

# INSTITUTE OF MARINE ENGINEERS

## INCORPORATED

SESSION



1908-1909

President: JAMES DENNY, Esq.

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## Visit to West Ham Corporation Electric Light and Power Station

*Saturday, April 11, 1908.*

A VISIT was paid on Saturday afternoon, April 11, to the West Ham Corporation Electricity Works at Canning Town. The works are situated on one bank of the River Lea, whence the supply of cooling water for the condensers is obtained, and the economical delivery of coal by water is effected; two excellent factors, in advantage of situation, coupled with the capable organization, which have gained for these works, under the direction of Mr. A. Hugh Seabrook, through whose kind permission the visit was arranged, an excellent reputation among the municipal electricity stations of the kingdom. The party was divided into sections, under the guidance of Messrs. E. Seddon, G. D. Bendix, and C. R. Ford respectively, and in the first place inspected the engine room, a lofty building containing in all eleven generating units, with a total rated capacity of 8,400 K.W., the average daily load being 3,500 K.W. two-phase alternating current for power, and lighting, and direct current for traction. The engines are arranged on each side of the building lengthwise, and two Willans-Parsons Turbo Generators crosswise; also there are two 500 K.W. motor generators for the conversion of alternating current to direct current or vice versâ.

The engines comprise :—

Two Willans-Dick Kerr 1,500 K.W. 2 Phase A.C. Generators.

Two Ferranti-G.E.C. 600 K.W. 2 Phase A.C. Generators.

Two Ferranti 1,200 K.W. 1 Phase A.C. Generators.

One Ferranti 300 K.W. 1 Phase A.C. Generators.

Three Ferranti-Bruce Peebles 500 K.W.D.C. Generators.

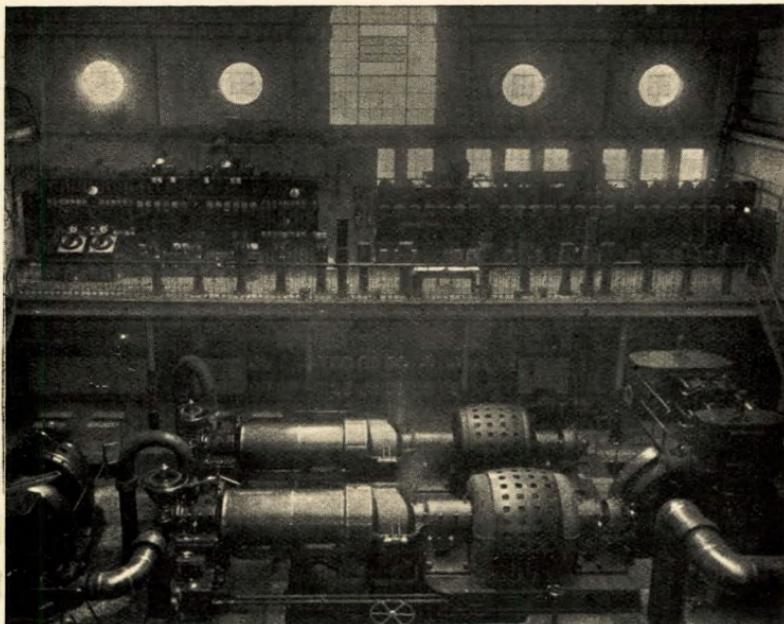
The machines of the Ferranti-G.E. Co. sets were originally single-phase, but have since been converted into two-phase generators. The valves on the Ferranti engines are driven



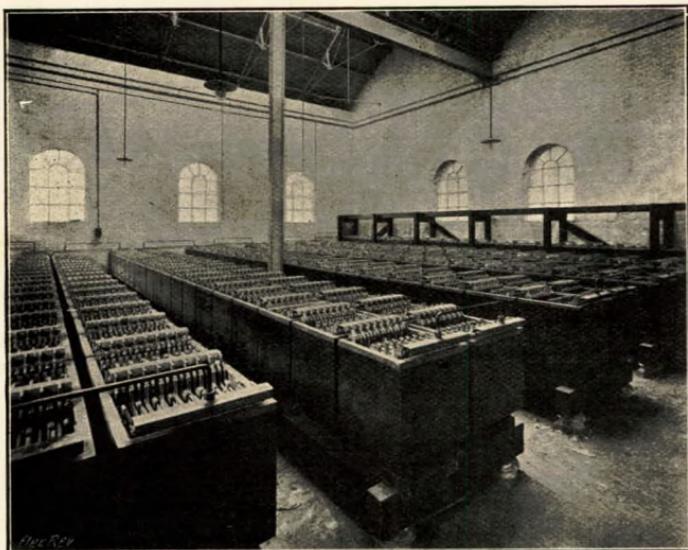
ENTRANCE HALL.

by cams situated on a vertical shaft at the side of each standard running at half the speed of the crank-shaft, giving two admissions for each complete cycle. The cams give a constant distance between the cam rollers, affording a positive motion which does not need springs for the return stroke. Each cylinder has four valves, which are of the grid type.

