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INSTITUTE OF MARINE ENGINEERS  
INCORPORATED

SESSION



1906-1907

President: LORD PIRRIE.

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VOL. XVIII

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R E P O R T S

OF

SUMMER VISITS TO WORKS

ON

May 11th and 28th, June 16th and 30th,  
and August 18th, 1906.

# INSTITUTE OF MARINE ENGINEERS

## INCORPORATED

SESSION



1906-7

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# INSTITUTE OF MARINE ENGINEERS INCORPORATED

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1906-7

PRESIDENT : LORD PIRRIE.

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VOLUME XVIII.

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## Visit to Works of Messrs. Fraser and Chalmers Limited.

*Friday, May 11, 1906.*

A VISIT was paid by the members of the Institute of Marine Engineers to the works of Messrs. Fraser & Chalmers, Erith, on Friday, May 11, at 5 p.m., when the party was received and shown round by the Works Manager and the Draughtsman, who kindly pointed out to the visitors the various details of the different machinery in course of erection and manufacture.

The works employ about 1,250 men, and cover a total area of about 18 acres, of which the various shops represent  $6\frac{1}{2}$  acres.

The most striking features which called for the interested attention of the members were the minutiae of the steam turbines, of which there were several in different stages of manufacture from start to finish ; these are all of the Rateau "Impulse" type, in which the steam is at the same pressure on both sides of the moving vanes, whereas in the "Re-action" type, such as the Parson's, there is a difference in pressure on each side of the moving vanes.

The following machines were seen by the members com-

plete, besides various others in course of construction :—A 750 B.H.P. turbine, driving a Siemens alternator, and running at 1,500 revolutions per minute. This was seen by the members under test at 160 lb. steam pressure.

2 L.P. turbines of 650 B.H.P. driving generators at 1,500 revolutions per minute. These were for use on the Rateau regenerator system, using the exhaust steam from colliery winding engines.

The dies, gauges and other tools used for the discs and vanes were exceedingly interesting and brought forth appreciative comments, as also did the methods used for accurately balancing the discs for carrying the vanes in order to reduce the vibration to a minimum, and give a perfectly true running to the shaft. The special packing used at the ends of the turbine for the glands of the shaft was also examined.

Of the other work in progress a large set of winding engines, fitted with many details to ensure steady running under varying conditions of load excited much attention. The winding drum is 24 ft. in diam. coned down to 18 ft. at ends, to work from a depth of 800 yards, the steam cylinders being 32 in. and 53 in.  $\times$  72 in. stroke, a 4-cylinder duplex tandem engine, steam pressure 140 lb. This will hoist a load of 6 tons of coal at a maximum speed of 5,000 ft. per minute.

Two other winding engines were in course of erection, to draw a load of 4 tons from a depth of 4,400 ft. at a maximum speed of 4,000 ft. per minute. These had two drums, each 20 ft. diam. coned down to 10 ft. at the small end ; this was also of the 4-cylinder duplex tandem compound type.

Parts of other large winding engines, and pumping and air compressing machinery for both electric and steam drive, were seen in different stages of construction.

The foundry, pattern shop and drawing office were visited, and the members—all of whom were more than pleased—left the Works satisfied that the time and labour they had expended were amply paid for by the information and experience they had gained.

The Works Manager, Draughtsman and Foreman, kindly accompanied those who returned to London by rail to Erith Station, and after expressing their thanks to the representatives of the firm for the courtesy with which the Institute of Marine Engineers had been treated, the visitors left shortly after 7 p.m.



## Visit to the Works of Messrs. Baker and Co., Willesden.

*On Friday afternoon, May 25.*

THE Institute of Marine Engineers paid a visit to the works of Messrs. Baker & Co., Willesden, on Friday afternoon, May 25, and were received by Messrs. G. Baker and Townsend, who kindly arranged the progress of the visitors through the works.

