

2448 f/II ex.

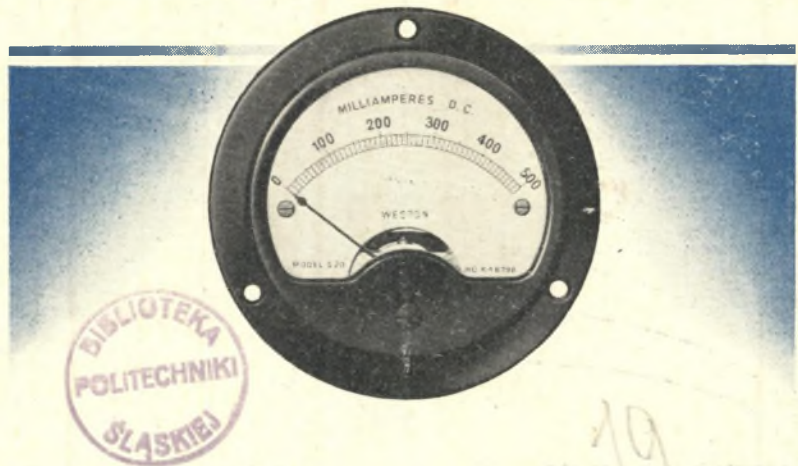
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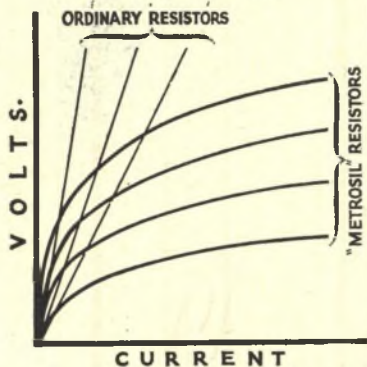
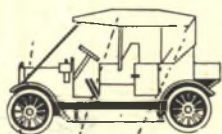
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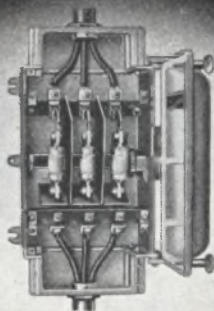
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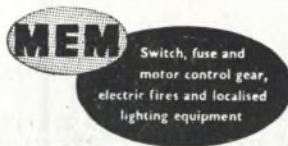
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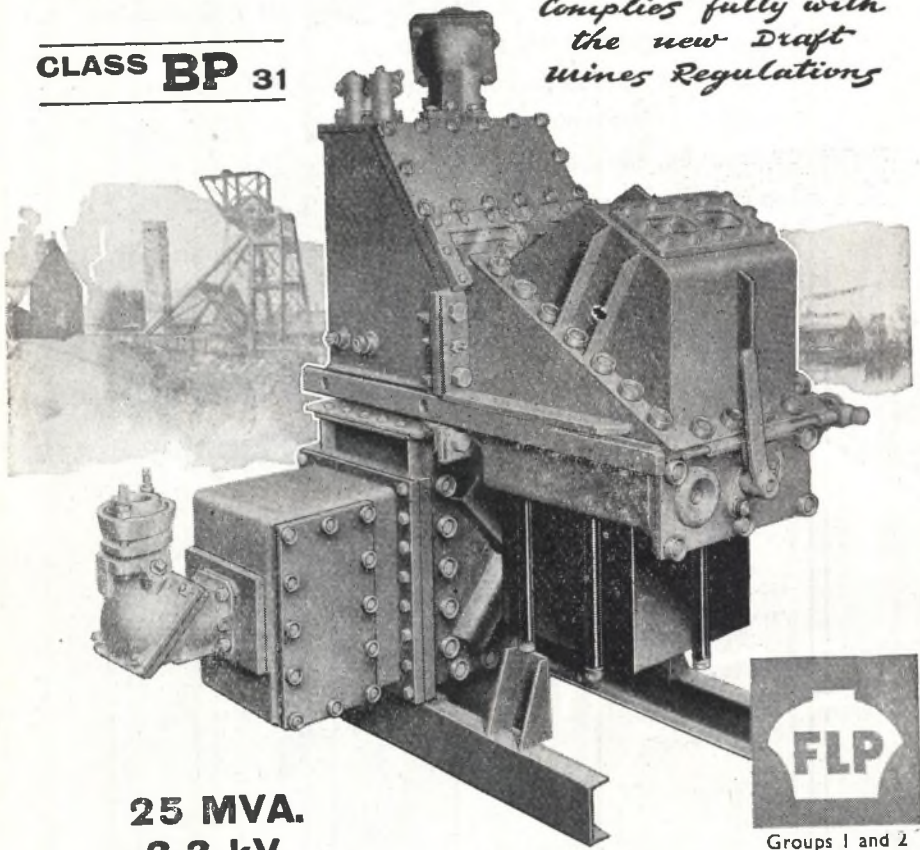
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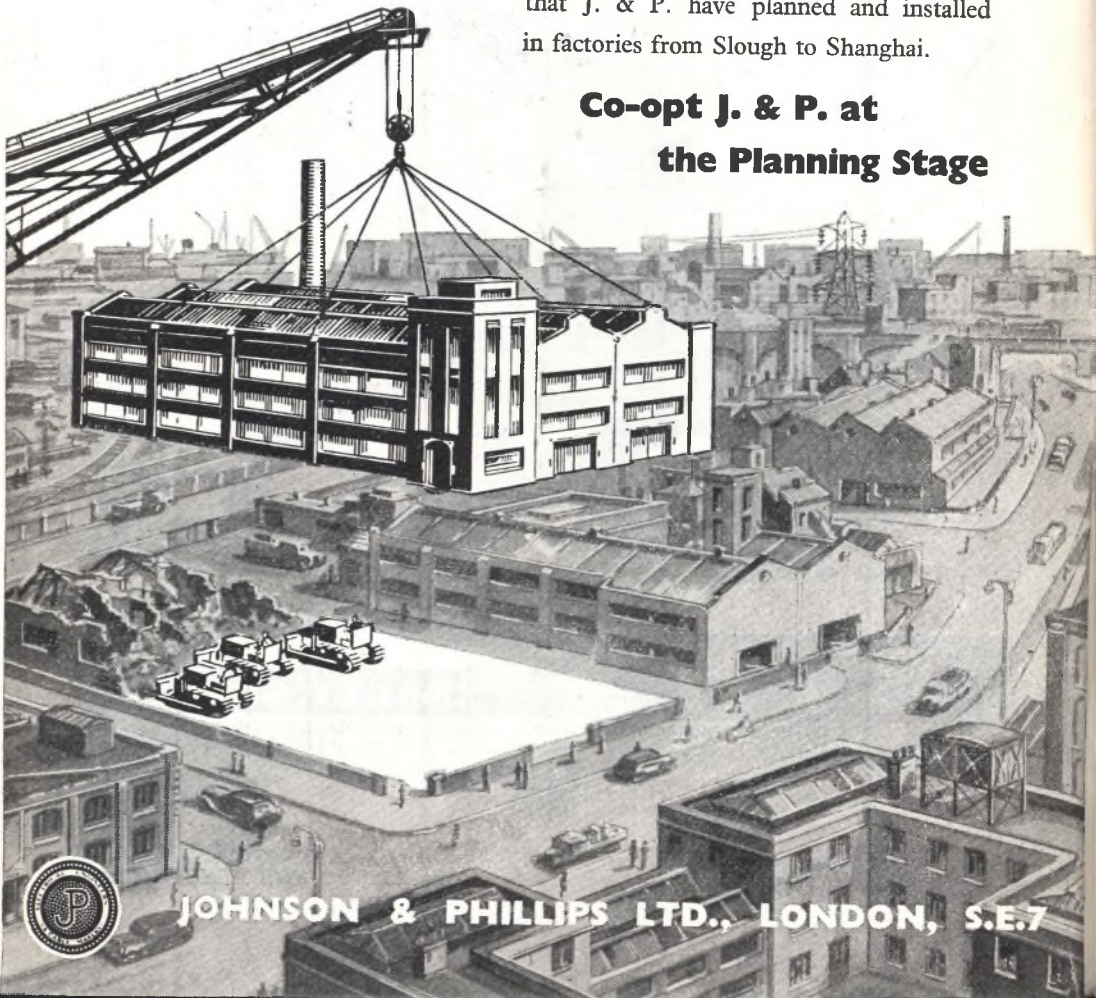
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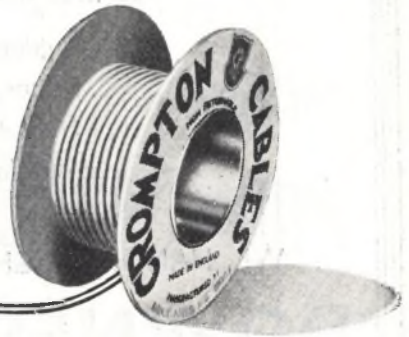