Between the rows of engines the condensers and air pumps are situated on a level 15 feet below that of the engine-room floor, and extend the whole length of the room. The demand

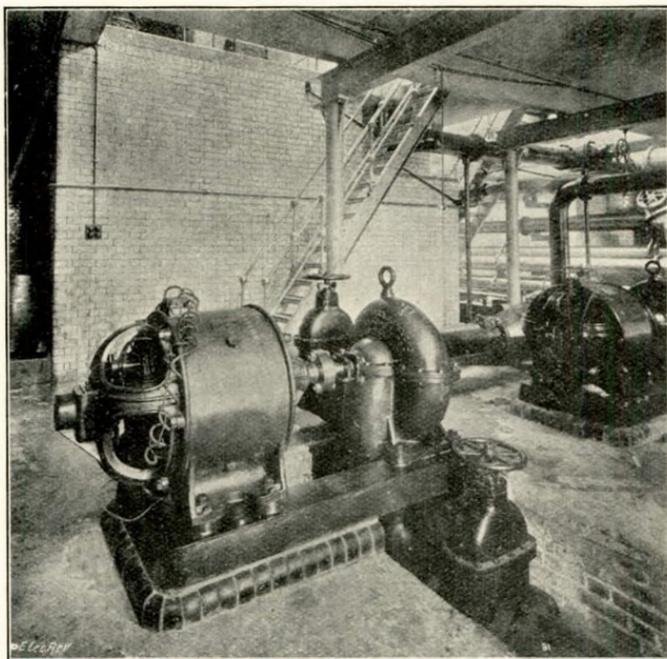


W. P. TURBO GENERATORS.



BATTERY ROOM.

for electricity on Saturday afternoon is principally for traction purposes; the only engine running was one of the Willans-Parsons turbines, driving a Dick-Kerr two-phase A.C. generator. This generator is rated at 1,500 K.W.s nominally, and has an emergency overload capacity up to 2,200 K.W., a voltage of 7,000, and a periodicity of 50 cycles per second. The steam pressure at the turbine stop valve is about 145 lb. per square inch, and the steam consumption per kilo-watt hour is about 17 lb. at full load. The best results are obtained when kept running at full load in continuous service and with the



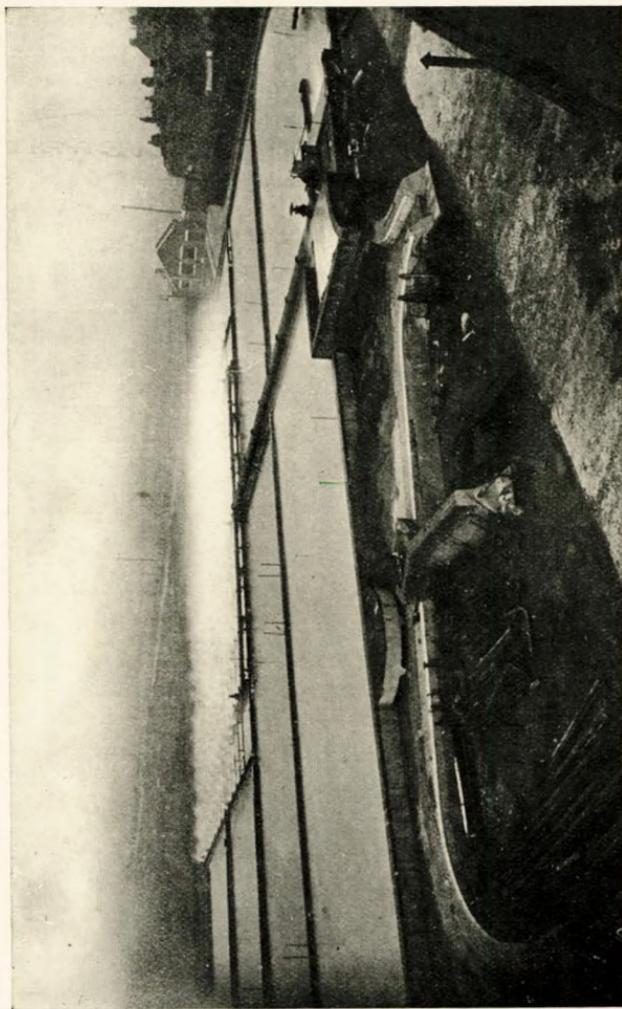
PUMP ROOM.

highest attainable vacuum, which is usually not less than 28 inches.

For the top load, when the maximum load reaches at this season about 4,000 K.W., the second generator and a 500 K.W. reciprocating set are also brought into requisition. The remaining engines are used for stand-by purposes and to meet the peak loads of the winter months as required.