The first department entered was a combination of machine and erecting shop, with galleries under which were the machines and lathes; the centre formed a long bay for erecting in which were seen machines for chocolate refining, in various stages towards completion, with four to five granite rolls, or as many as the manufacturer wished to put the chocolate through to get it refined for the paste stage of the manufacture. These rolls have a trueness so fine that a chalk mark drawn on one roller from end to end, will leave the mark on its covering roller, and so on until the series has taken the impression; this was practically demonstrated, also the method adopted in grinding to such accuracy. In some machines these rollers are in vertical frames, others have horizontal or diagonal frames, a style which lends itself better to the multiplying system of rollers. Another class of chocolate machine was the Melangeur, or edge runner for crushing, preparatory to refining. A wafer sandwich machine was much admired as a marvel of ingenuity; the pump for delivering just gave with each stroke the required quantity of prepared paste into the stamp trough, at the same time the stamp or platten moves over guides, and making half a turn from face up to face down, thus automatically locks itself in the stamp trough and travels forward through the baking oven and back under the machine, where it disengages the platten, and the wafer sheet is ready to make the sandwiches. The plates or moulds are all cut out and designed by special machinery which takes up a considerable space on one of the galleries. Here also was shown the sun and planet motion, the wheels being cut out of the solid for a special reducing gear for motor car and electric motor work: a travelling crane driven by electric power was at work in the packing and loading shed, where a number of ship's ovens were in preparation for one of H.M. ships.

There was another large shop somewhat more extensive than the one just passed through, better lighted and up to date, where the biscuit making machines, dough mincing and kneading machines, vacuum sugar boiling and jam boiling pans in copper work, also every class of machine appertaining to baking, confectionery and similar business were seen.

The steady application of the men to their several jobs was very marked and called for comment. "The Londoner," said Mr. Baker, "is essentially a late bird, so we shortened the hours of labour in the morning, and thus assured sufficient bodily rest for all. The result has exceeded our expectations, and we have had no diminution of output except from one machine, a planing machine, which cannot be hurried."

The store system in vogue seemed an admirable one: a labourer called "The Shopwalker" is handed an order for a tool by a workman who is thus saved a journey from a job in which he is engaged, while crowding and waiting round the store door is obviated.

On entering the works two capital bicycle sheds containing a large number of machines were seen; these belonged to the employees, almost a third of whom, living at some distance, use this means of locomotion to and from work.

The men are so trained that while everything works in an orderly sequence, individuality of work is retained. Thus a man receives the drawing of a complete machine—instead of only a special part that he may devote himself to that detail alone, thus becoming more or less of a machine, as is the practice in many large works; having received his drawing and instructions, he constructs the machine, putting his brains and ingenuity into it, striving to prove his method and work better than his neighbour's.

The system of making standard sized blue prints, and of filing them by number, is a time-saving arrangement that recommended itself to every one of the visitors.

Altogether the sense of cleanliness and order, from the entrance gate to the last thing shown—a first class fire extinguishing installation—made the visit a memorable one.

After a substantial tea, a vote of thanks was proposed by Mr. Aukland, and seconded by Mr. W. McLaren to Messrs. Baker & Co., specially naming Mr. G. Baker and Mr. Townsend. Mr. G. Baker suitably replied and escorted the party of visitors back to the station on his motor car.



## Visit to the National Physical Laboratory, Teddington.

*Saturday, June 16, 1906.*

THE Institute of Marine Engineers paid a visit on Saturday afternoon, June 16, to the National Physical Laboratory, Bushy House, and were received and shown over the different departments by Dr. Glazebrook and his assistants. The members were accompanied by several lady friends, including two visitors from Canada, who came over in the Turbine steamer *Virginian*, making a record passage of 5 days 23.5 hours to Liverpool from Montreal.

The Laboratory is beautiful for situation, the attractions of the surrounding country being particularly pleasant. The attractions within Bushy House are no less pleasing to the senses than those without, and by the kindness and courtesy of the guides and expositors, the more abstruse problems which are solved in the building were made clear, and were made of interest even to the ladies, who appeared thoroughly to appreciate the visit.