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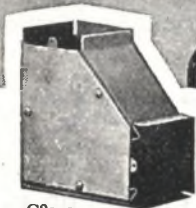
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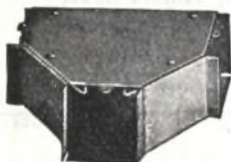
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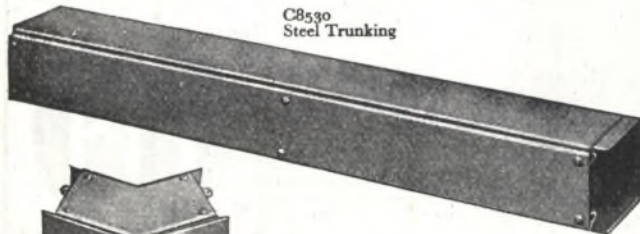
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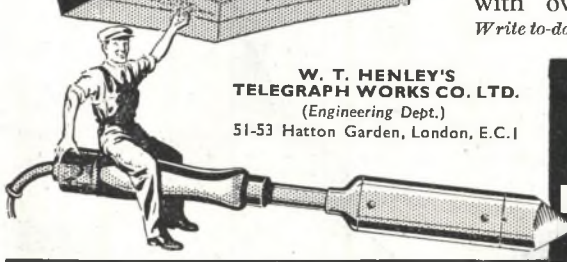
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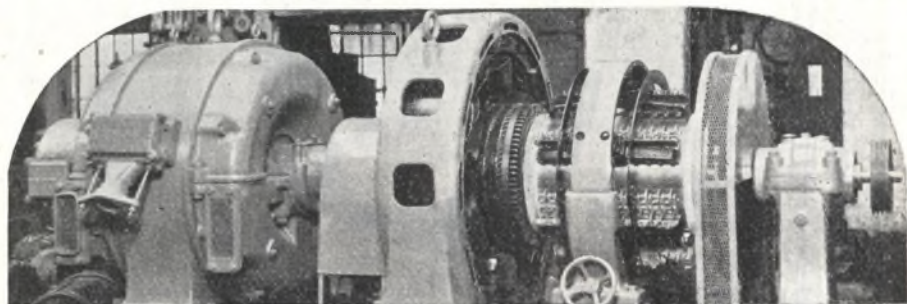
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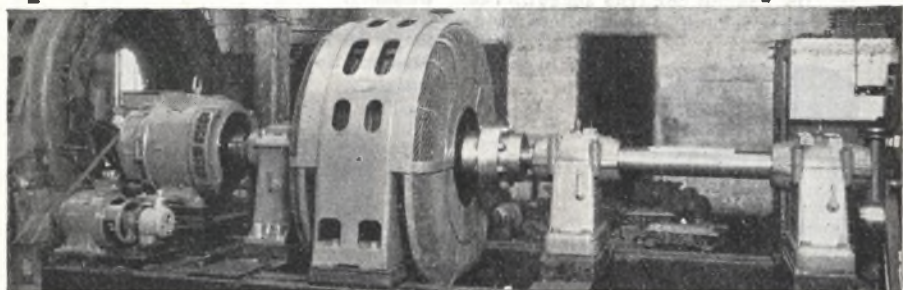
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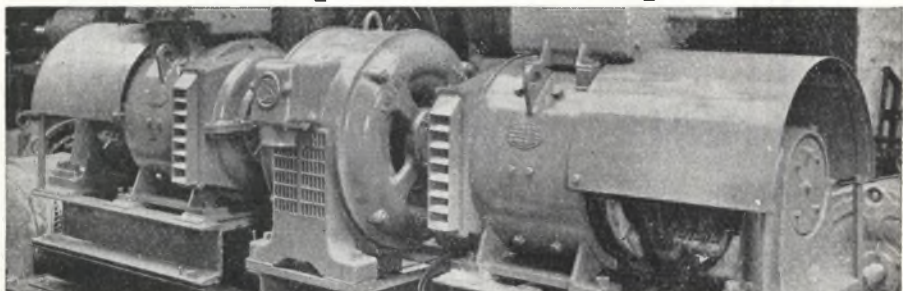




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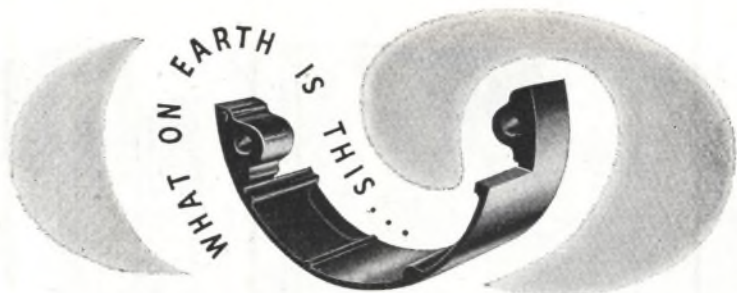
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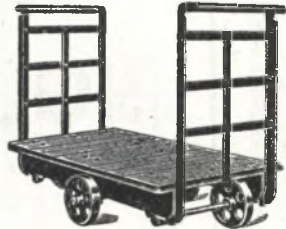
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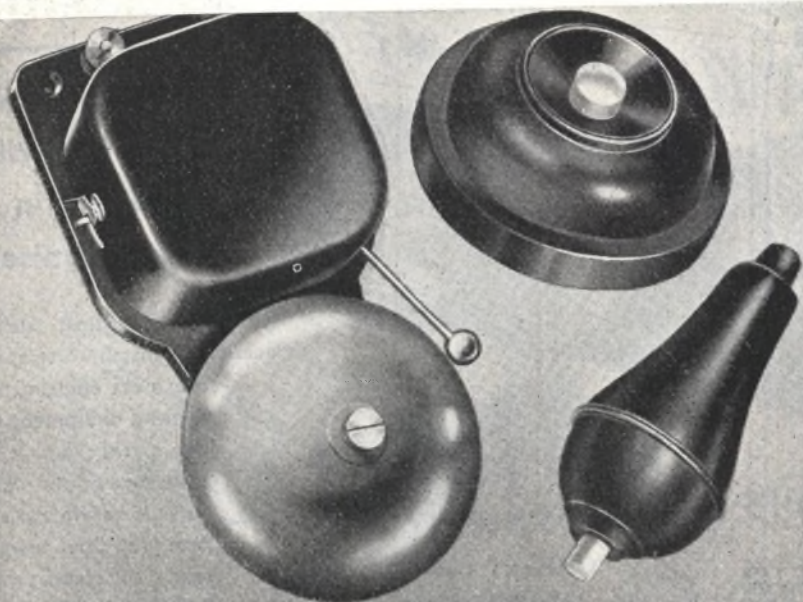