Of the six condensers four are by Messrs. W. H. Allen &

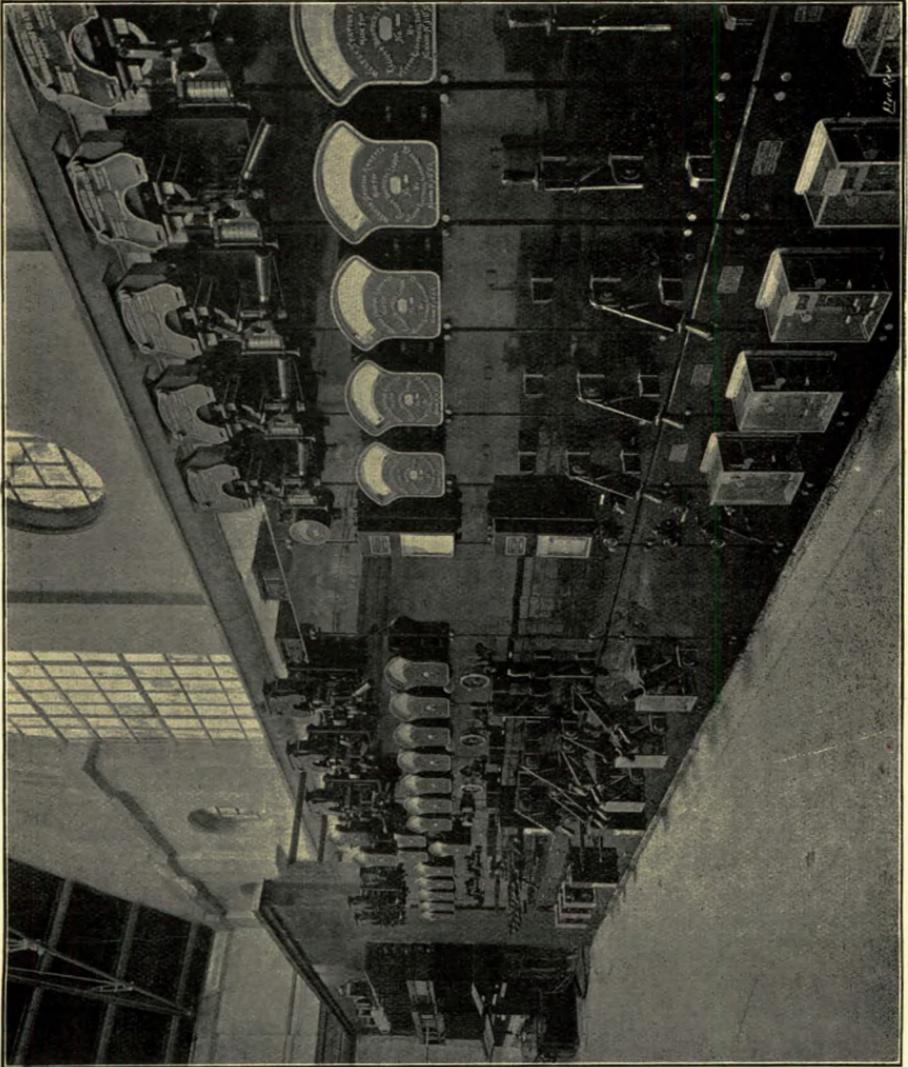
Sons, Ltd., and two by Messrs. Willans & Robinson, Ltd., and combined with each of the condensers are three-throw air pumps of the Edwards type, with force pumps and centri-



WATER SPRAY PLANT.

fugal pumps for circulating water available on any of the condensers as required. Four of the air pumps run at 110 R.P.M., one at 100 R.P.M., and the other at 170 R.P.M.