To describe in detail one half of the work which is done at the Laboratory would occupy a journal, and a reference can only be made to the more striking features of these operations, the results of which are of national importance in connexion with the trades and manufactures of the country.

Under Dr. Harker, in the thermometry department, were on view apparatus for testing thermometers for all ranges of temperature up to  $1,300^{\circ}\text{C.}$ , electro furnaces for reaching a temperature of  $2,000^{\circ}\text{C.}$ , and other instruments dealing with heat and the radio activity of metals.

Messrs. Campbell & Melsom have charge over the testing and recording instruments and apparatus in connexion with electrical work, galvanometers, voltmeters, resistances, sensitive insulation, testing machine, electrical clock, etc.

The electric standards department, which comes under the supervision of Mr. Smith, contains the standards used as guides for the regulation and adjustment of instruments where the resistance can be measured to .002 per cent. in a room maintained at an unvarying temperature.

The department of photometry, where Mr. Paterson holds

sway, is shrouded in mysterious drapings and contains the means for testing electric lamps at a glance in comparison with a known standard; a mercury vapour lamp shedding its rays on colours, and changing their apparent hue, and other instruments, including also a dynamo specially set for testing lamps, as to life.

Dr. Carpenter and Mr. Edwards conduct experiments in metallography, the instruments in connexion with which are the best of the kind for the purpose. A Crompton motor is fitted for driving the tools in use for preparing the specimens.

Messrs. Jeffcott and Attwell preside over the metrology section, which contains measuring machines, standard-length rods, gauges, and templets of recognized standards. The mechanism of the machines is wonderful in design and accomplishment, where even the heat of the hand in moving the pieces is entirely eliminated.

The section devoted to optics is a most interesting one, where lenses can be tested and the correctness of the finer qualities can be proved by apparatus. Amazing is the mechanism in charge of Messrs. Selby and Brookes, by means of which the tides at any part of the world can be worked out for years ahead. The tides at Perim for 1909 were being traced on an indicator on Saturday afternoon, and those at Elephant Point were being transferred from a diagram recently made.

The interests of the chemical laboratory are no less important than those of other sections of the work, and are watched over by Mr. Gemmell, to whose care and attention is due the avoidance of combinations which would otherwise be detrimental to many manufactures and ingredients in common use.

The engineering department, under the supervision of Dr. Stanton and Mr. Jakeman, naturally claimed special attention, and the various testing machines in operation or at rest excited the warmest commendation of the visitors. Metals were being tested for fatigue, direct impact and other stresses or strains. A tower and apparatus for measuring the wind pressures on various angles of roofing, stays and girders, showed how completely the whole work has been thought out, and how the desire to find the best for every region of industrial work has been paramount, and is evolving new plans to reach further, even beyond the limits of the present building. To the

## VISIT TO WORKS OF MESSRS. JOHNSON PHILLIPS II

standard screw cutting lathe of wonderful accuracy is allotted a special building enclosed within outer walls in an inner chamber.

The electro-technical department is under the direction of Messrs. Paterson and Rayner, and contains a motor alternator presented by Messrs. Siemens Bros. The Kelvin instruments, Addenbrooke electrostatic instruments, a 1,000-amp. water tube resistance, transformers under test for rise of temperature and investigation connected therewith are under observation from time to time.

When the various rooms had been traversed, the party assembled in the hall, and after partaking of tea Mr. A. Boyle (Vice-President), proposed and Mr. Stephen Terry seconded a vote of thanks to Dr. Glazebrook and his assistants for their very great kindness in showing to all so patiently and carefully the many interesting and accurate instruments and machines. Their visit had been a most delightful one.

Dr. Glazebrook responded, and stated that the object of the laboratory was to gain knowledge and accuracy for the benefit of the whole nation. The members then dispersed in small parties, some to visit, with renewed interest, the departments, the details of which they sought to master more thoroughly, others to wander round the parks and woods, returning home by Hampton Court, Richmond and Teddington, loth to leave the pleasant surroundings and the fresh atmosphere for that of the smoke-charged City and its immediate suburbs. Hampton Court Gardens and a row on the river held some of the party till an hour which bid fair to mean a midnight arrival home.