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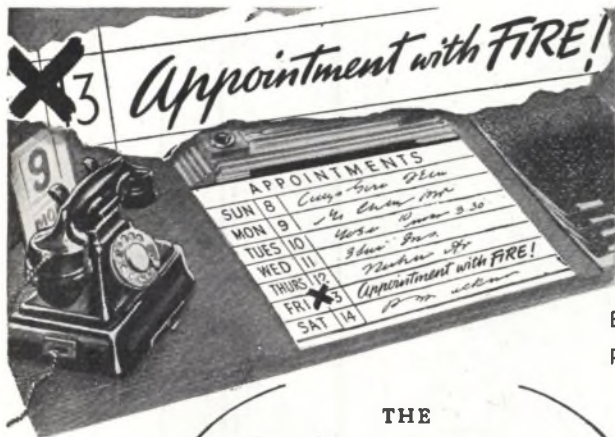
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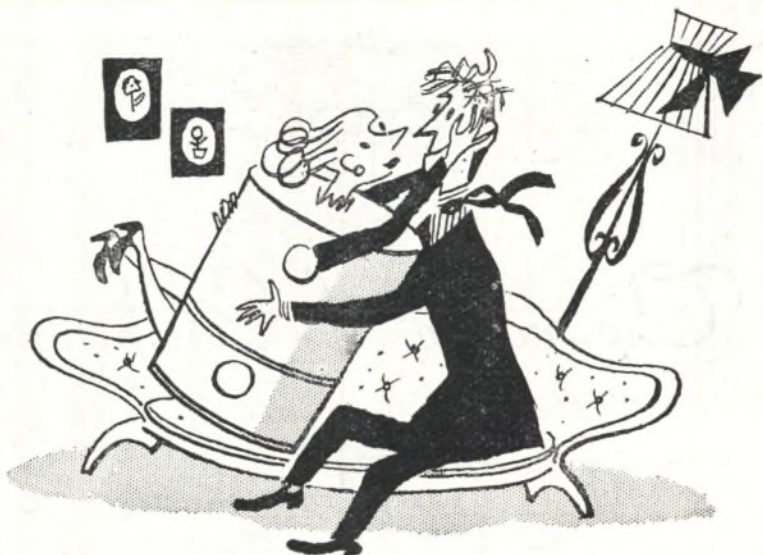
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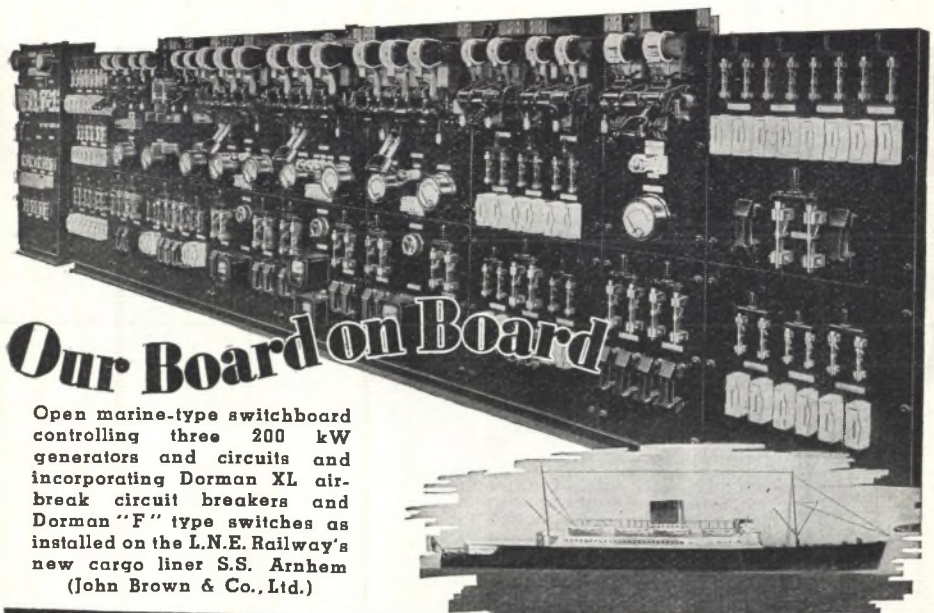
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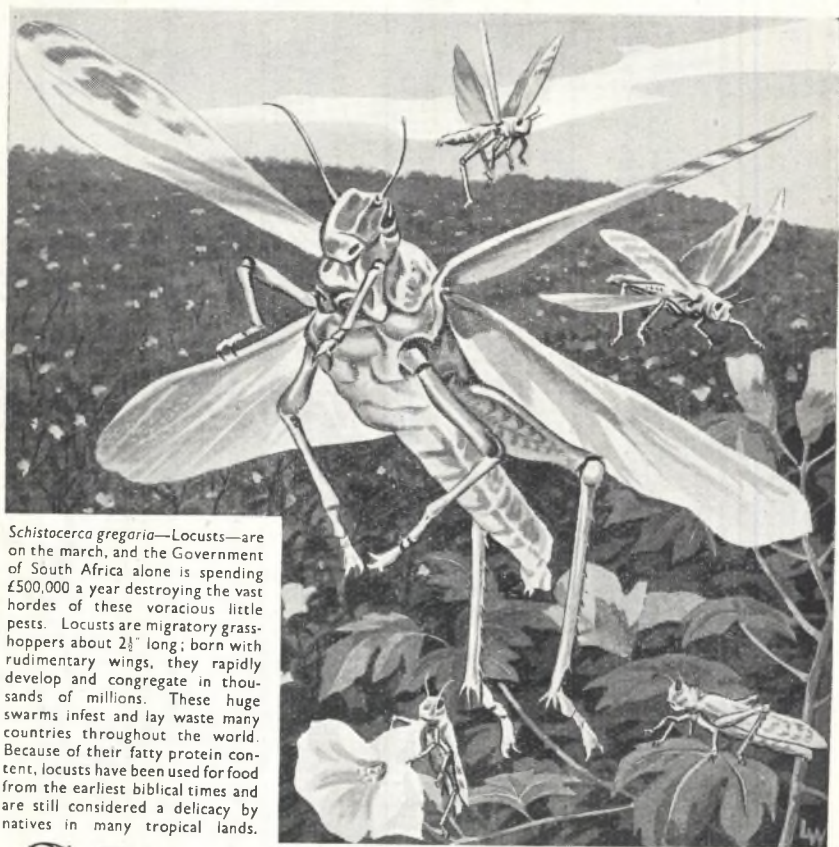
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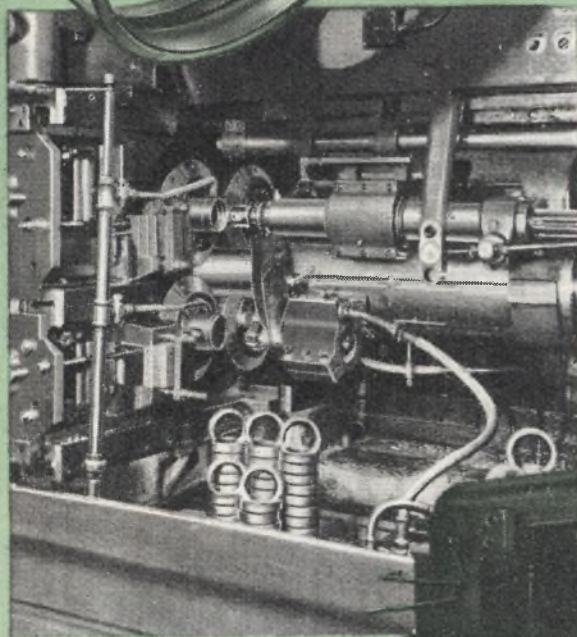


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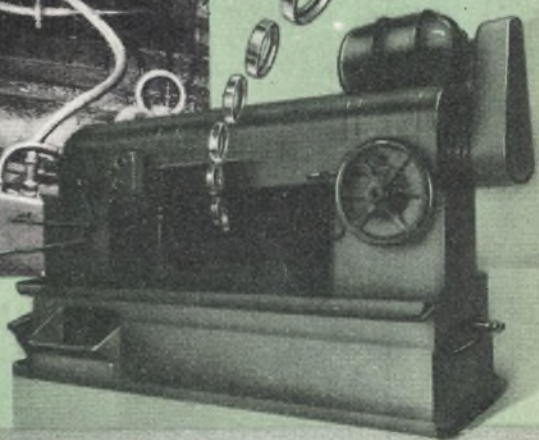
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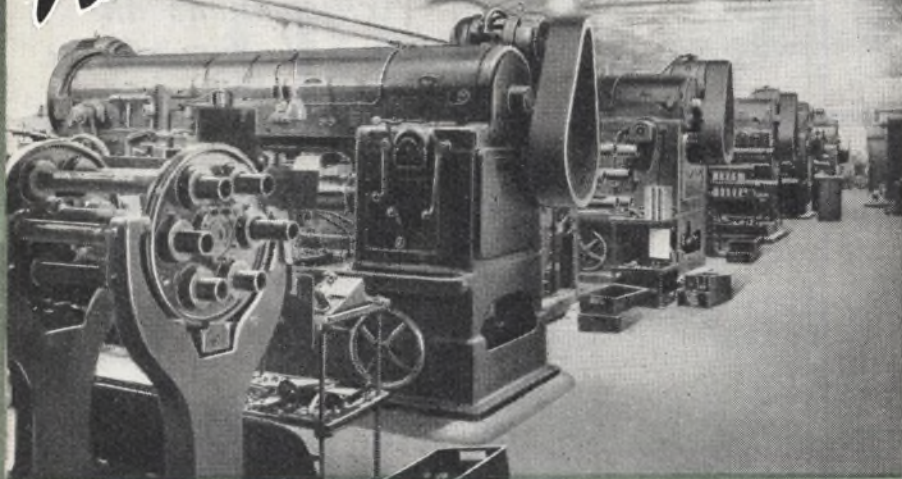