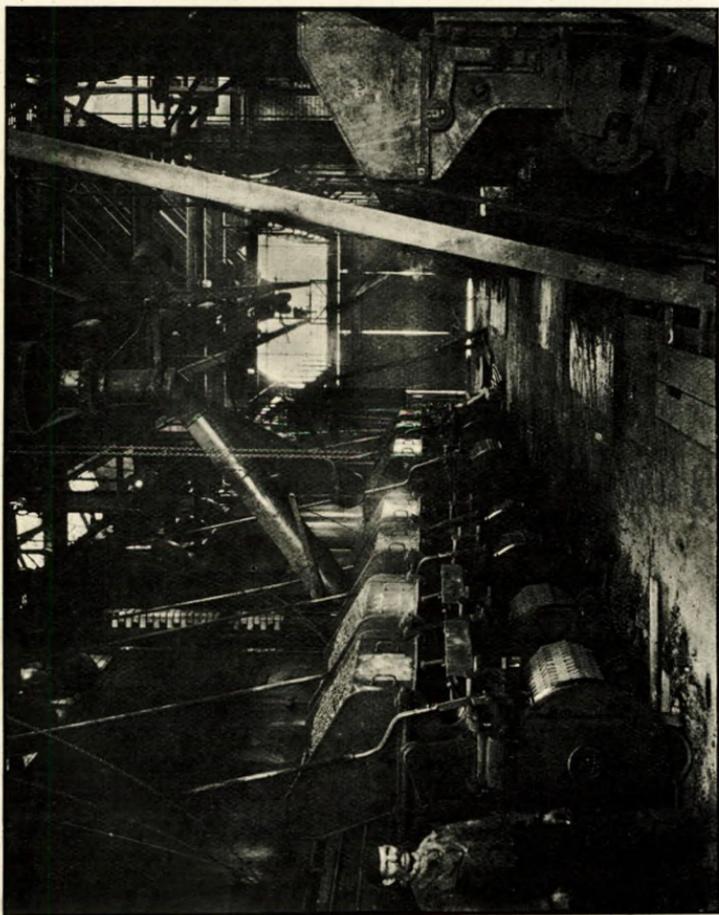
The force pump takes away the condensed steam and discharges it into a purifying tank to remove oil. The 15-inch



MAIN SWITCHBOARD.

centrifugal pumps deal with the circulating water, drawing it from a tank outside the engine-room end wall and dis-

charging into two circulating water mains which supply the condensers. The water is afterwards conveyed into a large cooling pond, the cooling operation being considerably accelerated by means of an elaborate spray system, in which 230 of the Harrison atomizing nozzles are used. The suction



BOILER HOUSE.

tank is fed with the water from this pond. Water is drawn from the river by means of a vacuum sump, which enables the water from that source, otherwise unavailable, to be used so long as the inlet pipe is submerged at the river intake. Another source of water supply used for make-up and

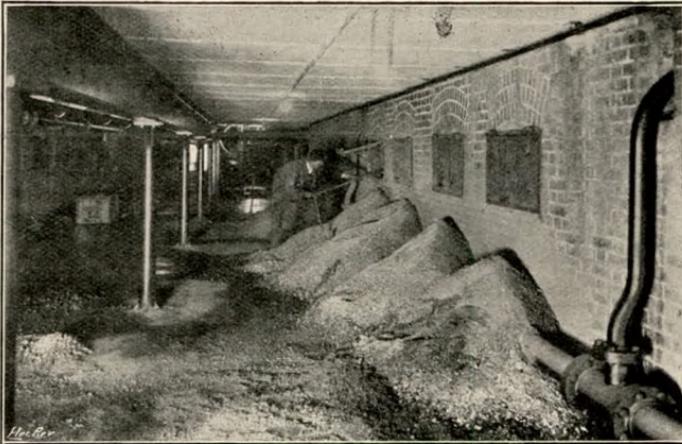
general purposes is from an artesian well in another portion of the works. This water is passed through a water softening plant made by Messrs. Mather & Platt, capable of dealing with 8,000 gallons per hour, reducing the hardness of the water from  $15^{\circ}$  to  $7^{\circ}$ .

The switch-board gallery is situated at the end of the engine room immediately above the turbo-generators. Here are arranged the various instruments, voltmeters, ammeters and wattmeters numbering about 130 in all, the high tension and extra high tension switchgear being operated by remote control. There are five step-up transformers of the oil-cooled type, with a capacity of 500 K.W. stepping-up from 2,000 to 6,000 volts. In the boiler house are seventeen Babcock and Wilcox boilers (water-tube), eleven provided with chain grate stokers, one with Erith underfeed, the remaining being hand-fired; the flues from each of the two pairs of sections, after passing through Green's economizers, converging in a steel chimney 125 feet high, lined with firebrick. Each of the boilers is capable of evaporating 15,000 lb. of water per hour. The boiler pressure is 150 lb., and superheaters are fitted to each boiler to raise the temperature  $100^{\circ}$  F. A 60-in. sirocco induced draught fan, driven by a 55 B.H.P. Allen compound high speed engine, discharges the gases into the chimneys from each section. A  $\text{CO}_2$  recorder is also fitted, and shows an average analysis of about 12 per cent.