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### Visit to the Works of Messrs. Johnson and Phillips, Charlton.

*Saturday, June 30, 1906.*

THE Institute of Marine Engineers paid a visit on Saturday, June 30, to the works of Messrs. Johnson and Phillips, electrical engineers, Charlton, and by the courtesy of the directors were privileged to see the machinery and appliances used in the production of, and also the electrical apparatus, fittings,

and connexions manufactured by this well known firm. The visitors were shown over the works by the Assistant Manager and the details of each department were explained by the head of that department, an arrangement which was most excellent as it ensured the specialities being described by the one immediately responsible.

The foundation of the firm dates from 1875, and since that time, not only the works but the whole neighbourhood has very greatly increased in bricks and mortar, as also in importance and output. The spirit of enterprise is very markedly shown in the works and management. A recent fire in one of the buildings hampered the proceedings very seriously for the time being, but the rising walls of the new building to replace the old illustrate the fable of the Phoenix, and from the ashes of the fire are growing an improved building and accessories. As one part is roofed in so are the machines erected and the work put in action again.

The tanks of cast iron containing a coil of solid drawn pipe were first inspected, and the process of manufacturing the special bitumastic covered cables was explained. The arc-lamp workshop next claimed attention and the mechanism of lamps new and old, with all the details, caps, levers, springs and carbon holders were shown and the advantages pointed out in connexion with the latest style, in which the cost is reduced to a minimum, and the light advanced in steadiness and brilliancy.

In the erecting workshop were inspected spinning machinery in execution of an extensive order from France for a cable factory, some of the machines being in course of erection, but the greater part completed and packed ready for despatch; a patent pneumatic hub for motor and other carriage wheels, a speciality which called forth expressions of strong approval from one of the visitors whose last twenty years have been passed amid the roads of South Africa; Grapnels of various kinds for lifting and holding, held those who sought to discuss and determine the best and most reliable form, and other details of mechanism in course of construction.

The visit to the instrument workshop revealed what is being done to perfect instruments for gauging electricity in all its phases and producing those in course of manufacture to meet a known acknowledged standard; the penny in the slot machine with its ingenious devices, made to circumvent the

no less ingenious devices—or shall we say cunning schemes—of those who seek to derive perpetual benefit from the single outlay of one coin, deeming it no dishonour to rob a mere machine ; a more ambitious instrument was seen in course of construction in the experimental stage, where the introduction of a shilling into a slot would give that value, either by continuous current or by instalments ; an automatic switch fitted to a motor and connected by a clockwork mechanism was shown in operation, and excited much interesting comment.

The cable department was then visited and the various winding machines examined in detail, whether for light or heavy cables, and several of the former were shown in action ; these are extremely clever in mechanism and turn out an excellent article, neat and strong. The method by which the insulating tape is placed on the wires is simple and ingenious, by a half turn as the tape passes to the grooved rollers which carry the wires. The machine for coating the cable with lead to an accurate gauge was admired and its action explained, while samples of the finished cable recently produced were shown and handled by the visitors.

Dynamos, motors, and other machines for electrical work were in various stages of construction or ready for the market.

In the Rubber Department the whole of the machines and appliances needed in connexion with the manufacturing process from the reception of the crude material to the finished article were shown and inspected.

On assembling together in the Board Room, the Pendent-Electrolier was pointed to as a grapnel which had been at the bottom of the ocean, having been used to pick up the cable laid by the *Great Eastern*. After partaking of tea, Mr. J. R. Ruthven proposed, and Mr. Wm. McLaren seconded a vote of thanks to the Assistant Manager and his staff for their great kindness in devoting a fine Saturday afternoon to meet the members of the Institute and showing them the interesting machinery which was under their charge. Their visitors had profited by the visit, and were delighted with the attention shown to them. It was also desired that a vote of thanks should be conveyed to the Directors for their courtesy.