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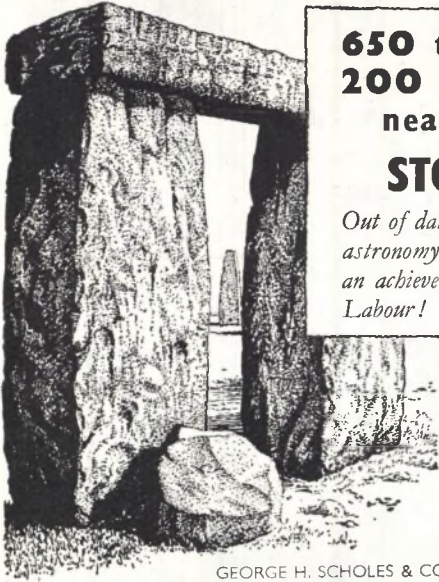
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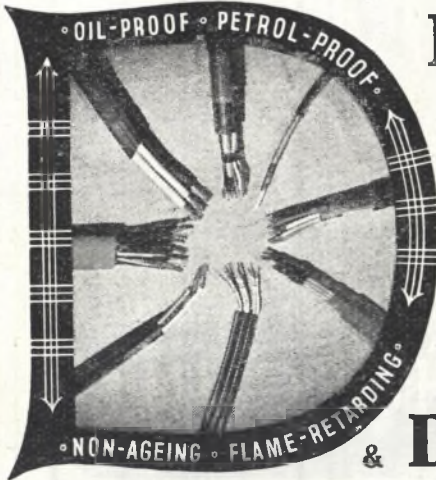
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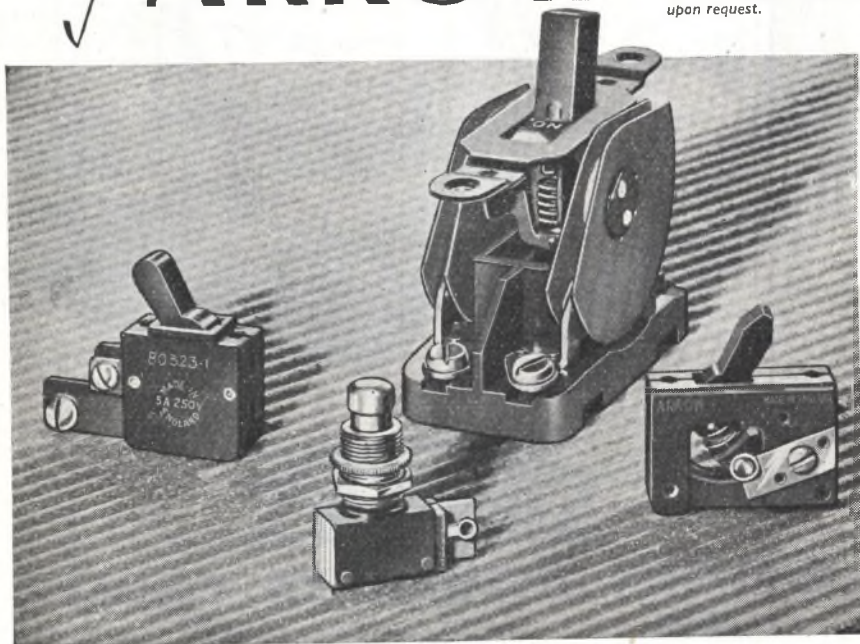
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## Electron Jubilee

**T**RIBUTE is being paid this week to the discovery of the electron by Sir J. J. THOMSON fifty years ago, and an exhibition, designed to illustrate the principles underlying the applications of the various devices in which the electron plays an essential part, is being opened at the Science Museum, South Kensington, to-day, Friday.

The discovery of the electron opened up a new era both in science and industry, for from it was born the thermionic valve, the photo-electric cell, the cathode-ray tube, to name only a few, together with a long train of researches which have vastly enlarged our knowledge of the structure of the universe and have led in these later days, for better or worse, to the release of atomic energy. Apart from marking the importance of the discovery, the jubilee celebrations will, it is hoped, bring about some public appreciation of the way in which investigations in pure physics, which may at first appear to be only of academic interest, can lead to developments revolutionising the everyday conditions of civilised life. These include radiolocation and allied radio communication, electric gas discharge street lighting, the fluorescent lamp, long distance telephony, the control of manufacturing processes and machines, and an untold number of other applications to which we have grown so used that they are accepted without comment until from some cause or other the service they offer is denied us.

When fifty years ago, Prof. J. J. THOMSON working in the Cavendish Laboratory at Cambridge discovered the existence of

a new particle of a kind hitherto unknown to science, he laid at the same time, the foundation upon which has been built a new form of engineering, which is to-day so closely allied to our own that the electrical industry now plays a leading part in its development and has not even approached the limit of its applications. It is on this particle that electronic engineering is based and it is fitting that electrical engineers and physicists the world over should pay tribute at this time to the outstanding man of science who discovered it.

### **Fifty Years Ago**

REFERENCE to *THE ELECTRICIAN* of May 21, 1897, shows that Prof J. J. THOMSON as he then was, gave details of his discovery of the electron at a lecture before the Royal Institution on April 30 of that year. Commenting upon this "dissociation of atoms," Prof. G. F. FITZGERALD wrote in the same issue that the hypothesis was by no means impossible and that it might be the beginning of a great advance in science; its results might easily eclipse most of the other great discoveries of the nineteenth century. From those early beginnings has in fact grown an industry which has played a major part in two world wars, and which is to-day finding ever wider opportunities for applying the knowledge gained by Sir J. J. THOMSON, to the service of mankind. The contribution made to science in that year coincided with the Diamond Jubilee of QUEEN VICTORIA, and commenting upon this and other facts, the then-Editor wrote, "We hazard the prediction that the past 60 years will stand out prominently in history as the period in which electrical science was revolutionised, as the period which witnessed not only the birth of the practical application of electricity, but an extension so marvellous that civilisation would feel the shock if suddenly deprived of it." If that was true fifty years ago, how more so is it to-day.

### **Control of Engagement Order**

PUBLICATION of this Order last week showed that the comment in *THE ELECTRICIAN* of August 22, upon the latest move of the Ministry of Labour was justifiable and is still applicable to the operation of the Order. It is true that when speaking of the Order, Mr. ISAACS said that his powers of direction would

not be used except in relation to persons unemployed who refused to be guided, but the powers for wider application exist nevertheless. Questioned on what were to be classified as essential and non-essential industries, the Minister said that this would have to be decided in step with the development of the export drive, and in this connection we draw his attention to our earlier remarks. The framing of an Order for the control of industry presents little difficulty in theory, but before the Order becomes operative it is necessary to know how to apply it without serious interference with production, what industries will be affected. As things stand the Order comes into force on October 6, and neither the Minister nor industry knows what will be the result. The Order is confusing, and individual effort is likely to be discouraged rather than promoted by it.

### **Gas Turbine Research**

THERE would seem to be general agreement that of recent technical advances, the two of greatest importance to industry are the discovery of a means of using atomic fuel as a source of heat and the development of the gas turbine engine. Those in charge of the Government research establishment in Leicestershire, which, as described on another page, was visited last week, expressed confidence that, at present, the gas turbine has the greater significance. It has already demonstrated its value in aircraft of all types and, in recent weeks, in a naval vessel. Its possibilities as a prime mover in power stations are now being tested in Switzerland and it seems probable that its use for peak load working, at least, will become widespread within the next decade. One medium-power set has already been ordered by the C.E.B., another is shortly to be purchased by the Government and by August next year, it is learned, the research establishment itself will have completed an experimental 3 000 kW machine. Although efficiencies up to 40 per cent. are expected in power station plants, some anxiety may reasonably be felt at the growing dependence on imported oil supplies which the wider use of gas turbines implies. The outcome of research now being conducted on the design of cyclone burners for pulverised coal will, there-



fore, be watched with considerable interest.