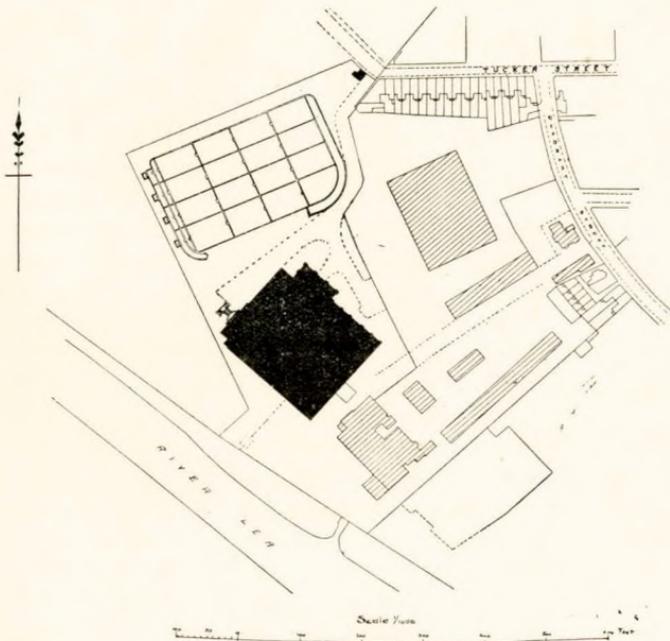
Another element which conduces to economy in working expenses is the arrangement for dealing with the coal, of which there is a consumption of 80 to 90 tons per day, and the firemen are trained to observe the  $\text{CO}_2$  recorder results and watch the fires closely.

Coal is unloaded by means of a loco electric crane provided with Hones grab, into a hopper. From this hopper skips are filled, then taken by means of a Temperley transporter and discharged into bunkers situated above the boiler house. Travelling shoots convey the coal from these bunkers to the hoppers of the mechanical stokers, and the coal is thus transferred from the barge to the furnace without being touched by hand. A sloping shoot receives the ashes, which are then emptied into barrows in a race below the firing floor. The hotwell tank is placed as near the centre of the boiler house as possible, and two Hall's and four Weir pumps are situated directly over it. The water softener and the Harris

feed water purifier were afterwards inspected. The water from the engines is drained into the latter, which is capable



ASH TUNNEL BOX.



PLAN OF WORKS.

of dealing with 15,000 gallons per hour, and after having the oil and other impurities extracted, is conducted back to the feed tanks.

An examination of the coal-transporting gear brought a very interesting visit to a close, thanks being accorded to the assistant engineers for their kind attention and devotion to the duty entrusted to them.



SESSION



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## Visit to the Premises of Messrs. George Jennings, Ltd., Sanitary Engineers, Lambeth, S.E.

*Saturday, May 16, 1908.*

A VISIT was paid to the premises of Messrs. George Jennings, Ltd., Sanitary Engineers, Lambeth, S.E., on Saturday afternoon, May 16. The founder of the firm, the late Mr. George Jennings, was widely known as one of the great sanitary reformers of the early part of the last century, and was the first who carried his theories into practical effect. In 1838 he established in Blackfriars the undertaking which, rapidly increasing, mainly owing to his inventive genius, was removed in 1866 to the more extensive works at Lambeth. Having patented an improvement in the construction of stoneware drainpipes, and experiencing some difficulty in securing its introduction by London potters, to whom it was shown, his attention was directed to the extensive clay-beds at Parkstone, in Dorsetshire, and the idea of utilizing them suggested itself. He at once erected kilns and pottery works, thus originating the extensive manufactories of stoneware and terra-cotta goods which have since so greatly developed and now cover many acres. The works at Lambeth give direct employment to a great number of workmen skilled in many trades, and the various shops are well equipped with the most modern and improved appliances for the rapid production of all descriptions of sanitary work, and for the variety of trades employed in this class of work. In the masons' department the several kinds of marble

and slate are smoothed and sawn by machinery and afterwards shaped and polished ; in the cabinet-makers' shop are evolved elaborate designs in woodwork to form enclosures for lavatories and baths ; brass-finishers in another part of the works transform the brass and gun-metal castings into valves, taps, and other fittings ; joiners, fitters, machinists and copper-smiths turn out the larger and more massive productions ; while smiths', moulders' and patternmakers' shops, foundry, engine-room and boiler-house are other necessary adjuncts to the works.

In the large showrooms, through which the party was conducted, an opportunity was given of seeing some of the more distinctive productions of the firm. The familiar " tip-up " wash basin, which owes its inception to this firm, was exhibited in its various stages of improvement. In the new form, the construction of the container is such that the front portion is not affected when the basin is emptied, splashing is prevented, and the portion of the container which is polluted by the discharge of waste water can be cleansed without disconnecting the basin. Lavatory and toilet-room fittings, adapted in style to the requirements and means of the purchaser, were, of course, in evidence in great variety. One of these fittings worthy of special mention is the shower douche and spray apparatus, with combined hot and cold supply valves, by the adjustment of which the force and temperature are regulated. The valves may be so arranged that the water will flow, and will only flow, when the swan neck comes over the basin. Another ingenious contrivance was shown, by means of which a continuous supply of hot water is obtained, automatically, for lavatory use. When the tap is turned on the flow of hot water releases the pressure on, and consequently opens, a valve through which gas is admitted to a range of jets under the vessel from which the water is taken. These jets are ignited from a by-pass, and thus the flowing water is kept hot all the time it is running through the tap. When the hot water is turned off, the pressure is again put upon the valve, automatically shutting off the gas. A striking feature was a most ingenious and simple arrangement of hot and cold supply and waste fittings for baths and lavatories, designed so that the cold water must be first admitted, thereby diminishing the risk of injury to the enamelled surface of the bath or basin, a risk attaching