Mr. Pope responded on behalf of himself and his colleagues, and said they were always glad to give any information or to show their work to those who appreciated it, and as the visitors had done so, they were compensated. He had been desired

by Mr. Paterson, Managing Director, to express regret that other visitors claimed his presence elsewhere, otherwise he would have been present to welcome them himself.

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## Visit to the Vauxhall and West Hydraulic Engineering Co., Luton.

*On Saturday, July 14, 1906.*

THE Saturday afternoon visit paid on July 14 by the Institute of Marine Engineers was an ideal one for a fine summer day, and the members whose arrangements permitted of taking advantage of the kindness of the Directors of the Vauxhall and West Hydraulic Engineering Co., Ltd., to visit the works at Luton, were fortunate and privileged. Luton had been *en fête* the previous day on account of the visit of the members of the Chambers of Commerce of the Empire, and the decorations on the works and elsewhere were still in evidence, giving the outing quite a festive appearance. The outward display was quite equalled by the cordial reception accorded by the representatives of the firm, Mr. Gardner, Managing Director, his co-Director, Mr. Todhunter, and Mr. Ash, who met the visitors on their arrival at the station and drove to the works in motor carriages, thus giving at the outset a practical demonstration of a speciality, the manufacture of which now engages the attention of this firm, and with success, about 150 carriages with their motors having been made at the old works at Vauxhall, London, and 150 at the new works at Luton within the last three years.

Arriving at the works, the Marine department was visited, where two sets of twin screw engines, 15 in. and 30 in. cylinders with 18 in. stroke were in the early stage of progress, including evaporating plant, electric lighting, feed and ballast donkey pumps, and two boilers about 10 ft. diam. by 10 ft. long. The steamers for these sets of machinery are about 200 ft. long and are being built for the contractors employed to line the banks of the Suez Canal with stone. The vessels in question are designed to carry material to be used in the construction work. From this department have recently been despatched a set of marine engines of 13 in. and 26 in. cylinders by 20 in. stroke, and a set of twin screw engines of 9 in.

and 18 in. cylinders by 12 in. stroke, for South America. The steamer for which this set was made sailed early in July ; it is of interest to note that she was fitted with Yarrow's patent tunnel flap, an arrangement which keeps the propellers in the tunnels working at the best efficiency as the draught of the vessel varies between light and full load. On the trial trip a speed of 12 knots was attained, the contract speed being 11 knots. Our old friend (as one of the visitors termed it), the "Vauxhall" Pump, was here in evidence also.

In the Hydraulic department was seen an excellent hydraulic tester, so designed that the desired pressure can be applied to suit the requirements of the job, by the application of a smaller or larger ram, according to the pressure wanted. The special machines for the setting of tyres excited a good deal of interest. One machine was in course of construction to take in a 12 ft. wheel, 12 in. broad with a thickness of tyre  $1\frac{1}{2}$  in. The object of the machine—West's patent—is to do away with the old process of heating the tyre and allowing the shrinkage to bind it on the wheel, and substitute direct compression very gradually on the tyre, by means of hydraulic pressure, transmitted all round the circumference. Another hydraulic machine under construction was for compressing crucibles, accurately built and adjusted so that the pressure necessary and no more should be applied. The actual compression force is transmitted to the material to be compressed into shape by a ram and accumulator, the absolute pressure on the former being due directly to that on the latter, which is constant. The ram itself is worked through a system of gear wheels and crank shaft. The importance of the object gained in this press arises from the fact that the material used for the crucibles is deteriorated by an excess of pressure, hence at once the Necessity, and her daughter Invention.