### **Collaboration With Industry**

THE experimental equipment required for fundamental research into gas turbine problems is costly, and in avoiding unnecessary and uneconomic duplication and carrying out tests of new components designed in industrial laboratories, the Leicestershire establishment is performing a useful service. Great Britain is still at least one step ahead of the rest of the world in this form of engineering, and so that this lead may be maintained, provisional plans have been drawn up for the consolidation of the two existing research stations on one site in Hampshire, and for an appreciable expansion within the next few years, of both experimental plant and the scope of work undertaken. The technical lead which has been established is largely the result of co-operation between the research organisations as now operating and industry. In this connection it must be pointed out that as a result of the projected expansion of the establishment, there is a possible danger of the fruitful contacts which have hitherto existed between the official investigators and those of private enterprise being caught up in departmental procedure, and the transmission to industry of the results of research being delayed. It is for the Government to guard against this possibility and to ensure that the findings of the establishment continue to be made available to all concerned, with the same expedition, as now.

### **B.E.A. Staff Vacancies**

APPLICATIONS are invited this week to fill technical appointments on the staff of the British Electricity Authority and call for a chief engineer and deputy engineers. The qualifications asked for are those one would expect to find in such men and we await results with interest. Whoever is appointed to the senior vacancy will hold a position unique in the history of electricity supply, for not hitherto has there been a chief upon whose shoulders has rested a technical responsibility so wide in its dimensions. The importance of the positions and the care which will have to be exercised in the selection of the engineers to fill them cannot be over-estimated, for, apart from technical experi-

ence, upon tact and diplomacy will depend not only a maintenance of that enthusiasm so rightly hoped for by Lord CITRINE, but a continuance of that pioneering spirit which has built up the industry to its present state of efficiency.

### **Fall in Electrical Exports**

THE effect of the holiday season was reflected in a falling-off in the value of electrical exports from £7 543 178 in July to £6 427 292 last month, a decrease of £1 115 884. The total, however, compared favourably with that for the corresponding month last year and was more than three times the monthly average of 1938. While there was a drop in a number of shipments, the quantities of electrical machinery other than generators and motors, of house service meters, and welding machinery and electrodes sent overseas, showed appreciable increases over the July figures. The value of electrical imports fell from £561 627 in July to £336 442 in August, which was only £8 325 in excess of the monthly average of 1938, and was less than half of the total for August of last year. In view of the export targets set by the Government the tabulated details given elsewhere in this issue are of special interest.

### **Load Spreading in Scotland**

THE apathy referred to last week with respect to industrial load staggering has brought about a blunt warning by the Chairman of the Scottish Board for Industry, to the effect that firms in Scotland which have not so far forwarded any plan for staggering their load will have to accept the consequences after October 1, for there will be no interference with the plans already approved. Generating capacity north of the border is adequate for all demands only so long as the load is staggered, and delays in the preparation of schemes for reducing demand by a third during the peak period, can only result in indiscriminate shedding. It is accepted that certain industries cannot make their full contribution, as for instance, shipbuilding, but there are in Scotland many trades and industries which by staggering their demands on generating resources would suffer no serious set-back in output—and it is among these that the urgency of the problem does not yet appear to be fully appreciated.

# Gas Turbine Research

## Developments at National Experimental Establishment

IT was claimed at the Ministry of Supply National Gas Turbine Establishment at Whetstone, on September 17, that in gas turbine engineering this country is one step ahead of the remainder of the world. The Government did not intend to reduce expenditure on fundamental research projects, and the work already done was yielding useful results in the export field.

The establishment officially came into being on July 1, 1946, as a result of the merging of several existing official bodies conducting research into gas turbine problems, including the Whittle company, Power Jets, Ltd., and teams from the Royal Aircraft Establishment. At present it is located partly at Whetstone, where investigations are carried out under the direction of Wing Comd. G. Lees, and partly at Pyestock in Hampshire, where Mr. H. Constant is in charge. The director of the establishment as a whole is Dr. Roxbee Cox. Eventually, the whole of the plant will be located at Pyestock, and plans for additions to the test equipment include plant capable of testing compressors of up to 14 000 H.P.

After explaining the functions of the establishment to a representative of THE ELECTRICIAN, Dr. Roxbee Cox said that the results of its work were continually being applied to the improvement of design, and were handed to industry through the medium of reports or by direct contacts. The establishment undertook the technical assessment of new designs, but it was not normal policy to produce complete engines. When there were no problems in any particular field, interest in the matter ceased.

### TESTING COMPRESSORS

Apparatus demonstrated during the course of our visit included a testing bay for compressors, in which was available a 6 000 H.P. steam turbine running at 18 000 r.p.m., suitable for use in either the investigation of performance of compressors under service conditions or for driving a plant compressor to operate experimental turbines. Combustion chambers were seen on test, one being a new type evolved to give efficient combustion with a small loss of pressure.

In the laboratories, electrical testing and measuring equipment are extensively used. Frequency analysers are employed when studying vibration problems and an apparatus for investigating the aerodynamic properties of blades indicates

their characteristics as cathode-ray oscillograph traces. A useful application of electrical theory to aerodynamics is an "electrical analogy," by means of which the air-flow past blading is measured in terms of the potential distribution between adjacent blades immersed in an electrolyte. Other special equipment included supersonic tunnels and various optical devices. A study is also being made of the heat flow from hot gases to a cooled turbine blade. Work on this subject is expected to lead to higher maximum gas temperatures in the future.

### POWER STATION PLANT

Speaking to our representative, Mr. H. Constant stressed that, although much of the impetus given to gas turbine design had been provided by the need for aircraft power units, at least three-quarters of the work now being done in the establishment is equally applicable to land and marine plants. There is being built, in fact, an experimental land turbine for electric power generation, which it is hoped will be in operation by August next year. This set will be of comparatively simple design, employing a compressor, combustion chamber and two parallel turbines—one driving the compressor and the other the alternator—and will be coupled initially to a 3 000 kW, 3 000 r.p.m., alternator. Later it is hoped to raise the capacity to 7 000 kW. An order will shortly be placed with industry for a 10 000 kW turbine, and the C.E.B. are also believed to be contemplating the installation of a set.

A typical power station gas turbine plant, Mr. Constant explained, would be considerably more complicated than an aircraft machine, and special attention would be paid to the working life of the machine. Ten years between major overhauls was a reasonable expectation. While the efficiency of aircraft units was of the order of 15 per cent., it was expected that early power station units would be built, by paying careful attention to ducting losses, which could dissipate a considerable horse-power, to give an efficiency of 30 per cent., and later models should be able to reach 40 per cent. Blade temperatures of about 700° C. at a maximum would be met on the early installations. There was continuous experiment in the use of cruder and cruder fuels. Asked what progress had been made with turbines fired by pulverised coal, Mr. Constant stated that no work had yet been done in that direction. The operation of cyclone burners, however, was being investigated.



# 45 MW EXTENSION AT BRADFORD—

## NEW PLANT PUT INTO OPERATION AT THE VALLEY STATION



MR. T. H. CARR, *electrical  
engineer and manager, Bradford*

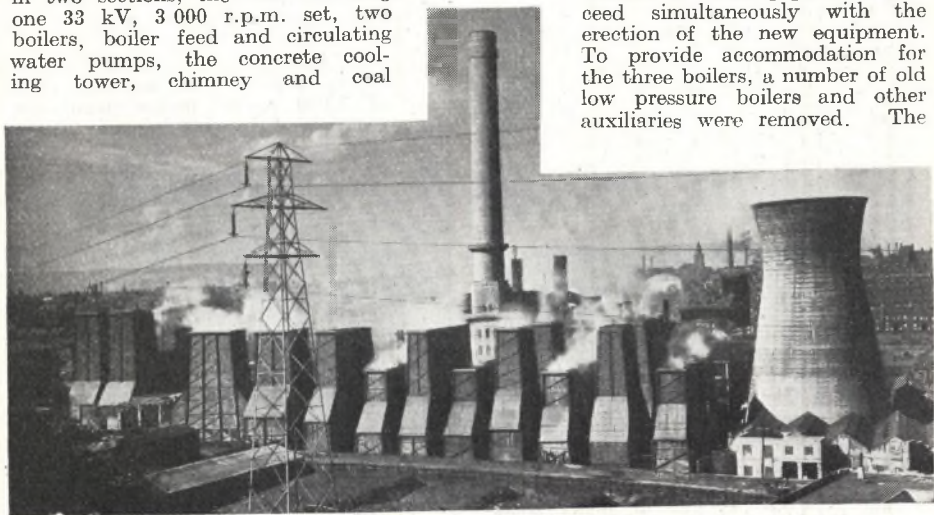
At a civic ceremony on Saturday last, part of the 1946-48 extensions to the Valley power station of Bradford Corporation, consisting of one 22 500 kW set, a cooling tower and a chimney, were officially opened by Ald. R. Barber, chairman of the City Electricity Committee. The occasion was also used to mark the golden jubilee of the undertaking, which fell due soon after the commencement of the recent war, on September 20, 1939. Among those present was Lord Citrine, chairman of the British Electricity Authority.