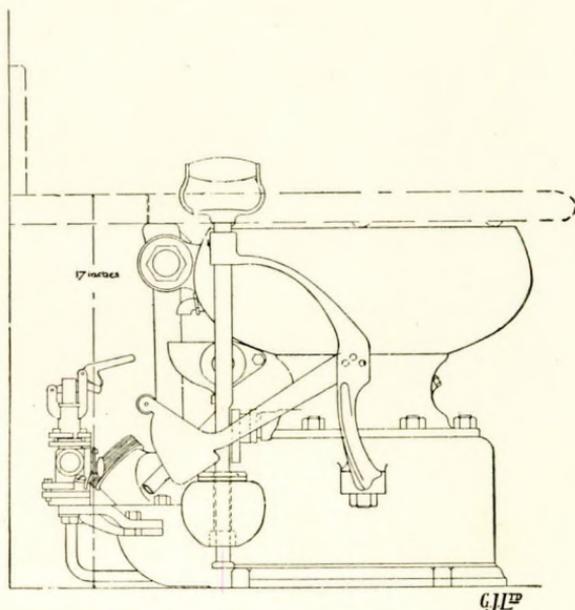
to the ordinary types of valves. Another important feature in these improved valves, from the point of view of the marine engineer, is the ready and convenient means of access to the working parts attained by the removal of four screws which secure the covers to the valves, so that, when necessary, repairs can be effected in a few minutes. Interesting also is an improved fire-grate for heating and ventilating rooms. The invention comprises a terra-cotta cellular chambered body immediately at the back of the fire-place, into which fresh air is admitted through an opening or grating in the external wall, and the air, after passing over a series of warmed ribs of terra-cotta, is drawn into the room at an agreeable temperature to replace the vitiated air drawn out of the room up the chimney by the usual process of combustion. In addition to furnishing an increase of 40 per cent. additional



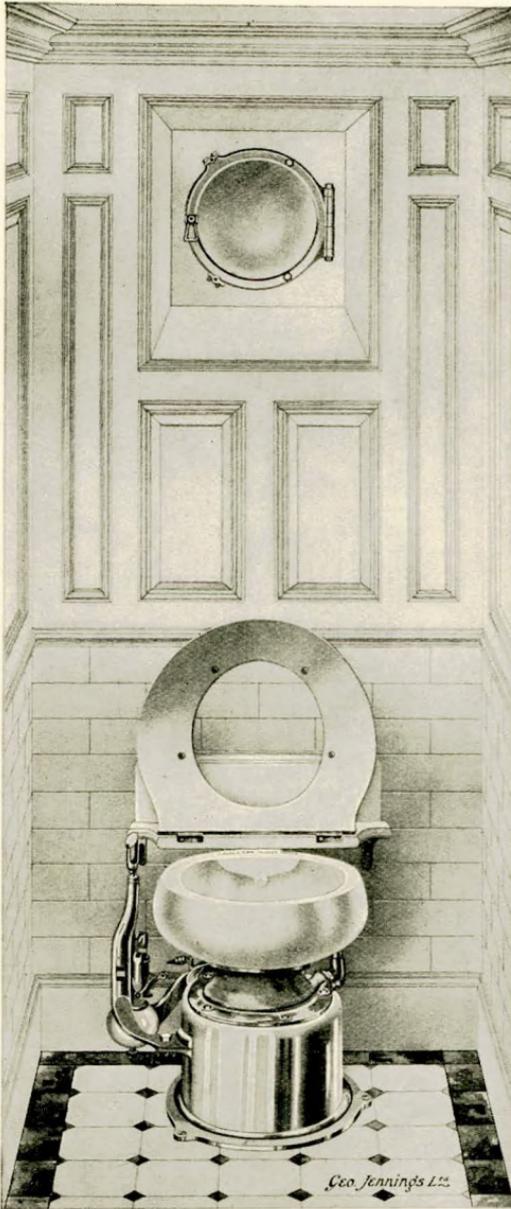
"PIONEER" W.C.

warmth in fresh air, the consumption of fuel is decreased by quite 20 per cent., while the supply of warmed fresh air is maintained in the apartment for about twenty-four hours, due to the heat-retaining property of the terra-cotta, after the fire is extinguished. These grates have been adopted in many important buildings, such as the Bank of England and branches, Kent County Council schools, offices and waiting-rooms of the principal railway companies, etc.