Motors and motor carriages were seen in all stages of manufacture, and all the details, from the axles to the ignition gear, from the frame to the upholstered body. Aluminium has rendered possible the lightness of cases and other parts, which, made of other material, would add greatly to the weight of the motor, and full advantage is taken of this to reduce weight at even the enhanced cost of aluminium. The four cylinder motor is preferred for steadiness of motion, and the excellent motor and carriage of 18 H.P. nominal which works up to about 20, is a machine to be desired.

The facility with which examining and overhauling can be dealt with called for warm commendation from those whose duties call them to look for such facilities in vain sometimes, where apparently the last thought of the designer has been how to take a machine to pieces for overhaul with the least possible work. In the favourite carriage on view, the whole of the motor and its connexions, cylinders, valve gear, cooling pump and connexions, brake gear, ignition arrangement, could be inspected without bending the knee. In some cases we have had a bird's eye view between the heads and shoulders of the gathering crowd of the motor driver down on hands and knees worshipping the demon under the car. Perhaps the fact that a marine engineer has the active management of the Vauxhall works has had something to do with the insistence of this feature being kept in the front.

The last place visited was the drawing office, turned for the nonce into a tea-board room, where after partaking of tea a few words of welcome by Mr. Gardner were given, and in the course of his remarks he referred to the extremely healthy surroundings of the works, the purity of the atmosphere, and the strength of the straw—the local industry being well known as the making of straw hats, while to America are shipped in large quantities straws for brother Jonathan's drinks.

Mr. W. C. Roberts proposed and Mr. E. W. Ross seconded a vote of thanks to Messrs. Gardner, Todhunter, and Ash and his staff, for their kindness in showing them over the works.

The visitors were then grouped into motor carriages, and led off by Mr. Ash a procession was formed for a run of 15 miles to St. Albans, with a visit to the Cathedral, and at St. Albans the motor carriages were changed for the train to London. It was whispered that on the way to St. Albans the speed exceeded that of the train, but it was not clear whether the whisper was cynical, and referred to any particular train or railway, or to the speed and celerity with which the motor carriages were worked, and it was marvellous, suffice it to say, that two or three policemen were passed—at a moderate speed—and no protest was made, so that we may take it that everything was in order. So closed a most delightful afternoon, which will live green in the memories of those who were present for the treat they enjoyed, and in the memory of those who were absent for the treat they missed.

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## Visit to the Walthamstow Power Station.

ON Saturday, August 18, the Institute of Marine Engineers paid a visit to the Walthamstow Power Station, and were shown over the works by the chief Electrical Engineer, Mr. Spurr, ably assisted by his second in charge, Mr. Taylor. It was very satisfactory to note that many junior members of the Institute availed themselves of the opportunity thus afforded of examining the details of the machinery.

The premises lie near the Hoe St. Station on the G. E. R., but as there was no tall chimney, the outward and visible sign to indicate that electric power is being generated to such an extent for light and traction as was subsequently revealed to the visitors, it was apparent that a more modern system of producing power than that of coal burned in the furnace with its accompanying smoke was in vogue. It was found, on entering the works, that all the plant is run by the Dowson Gas Producer Plant.

The Electricity Works were opened in September, 1901. The supply for Lighting and Power is arranged on the 3-wire continuous current system, of 460 volts across the outers, and for Traction purposes the same machines are used, working at a pressure of 500 to 550 volts.

Instead of the ordinary practice of installing steam plant, gas engines were adopted as the motive power. The plant comprises 8 Dowson gas generators, 5 vertical boilers, used in the production of gas, 13 British Westinghouse gas engines of 120 to 250 B.H.P. each, direct coupled to continuous current dynamos of 75 to 170 kilowatts, together with the necessary auxiliary plant, consisting of circulating pumps, for cooling water, and air pumps.

There are two storage batteries, one for lighting, and the other used in conjunction with a Highfield booster for traction purposes. This is a most important device which equalizes the amount of current required for the traction mains. There is unavoidably a fluctuation of load on the Tramway system, requiring a greater or less amount of current than one machine gives out, to run one machine is barely sufficient at one period, and more than sufficient at another period, so through this booster the current is augmented to the main from the accumulator, or the surplus from the dynamo stored in the accumulator—the fluctuations out or in are shown by meters, and also by a diagram.