The present extensions, for which C.E.B. directions were issued in September, 1943, and November, 1944, consist of two 22 500 kW turbo-alternators, complete with ancillary plant, to replace two existing 15 000 kW sets (both of which have already been removed), three 180 000 lbs. per hr. boiler units and one cooling tower. The condensers of the 15 000 kW sets are being used, with modifications, for the new plant.

The extensions are being carried out in two sections, the first including one 33 kV, 3 000 r.p.m. set, two boilers, boiler feed and circulating water pumps, the concrete cooling tower, chimney and coal

handling plant, forming the 1946 programme. In the second stage, there is a 6.6 kV turbo-alternator, one boiler and ash and flue dust handling plant. The final costs are estimated at £900 000 for the first stage and £550 000 for the 1948 programme. The first new set began operating some months ago and it is expected that the first of the new boilers will be ready for use during October.

To accommodate the two new sets, little alteration has been necessary in the existing turbine house. A 30 ton overhead travelling crane, running on the same rails as an existing 100 ton crane, was installed to allow repairs and maintenance of existing plant to proceed simultaneously with the erection of the new equipment. To provide accommodation for the three boilers, a number of old low pressure boilers and other auxiliaries were removed. The



A general view of the station, looking over Canal Road, in which can be seen the new chimney and cooling tower

new boiler house is a steel-framed structure, the coal bunkers being supported on steel columns which extend from the ash



*The new chimney, with the administrative block in its base. Part of the extended boiler house can also be seen*

basement level to the coal conveyor gallery and form a central aisle at firing floor level. Cast-in-situ concrete piles were used to form a reliable foundation for the building.

Adjacent to the boiler house, a brick-lined reinforced concrete chimney, 350 ft. high and 22 ft. in internal diameter at the top, was constructed. The boiler draught plant, being on the upper floor of the boiler house, affords a direct inlet for flue gases at roof level. In the base of the chimney, new administrative offices, equipped with air-conditioning plant, have been built.

Each of the three new boilers, of Babcock and Wilcox straight water-tube type, fired by chain-grate stokers, will generate steam at 650 lbs. per sq. in. and a final temperature of 850° F. The steam and water drum is of fusion-welded construction, with a thickness of  $2\frac{1}{2}$  in., diameter of 54 in. and length of 36 ft.  $3\frac{3}{8}$  in. Each boiler is provided with a superheater, economiser, air preheater, mechanical draught plant and mechanical stoker. Automatic steam temperature control and remote electrical control of soot blowers and draught plant are also included. A complete set of instruments, together with

remote control, is mounted on a panel at firing floor level for each unit.

With a total heating surface of 9 150 sq. ft., the superheaters are of the horizontal type and are in two sections, a desuperheating equipment being interposed between the primary and secondary sections. Further temperature control is effected by by-passing the gases through dampers. The superheater pressure drop is 30 lbs. The economisers are of the steaming continuous loop type and are located immediately behind the boiler, with a heating surface of 13 873 sq. ft. Each consists of 1 152 tubes, 23 ft. long, and works at a gas inlet temperature of 895° F. and gas outlet temperature of 463° F. Feed water enters at 300° F. and leaves at 458° F. Tubular cross flow type air preheaters are employed, these being in two sections and containing 2 716 11 ft. tubes. The preheaters operate at a gas inlet temperature of 463° F. and outlet temperature of 305° F., while air is taken in at 100° F. and heated to 275° F.

Draught is provided by two forced and two induced draught fans on each boiler. These are driven by two-speed motors and are fitted with vane control, and there are also two secondary air fans. The soot blowers are of the single nozzle retractable type, remotely controlled, on the scale of six for each furnace and eight for the superheater. In the boiler house annexe basement, a new seven-stage electrically driven boiler feed pump, with a capacity of 250 000 lbs. per hr., has been installed. The chain grate stokers, with an area of 572 sq. ft., are electrically driven through reduction gearing by two motors. Traversing coal chutes are provided on the scale of two per boiler.

Both of the new turbines are of the Parsons two-cylinder tandem type, running at 3 000 r.p.m. under steam conditions of 825° F. at 625 lbs. per sq. in. They are economically rated at 18 000 kW and have a m.c.r. of 22 500 kW. Each set has two h.p. and one l.p. feed water heaters, together with surface type drain cooler, and two two-stage air ejectors; there is also a quick-starting ejector. One surface type evaporator per machine is capable of a maximum output of 7 500 lbs. per hr. Rotor turning gear and a steam unloading device are also provided. In order that the condensers from the old 15 000 kW sets could be utilised for the new plant, the steam lanes have been increased by removing a considerable number of tubes. An automatic feed water control valve has been added to each condenser and its corresponding surge and storage water tank.

Apart from the difference in voltage, both the new alternators are of similar



design, with direct-drive enclosed pilot and main exciters on each machine. New paper-insulated screen type single cables have been laid from the 33 kV set to the switchhouse; the 6.6 kV generator will use the existing cable system.

New switchgear installed for the first of the new sets to be commissioned consists of English Electric metalclad 33 kV equipment, designed for 800 A and a short-circuit rating of 1 000 MVA. The breaker is electrically operated from either the main or emergency control room. For the second, 6.6 kV, set, two existing standard 6.6 kV Reyrolle metalclad breakers, each rated at 2 000 A and 500 MVA, are being utilised. Two additional 6.6 kV switchboards have been installed, in addition, to control works auxiliary power throughout the station. Power from these boards passes through 400 V transformers to a number of auxiliary boards. A new 500 A hr. battery has been installed for emergency supplies and switchgear control circuits.

The first of its type at the Valley station, the new concrete cooling tower has a capacity of 1 250 000 gal. per hr. and is 185 ft. high from sill level. Water enters at a height of approximately 27 ft. above the sill at about 84° F. Distributed through asbestos concrete pressure pipes fitted with 600 sprayers, it is cooled to approximately 70° F., depending on atmospheric and local conditions. The stack construction employs wood laths on reinforced concrete beams and posts. A new centrifugal circulating water pump of 2 000 000 gal. per hr. capacity driven by a 780 v.h.p. motor, has been installed to supplement those already existing. Loss in the cooling water system is made up from a well and the town's main. Steam and feed water piping systems already in existence and made of hot drawn weldless steel with butt-welded

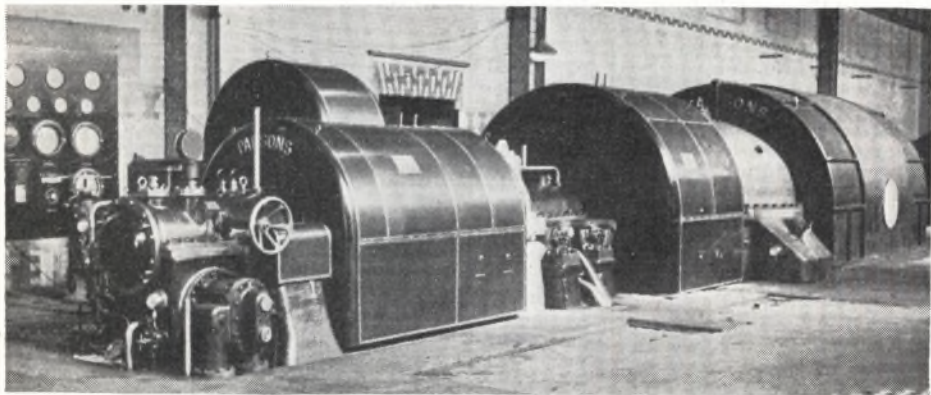
joints have been extended to serve the new equipment. The steam receivers are interconnected.

