draining into the main system is not accurately known, but there is generally a sewer in every street, and the total length of the streets is about 2,200 miles.

Pumping Stations.—The total discharging capacity of the outfalls and storm water pumping stations is 2,171,000,000 gallons in twenty-four hours. Considerable additions have recently been made to the pumping station plant at Abbey Mills and at Crossness, and additional storm water pumping stations have been erected at Chelsea on the north side of the river, and at Battersea and Shad Thames on the south side. A new engine-house is also being provided at Crossness. Of the eleven pumping stations now in operation the five principal ones, in which the motive power is steam, are continually employed in lifting sewage, although at three of them the plant can also be used to pump storm water direct into the river. The total indicated horse-power of these five steam plants is between 5,000 and 6,000, and the gross capacity 460,000 gallons a minute. The dead lift ranges from 19 ft. to 41 ft. The duty of the other six stations, where gas-driven plant has been installed, is to pump storm water into the river at times of excessive rain. The total indicated horse-power of the plant is between 8,000 and 9,000, and the capacity 300,000 gallons a minute. The average dead lift is between 12 ft. and 20 ft. In addition, large quantities can be discharged by the storm relief sewers, which act by gravitation, though the amount cannot be accurately estimated.

The first proposals for the new works were made in 1891 by the late Sir Benjamin Baker and Sir Alexander Binnie, the latter then chief engineer to the Council. The final scheme was laid before the Council by Sir Alexander Binnie in 1899, and was then approved. The greater part of the works, with additions and modifications, and also the scheme for flood relief works, were designed and carried out under the superintendence of Sir Maurice Fitzmaurice, late chief engineer, and are being completed by his successor, Mr. G. W. Humphreys. Mr. J. E. Worth, the district engineer, has had general charge of the works on the north side of the river, and Mr. R. M. Gloyne has acted in a similar capacity on the south side. Mr. H. M. Rounthwaite has been responsible for the mechanical work.

ELECTRIC PROPULSION FOR CANADIAN SHIP.

The electrical system of ship propulsion advocated by Mr. Henry N. Mavor, of Glasgow, will be tried for the first time in a merchant vessel in the oil-engined ship Tynemouth, launched at Middlesbrough, England, last week. The only vessels of this type so far are the small experimental craft Electric Arc, with which Mr. Mavor carried out trials of his transmission gear on the Clyde, and a collier for the United States navy. The Tynemouth, which is 250 ft. long and of 2,400 tons deadweight on fresh water, has been built for the Montreal Transportation Company, and is intended for cargo service on the Canadian Lakes.

For propelling purposes she will have two Diesel engines, each developing 300 b.h.p., and between them and the propeller there will be interposed Mr. Mavor's electrical gear, which is being manufactured at the works of his firm in Glasgow. This gear is designed to allow the Diesel engines to run at a constant high speed generating electricity, and at the same time to permit the use of a slow-moving propeller of coarse pitch, reversing, stopping, and starting being carried out independently of the prime mover. For efficient service on the Canadian lakes a large propeller running at not more than 800 r.p.m. is wanted, and so far it has been found possible to meet this requirement only with reciprocating steam engines.

ELECTROLYSIS FROM STRAY ELECTRIC CURRENTS.

By A. F. Ganz.

(Continued from page 588 of last issue.)

While relief from serious electrolysis can at times be obtained by such special measures as insulating pipe coverings or insulating joints, it must be understood that all remedial measures should have for their first aim the reduction of the drop in potential in the rails to a minimum, because this removes the cause of the trouble. The first and most important step necessary to accomplish this is to maintain the rails perfectly bonded, so that the rails themselves form continuous electrical conductors. The next important step is to limit the radius from the power station to which

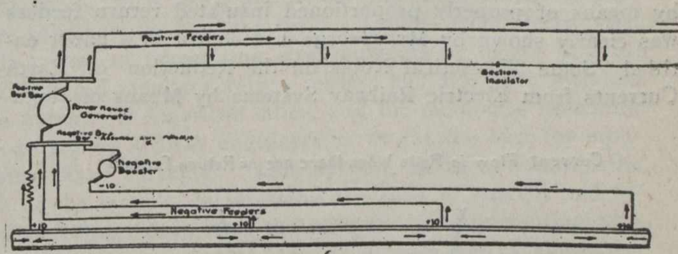

Fig. 17.—Single-Trolley Railway with Insulated Return Feeders and Negative Booster, Showing Path of Currents and Assumed Rail Potentials.

the station supplies electric power, so that current does not have to be returned from excessive lengths of rail lines to any one power station. This is usually accomplished in practice by supplying power to electric railways from distributed substations. The next step is to remove the current from the rails wherever there is concentration of current by means of insulated return feeders connecting from the rails at these points to the power station. In order that such insulated return feeders should be most efficient in reducing drop in potential in grounded rails these feeders should be proportioned for equal drop, so that the rails at all points where

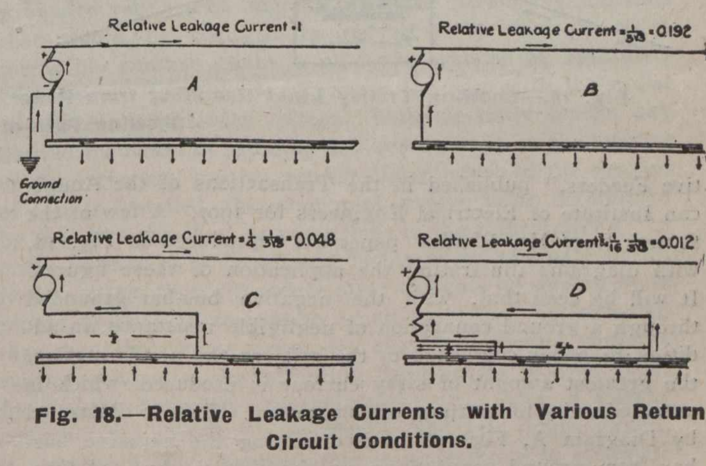

Fig. 18.—Relative Leakage Currents with Various Return Circuit Conditions.

return feeders are connected are maintained at substantially the same potential under average load conditions. This also requires that the rails immediately in front of the power station must not be connected directly to the negative bus-bar, unless a resistance corresponding to the average resistance of the return feeders is connected in this circuit. Where it is necessary to bring current back from a distant point in the rails it is sometimes more economical to employ a negative booster in series with this return feeder rather than make this feeder of such large cross-section as would be re-