure being built of cypress, and securely bolted to the concrete tank.

To the engine is direct connected a 500-kw., 4,200-volt, 3-phase, 60-cycle generator of Swedish General Electric make, excited by a 11.5-kw., 115-volt exciter. The leads from the generator enter the sub-station through a tunnel.

Sub-station.—The generator switchboard consists of one panel, upon which are mounted a.c. and d.c. voltmeters and ammeters, integrating and graphic wattmeters, frequency and power factor meters and synchroscope, one of each.

The main switchboard consists of ten panels, viz., two main oil switch, two transformer, five feeder, and one totalizing meter panel.

The generator bus-bars are connected to the main bus-bars through knife switches, so that the generator panel may be entirely thrown out when the engine is not in use. The generator is so arranged that it can be run in parallel with the main system through their own transformers.

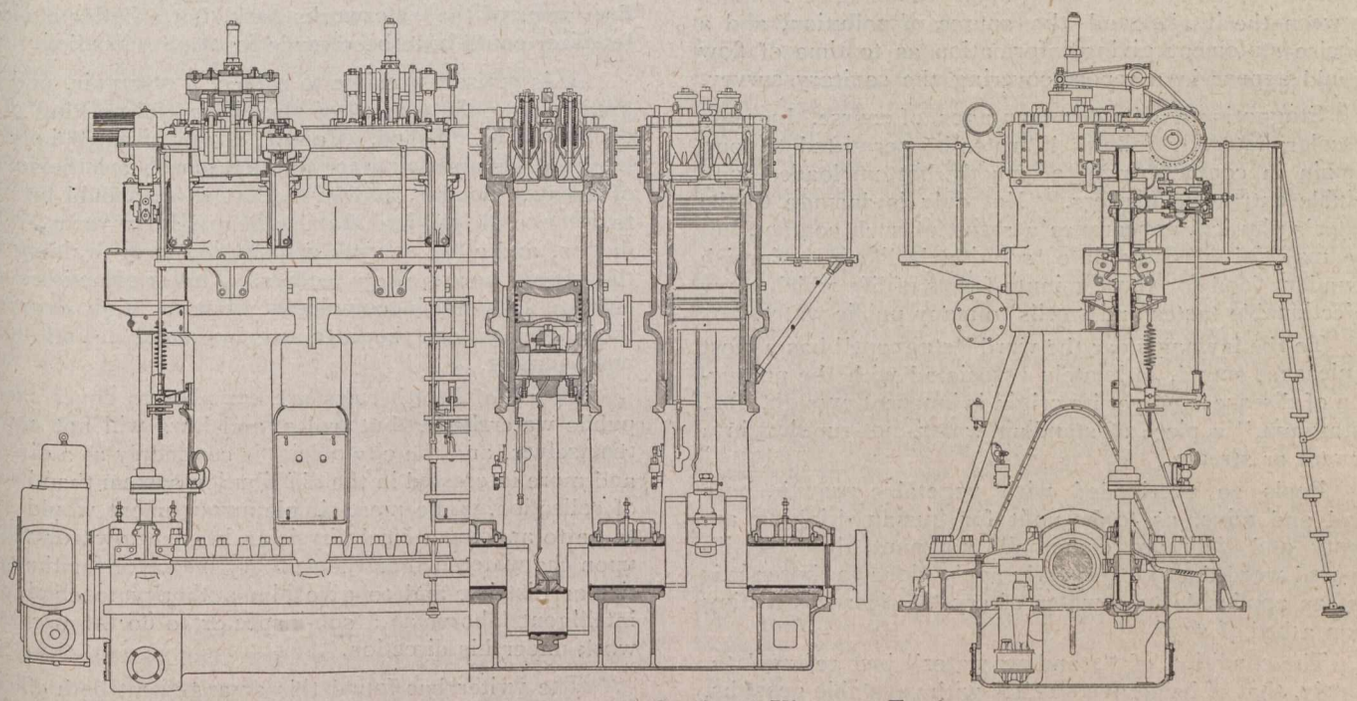

Fig. 3.—Elevations and Sectional Views of Engine.

The circulation of the cooling water is maintained by a rotary pump operated from the main shaft, the discharge being taken to the top of a cooling house mounted in a concrete tank in the yard. This tower is designed to avoid, as far as possible, the necessity of surrounding louvres structures to prevent waste by splashing, the water falling over stepped boards set in a series of A

The transformer room contains two 750 k.v.a. transformers with provision made for two more when needed.

Wm. Garnet and Sons, of Port Hope, Ont., were the contractors on the building. The engine was supplied by Willans and Robinson, Limited, Rugby, Eng.; the generator and exciter by the General Electric Company, of Sweden.

Recently many firms have transformed rope-driving into belt-driving systems, largely on account of the insufficiently criticized results of Kammerer. Experiments on a 200 horse-power plant are described. The ropes used for driving purposes are especially flexible. The efficiency of transmission has a mean value of 97.3 per cent. and increases with the load. Writing upon the subject in the *Zeitschr. Ver. Deutsch. Ing.*, lvii, 1911, H. Bonte says that few ropes are sufficiently stressed in practice. Rope driving properly applied is quite as efficient as leather belting, and probably more efficient than double or triple belts. It occupies less space and the initial cost is less.

At the Fosas mine in Sardinia a rather effective device is in use, permitting two buckets travelling in opposite directions to pass each other on the same rope. To the carrier of each bucket are attached 2 arms extending parallel to the track cable and above it. These arms are pivoted over the carrier, the one on the ascending side being kept elevated above the rope by means of a flat steel spring, while the arm on the descending side overlaps the rope and forms the track for the carrier coming in the opposite direction. The loaded descending bucket is, of course, placed at a higher level than the empty ascending one, enabling them to pass by means of the device described.