Extensions to the coal and ash handling plant have been necessitated by the additional plant. Deliveries of coal are discharged from wagons on the sidings by a tippler and conveyed under Valley Road by two 100 ton belt conveyors to a receiving bunker. From this bunker coal is fed into two bucket elevators which take it to the boiler house bunkers. The elevators discharge into overhead receiving chutes feeding the main belt conveyors, the latter distributing coal to the bunkers by means of adjustable throw-off carriages.

A low-pressure water sluicing system removes ash from the boiler house, carrying it to sumps outside the building. Telfer grabs pick ash from the sumps and normally discharge through grading screens into overhead concrete bunkers, to await collection by road vehicles. A direct-loading overhead bunker is also provided.

In the flue dust handling plant, comprising two 25 ton containers and two turbine type exhausters, a pneumatic suction draws the grit and dust from the boiler and chimney hopper into a central receiving container, where they are subsequently mixed with water and discharged into road vehicles by screw conveyor for tipping. Boiler coal riddlings and fines are also collected by this plant and returned to the bunkers for further use in the boilers.

With the commissioning of the second new set, the Valley station will have an installed capacity of 120 MW. In the year ended March 31, 1947, 308 379 950 units were generated for a fuel consumption of 204 942 tons, corresponding to 1.489 lb. of fuel per unit generated. The maximum city load so far recorded is 81 671 kW,



*The first of the two new 22 500 kW Parsons turbo-alternators, formally started-up last week-end*

this figure having been reached last winter.

The new extensions have been designed, planned and the specifications prepared by Mr. T. H. Carr, electrical engineer and manager, and the engineering staff of the undertaking, who have also supervised the construction throughout.

#### LORD CITRINE'S SPEECH

At a luncheon which followed the formal starting-up of the new set, Lord Citrine, as chief guest, proposing the toast of the undertaking, remarked that the city had been a pioneer in many matters connected with electricity supply. After paying a tribute to the books on power station practice written by the electrical engineer and manager, Mr. T. H. Carr, Lord Citrine turned to the question of nationalisation. Some time in the New Year, the British Electricity Authority would become responsible for the industry, but a moderating thought to be borne in mind was that the new Authority would take over certain liabilities. First, there was the shortage of generating plant. The future until 1952 had already been planned by the C.E.B. in their £450 million extension programme, but difficulties might make it impossible to realise the whole of the programme in the time allowed; for example, actual deliveries of new plant in 1946 had been less than the amount planned for that year.

Lord Citrine then spoke of the problem caused by rising costs. Before the war, he said, the cost of extensions worked out at about £13 to £14 per kW, and a new station could be built at £20 per kW. The cost of the new C.E.B. programme was about £45 per kW. In addition, operating costs, particularly with respect to coal and labour, had risen. He had a specific object in mentioning those facts. The sum expended on capital extensions had eventually to be recovered from consumers and, although he did not want to paint too gloomy a picture, he warned that, nationalisation or no nationalisation, some increase in prices could not be indefinitely postponed. He did not wish to be told later that a rise in charges was a consequence of nationalisation, and he was, therefore, anticipating arguments by referring to the matter now.

Regarding future developments, Lord Citrine said it would probably be ten years before atomic energy could make any significant contribution to power supplies. The Central Board were to experiment with gas turbine equipment, but the ordering of new plant could not be postponed indefinitely in the expectation of revolutionary new methods. The new Authority, however, would spare no effort in trying to achieve an efficient and economic supply.

Such a large undertaking would have

to experiment in order to find a flexible method of administration. It might be desirable to give a large measure of autonomy to the Area Boards, and it might be that they would have to sacrifice efficiency in order to serve local interests. To employees in the industry he would say "Don't worry." He knew the value of initiative and the new headquarters would make co-operation its keynote.

If the Authority could generate the same spirit of public service which had hitherto existed, many of the future problems would be satisfactorily solved.

Ald. R. Barber (chairman, Electricity Committee) responded, giving a short review of progress in the lighting side of the industry, and Counc. J. Foster (deputy chairman, Electricity Committee) then submitted "Our Guests."

Replying, Mr. C. G. Morley New (Electricity Commissioner) said that as a result of the previous development of the industry there had been wide variations in tariffs, voltages and agreements. The new Area Boards would have to bring about some measure of uniformity, but he offered a semi-humorous warning that while standardisation was a very good thing, there was nobody so standardised as the dead. Mr. M. F. Titterington also responded.

#### PRESENTATION BY CONTRACTORS

The final toast, to "The Contractors," was proposed by Counc. H. W. Semper (chairman, Finance and General Purposes Committee) and brief replies were made by Sir Claude D. Gibb, F.R.S. (C. A. Parsons and Co., Ltd.) and Mr. C. H. Sparks (Babcock and Wilcox, Ltd.). The proceedings ended with the presentation of silver salvers to the Chairman and Deputy Chairman of the Electricity Committee by Sir Claude and Mr. Sparks, on behalf of all the contractors who had been associated with the extensions at the station.

Among the chief electrical contractors employed on the extensions were:—

Davidson and Co., Ltd. (air conditioning plant); Davenport Engineering Co., Ltd. (cooling tower); Babcock and Wilcox, Ltd. (boilers); Bailey Meters and Controls, Ltd. (instrument panels); James Howden and Co. (Land), Ltd. (mechanical draught plant); Lancashire Dynamo and Crypto, Ltd. (fan motors); C. A. Parsons and Co., Ltd. (turbo-alternators); Brown, Boveri and Co., Ltd. (voltage regulators); Mather and Platt, Ltd. (boiler feed and circulating water pumps); English Electric Co., Ltd. (33 kV switchgear); A. Reyrolle and Co., Ltd. (6.6 kV switchgear); Brookhirst Switchgear, Ltd., and A. Reyrolle and Co., Ltd. (400 V auxiliary switchgear); British Insulated Callender's Cables, Ltd. (main cables for turbo-alternators); Pyrotenax, Ltd. (medium voltage cables); British Vacuum Cleaner and Engineering Co., Ltd. (grit, fine dust and riddlings handling plant); Chloride Electrical Storage Co., Ltd. (storage battery).



# Portrait—Mr. C. S. Briggs

*A member of the Council of the Institution of Electrical Engineers, and mainly concerned with the "light current" side of the industry, Mr. Briggs was responsible for the manufacture of the Warsaw to Lodz telephone cable, the first loaded trunk cable to be installed in Poland. He has had extensive telephone experience in Italy and supervised the manufacture in Milan and Turin of the extension southward from Naples of the Italian trunk telephone cable network. He returned to England in 1934 and is now in charge of the telephone cable engineering section of the North Woolwich factory of Standard Telephones and Cables, Ltd.*

**B**ORN on April 26, 1905, at Horsforth, Yorkshire, Mr. C. S. Briggs was educated at Spalding Grammar School, where he held both County Minor and Major Scholarships. Whilst at school he decided that his bent was engineering and was the first scholar to take his Intermediate B.Sc.(Eng.) examination from that school. As the school had no workshop facilities, the local garage was pressed into service to give him the necessary practical background.

In order that he might continue his engineering career, the Kesteven County Council made him a loan to enable him to complete his technical training at East London College, from whence he graduated with first class honours in 1925. Whilst at College he had chosen the "light" side, taking the subject of telegraphy and telephony in his final, and he has been connected with the communications side of the industry ever since.

After a brief student course at the Willesden factory of the British Thomson-Houston Co., Ltd., he joined the student course of the Western Electric Co. (subsequently Standard Telephones and Cables, Ltd.) and upon completion of that course was assigned to the International Standard Electric Corporation as a telephone cable engineer. After a brief period in their London office he was posted early in 1928 to the Tedeschi factory in Turin, which factory was making telephone cables under licence from the International Standard Electric Corporation. After one year

in Turin he was transferred to the Polish Skoda factory at Warsaw. There he was responsible for the manufacture of the Warsaw to Lodz telephone cable, which was the first loaded trunk cable to be installed in that country.

Upon the completion of that contract in the following year, he returned to Italy where he supervised the manufacture at the Pirelli and Tedeschi factories in Milan and Turin, of the extension southward from Naples of the Italian trunk telephone cable network. By 1934 this network had been completed to Brindisi and across the Straits of Messina to Sicily, and he returned to England in that year.

He was then assigned to the telephone cable engineering section of the North Woolwich factory of Standard Telephones and Cables, Ltd., of which section he is now in charge.