Among many other varied specialities exhibited in action, the special systems of water-closets designed for use on board vessels of every class were carefully examined by the visitors. For above water-line positions Messrs. Jennings have introduced a new type of pedestal wash-down w.c. designated the "Circuit," with connexions for water supply and drain arranged so that they can be attached in any convenient position. Where the closets are fixed close to the water-level, an ingenious form of balanced back valve is provided at the outgo of the closet, preventing the possibility of any back wash or escape of foul air due to waves entering the soil pipe.

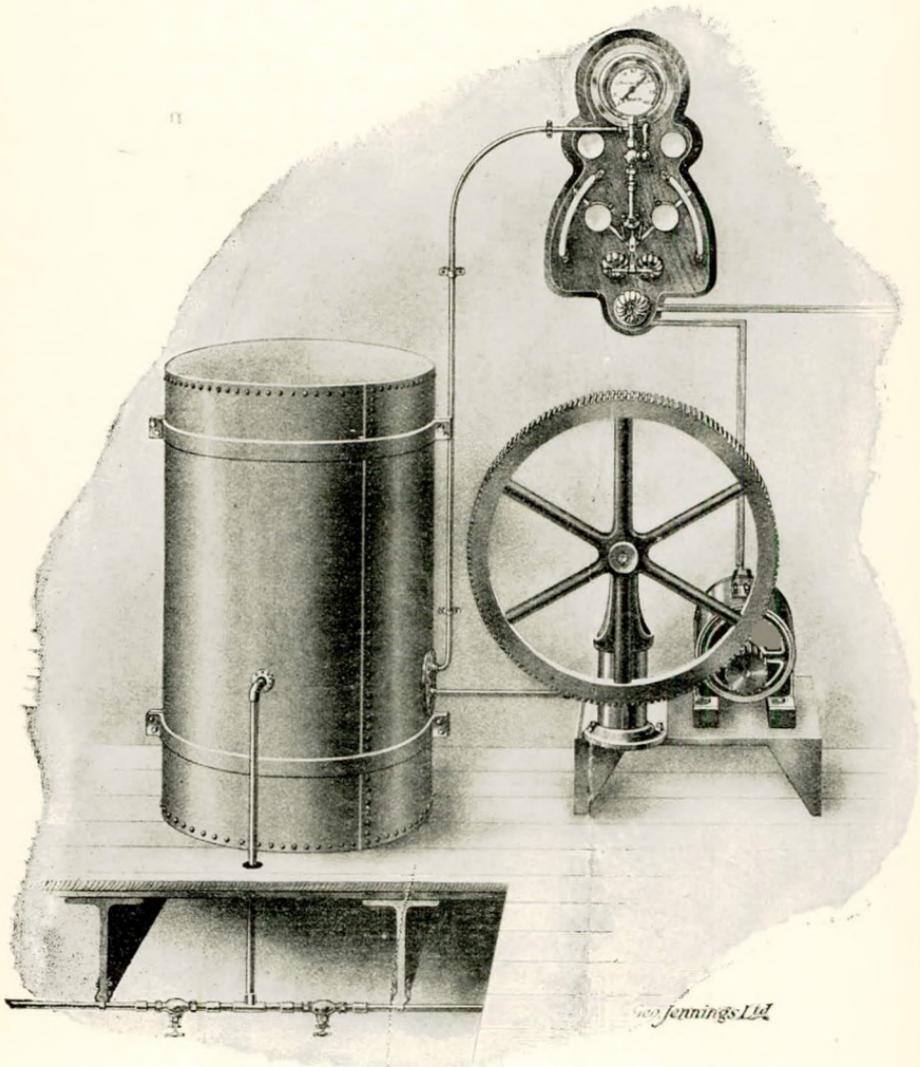


SIDE VIEW OF "PIVOT" W.C.



“PIVOT” W.C.

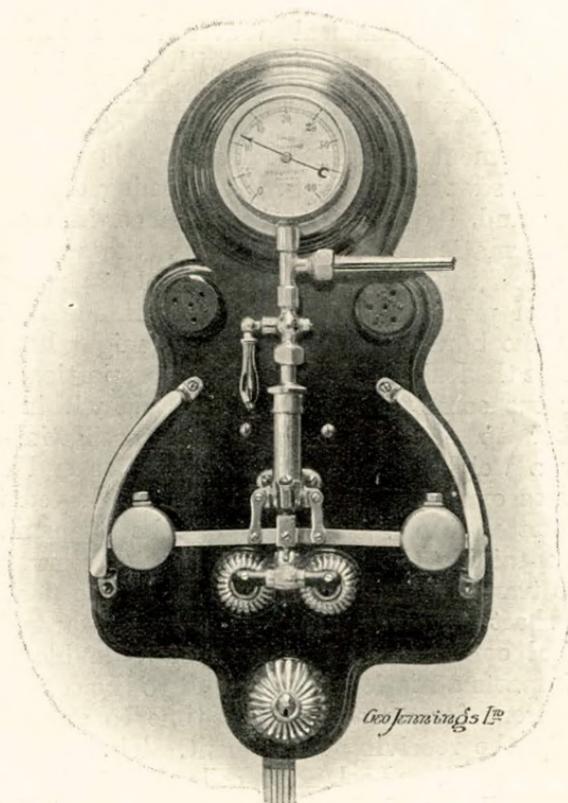
The most notable of the exhibits, from the point of view of the marine engineer and naval architect, is a novel,