## 18 VISIT TO THE WALTHAMSTOW POWER STATION

The engines can be started and attain maximum speed within one minute, the starting being done by admitting air compressed to 200 lbs per square inch into the cylinder, it is immediately shut off on completing one or two revolutions, the gas being then admitted by the necessary gear.

The water for cylinder jacket cooling is circulated by a motor driven force pump, the water being cooled by the usual tower coolers outside the main buildings. The water for this and boiler purposes used in gas generation is got from an artesian well, augmented by water from the town mains.

The Dowson gas producer for the station is generated in two gas houses, each containing 4 producers, and stored in two gasometers. All the gas producers are not required for the ordinary running, a certain number being off for cleaning and others damped down until required for extra power, the damping down of these only requiring about  $1\frac{1}{2}$  cwt. of anthracite coal per producer per day, showing that great power may be kept in reserve at small cost.

After a pleasant and instructive afternoon was spent, a hearty vote of thanks was proposed by Mr. Boyle to Mr. Spurr, Electrical Engineer, and Mr. Taylor, for the patient and painstaking way they had shown and explained the machines and plant under their charge, as well as for the pleasure and education which their visitors had received. This was seconded by Mr. Hawthorn.

Mr. Spurr in reply expressed his pleasure in receiving the members of the Institute that day, and had no doubt that the invitation to pay a future visit would be accorded by the Corporation if desired, and such an invitation would certainly be endorsed by himself.



58, Romford Road,

Stratford, Sept. 26, 1906.

GRADUATES, APPRENTICE ENGINEERS, who propose to compete for the prize (value £3 3s.) offered by Mr. A. E. Battle (member) for the best essay on "A Visit to the Engineering Exhibition," must comply with the following rules :—

The Essay to be—

- 1.—The certified sole work of the competitor.
- 2.—To be not more than 3,000 words.
- 3.—To be delivered addressed to "The Institute of Maritime Engineers, 58, Romford Road, Stratford," and marked "Prize Essay," not later than November 1.
- 4.—To be marked at the end of the essay with a *nom de plume*, and a sealed envelope inside, containing the name and address of the competitor, with a note certifying the essay to be his sole work, the outside of this sealed envelope to bear the *nom de plume*.

#### NOTICE.

THE BOHEMIAN CONCERTS, which formed a pleasant feature during last session, will be resumed on Friday, October 26, on the invitation of the Hon. Secretary and Mrs. Adamson. Others will follow once a month approximately on the invitation of office bearers and members of Council as may be announced in subsequent issues when arranged.

Invitation cards will be issued at the ordinary meetings of the Institute on Monday evenings preceding the concerts.

J. A.



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# INSTITUTE OF MARINE ENGINEERS INCORPORATED

SESSION



1906-1907

President: THE RIGHT HON. LORD PIRRIE.

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VOL. XVIII

*REPORT OF VISIT TO*  
THE ENGINEERING EXHIBITION, OLYMPIA,  
ON

*Saturday, Sept. 29th, 1906,*

WHEN

PAPERS WERE READ BY

MR. R. J. WALKER, Turbinia Works,

ON

THE DEVELOPMENT OF THE MARINE  
STEAM TURBINE

No. 131 of Transactions,

AND BY

MR. A. E. BATTLE, M.R.S.I. (Member)

ON

SANITARY SCIENCE AS APPLIED TO  
MARINE ENGINEERING

No. 132 of Transactions,

CHAIRMAN: LORD PIRRIE (PRESIDENT).

REPORT ON THE SANITARY CONGRESS  
HELD AT BRISTOL

BY

MR. CHAS. WILLIAMS (Member).

# INSTITUTE OF MARINE ENGINEERS

## INCORPORATED

SESSION



1906-7

*President :* THE RIGHT HON. LORD PIRRIE.

*Hon. Treasurer :* A. H. MATHER.

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