SWITCHBOARD AND PUMP.

simple and complete installation of water-closet apparatus for fixing below water-line, the contents of which, when the

handle is raised and lowered, are automatically ejected into the sea by air pressure discharge. For the purpose of keeping a pressure of air, a reservoir is supplied with a small motor attached, driving a pump electrically; the pressure is maintained by an ingenious contrivance, as shown in the illustrations, actuating a switch automatically as soon as the air pressure rises or falls beyond the prescribed limit, which, for the purpose of demonstration, was set at 25 lb. and worked admirably. Provision is also made for working the pump by hand should the electric current not be available.



SWITCHBOARD.

The system has been adopted on the steam yachts *Amalthea*, *Agawa* and *Maund* with success, and is being installed on the new steam yacht *Iolanda*, the second largest yacht in the

world. It is also in operation on the steam yacht *Valhalla*, R.Y.S., owned by the Earl of Crawford, and the invention bids fair to be very extensively adopted in situations where a below water-line system of closets is requisite, and is, therefore, well worth attention and consideration. Messrs. Jennings have had a large experience in marine sanitary engineering, and have furnished the equipment of sanitary appliances for the ocean steamships of the Peninsular and Oriental, Royal Mail, White Star, Cunard, Allan, Union Castle, and Orient lines of steamers, L. & N.W. Railway, and other companies, in addition to a very long list of private yachts. The Jennings' Electro-Mechanical Water Level Indicator, the details of which were examined with great interest, is an instrument designed to indicate periodically the levels of the water in reservoirs, locks, harbours, etc. The value of such an instrument would be especially felt where the water was rising in sewers, giving timely warning of the approach of a flood; and, indicating to the engineer-in-charge instantaneous information of fluctuations in the water-level of a reservoir a few miles away, its use would in many cases be the means of preventing the great loss in life and property caused by the bursting of dams, which might have been repaired before the leak had attained great proportions. Roughly, the apparatus consists of a float—encased within a cylinder or chamber to secure freedom from oscillation—counterpoised by a weight attached to the further end of a chain which passes over a pulley. This chain is keyed to a shaft which actuates the mechanism of the transmitter. The cylinder containing the float is put in the reservoir, on it is placed the transmitting apparatus, and as the float rises and falls the shaft revolves backwards or forwards, actuating an electrical commutator by means of a double roller cam. The cam imparts a frictional movement to the contacts, retaining the current for an appreciable time to ensure certainty of action in the receiving instrument. The battery consists of four or five No. 2 Leclanche cells sufficient for a line of four or five miles, and the current is transmitted to the receiver, where the dial indicates the feet and inches of water in the reservoir, showing variations up to 20 feet. The disc at the top shows at a glance whether the water is rising or falling: if the last movement is a rise the disc will be white,

out for a fall it shows red. The recorder is a revolving drum, on which is placed paper ruled with lines denoting each foot of depth of water in the reservoir, and cross-ruled for each hour during the week, and the drum is connected so as to make one complete revolution per week, turning one-eighth of an inch per hour.

The firm has also patented various appliances for the scientific disposal of sewage, and a model of the Jennings' Patent Automatic Sprinkler for sewage and water filtration was shown. It consists of a fixed central tank, from which four perforated revolving tube arms radiate. Attached to the inlet end of each arm is an overdraw syphon, which discharges the liquid from the tank with uniform force, whether the supply is large or small, thus the driving reaction from the perforations is always worked at maximum pressure; the arm perforations being so arranged as to distribute the liquid equally over every square yard of the filtering area. It is interesting to note that Messrs. Jennings have recently carried out the rearrangement of sanitary fittings in the London residence of one of the past presidents of the Institute, Lord Pirrie, whose firm has been one of their customers for many years past.

The visitors were conducted by Messrs. Walter Jennings and John Morley (directors of the firm), whose explanations proved most interesting and instructive. After partaking of light refreshments, the pleasant visit terminated, concluding with a very cordial vote of thanks to Messrs. Jennings proposed by Mr. Aukland and seconded by Mr. W. McLaren, after which a brief discussion ensued on the various appliances which had been inspected, in the course of which congratulations were offered to Messrs. Jennings on the success of their efforts to combine simplicity, adaptability, and efficiency in their manufactures. The standardizing and interchangeability of parts to admit of placing details of fittings on one side or another was also noted.