He was elected a graduate of the I.E.E. in 1929 and was a contributor to the Students' Quarterly Journal. "An Impression of Poland" was published in the September, 1933, issue followed by "Italy To-Day" in the March, 1934, issue. In 1933 he was elected an associate member of the I.E.E. and in 1946 was elected to the Council of that body. In January, 1947, he became an associate of the Institute of Industrial Administration.

Whilst at college he was an exponent of the art of boxing, but his prolonged stay abroad prevented him from maintaining his prowess and he substituted tennis in its stead. His hobby is gardening and fruit culture.



# ELECTRICAL OVERSEAS TRADE

VALUE OF AUGUST EXPORTS DOWN BY OVER £1 MILLION

**D**UE to holidays and the fact that there were two fewer working days in August, the value of electrical goods, apparatus and machinery exported in August fell by £1 115 884 below the figure for July of £7 543 178. Last month's total of £6 427 292 was better than that for August last year, which was £5 680 880. The monthly average for 1938 was £1 829 198. Electrical imports dropped in value from £561 627 in July to £336 442 in August. For the eight months ended August 31 the value of electrical exports was £47 023 143, contrasted with £32 613 961 for the corresponding period last year.

Last month domestic radio receiving sets despatched overseas numbered 31 036, against 38 362 in July, 33 277 in August last year, and a monthly average of 7 053

in 1938; valves and cathode-ray tubes, numbered 287 768, compared with 428 274 in July, 424 167 in August last year, and 183 826 in 1938; electric bulbs and discharge lamps, 2 322 499 in August, contrasted with 2 875 347 in July, 2 571 255 in August last year, and 1 638 099 in 1938; generators, 989 tons in August, against 2 172 tons in July, 617 tons in August last year, and 858 tons in 1938; motors, 1 216 tons in August, contrasted with 1 301 tons in July, 928 tons in August last year, and 927 tons in 1938; other electrical machinery, 3 528 tons in August, as against 3 115 tons in July, 1 605 tons in August last year, and 1 938 tons in 1938. welding machinery and electrodes, 815 tons in August, against 629 tons in July and 663 tons in August last year.

	IMPORTS			EXPORTS		
	Monthly average, 1938	Month ended August 31		Monthly average, 1938	Month ended August 31	
	£	1946	1947	£	1946	1947
Submarine cables ...	—	—	—	17 289	20 867	34 149
Other telegraph and telephone wires and cables ...	—	—	—	71 803	280 446	319 515
Electric cables, wires, etc.—						
Rubber insulated ...	} 31 246	1 808	6 559	117 533	236 737	480 212
With other insulation ...				153 256	343 308	480 316
Radio and television transmitters, communication and navigational aid equipment ...	—	—	5 780	28 296	53 031	104 535
Radio receiving sets ...	10 148	10 609	282	36 755	325 123	380 015
Radio long distance telegraph and telephone equipment ...	9 243	2 750	8 708	242 716	536 934	510 327
Other descriptions ...	47 870	669 903	12 207	57 848	132 231	183 327
Transmitting and industrial valves ...	} 10 893	7 235	56 127	41 272	36 473	20 100
Other electronic valves ...					110 429	82 386
Electric furnace carbons ...	4 054	2 238	7 897	—	—	—
Other electric carbons ...	2 301	3 401	4 146	—	—	—
Electric bulbs and discharge lamps ...	10 265	1 518	2 351	49 440	92 088	105 983
Other lamps, lighting appliances and fittings ...	38 662	1 347	24 702	48 565	186 684	270 891
Batteries and or cells, primary ...	3 549	423	146	13 572	49 916	36 166
Accumulators ...	—	—	—	48 647	179 940	244 413
Parts and accessories ...	—	—	—	—	32 338	32 780
Heating apparatus and elements	—	—	—	14 064	54 247	91 614
Other heating equipment ...	—	—	—	16 600	66 281	119 983
Commercial electrical instruments and parts ...	32 057	6 348	12 647	15 878	43 543	83 575
House service meters ...	—	—	—	15 791	34 219	108 936
Other descriptions of instruments	—	—	—	9 612	42 123	65 950
Electro-medical apparatus ...	—	—	—	3 038	19 099	20 433
X-ray apparatus, vacuum tubes and parts ...	9 734	4 238	46 654	4 881	18 181	38 892
Insulating cloth and tape ...	—	—	—	7 038	38 481	33 958
Other insulating materials ...	—	—	—	12 305	67 762	67 791
Other articles ...	52 980	14 917	30 929	108 083	317 839	326 184
Generators and parts ...	—	—	—	157 150	149 301	363 729
Motors and parts ...	26 033	7 167	15 818	145 045	220 440	395 903
Other electrical machinery ...	14 455	11 467	83 301	355 663	439 061	967 069
Vacuum cleaners and parts ...	—	—	—	26 662	98 721	198 931
Other portable appliances	24 627	2 482	13 828	10 394	47 820	37 161
Welding machinery (including electrodes) other than tube making ...	—	12 796	4 360	—	107 217	228 068
<b>Total ...</b>	<b>328 117</b>	<b>760 647</b>	<b>336 442</b>	<b>1 829 198</b>	<b>5 680 880</b>	<b>6 427 292</b>



# ELECTRON JUBILEE

## FIFTIETH ANNIVERSARY OF SIR J. J. THOMSON'S DISCOVERY

TO mark the fiftieth anniversary of the discovery of the electron by Sir J. J. Thomson when at the Cavendish Laboratory, Cambridge, celebrations arranged by the Institute of Physics and the Physical Society, in collaboration with Institution of Electrical Engineers, commenced yesterday (Thursday) with two addresses at the Royal Institution. The first, by Prof. J. A. Crowther, dealt with the history of the discovery of the electron and early developments, and the second, by Prof. R. E. Peierls, was devoted to an explanation of the part played by electrons in modern theoretical physics. Yesterday evening (Thursday), Sir Clifford Paterson, delivered a public address at the Central Hall, Westminster, wherein he explained in non-technical terms how the discovery of the electron has influenced the lives of all of us.

To-day (Friday), at 10 a.m., at the building of the I.E.E., Sir G. Thomson will speak on electronics in research, and at 11 a.m. Dr. T. E. Allibone will speak on their relation to industry. At 3 p.m. there will be opened at the Science Museum, South Kensington, an exhibition of historical interest, and inclusive of working models illustrating the part played by electronic engineering in the world of to-day. The exhibition has been made possible through the co-operation of firms and organisations concerned with the electronics side of the electrical industry, and the Director of the Museum.

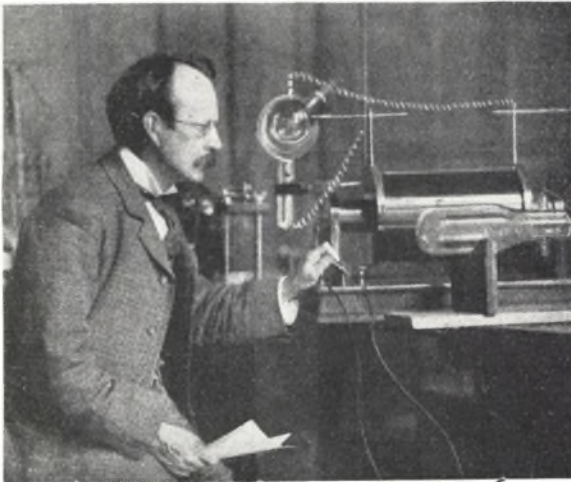
It is not possible in the space available to give a complete description of the exhibits, but below will be found a representative review of what may be seen, together with a list of organisations and firms responsible, among others, for staging the display. The exhibition is expected to remain open for at least three months.

The exhibition is divided into eight sections, each being devoted to a particular aspect of the subject of the electron and arranged to show progress in each field. Consisting largely of working demonstrations and "animated diagrams," the exhibits explain the principles involved in various electronic techniques and illustrate the advances made over a period of 50 years by examples of both early apparatus and modern industrial equipment. Arranged in a continuous sequence round the gallery, so that the visitor need not retrace his steps at any stage, the exhibits are accompanied by brief descriptive captions; labels of a general nature cover groups of exhibits or state general principles.

For those who require further details, an informative handbook has been compiled for the Institute of Physics by Mr. D. H. Follett, of the Science Museum. This takes the form of a guide to the exhibition, followed by a historical account of the discovery of the electron and a review of its modern applications. The book will be available at the museum, price 1s.

In the first section, devoted to the discovery of the electron by J. J. Thomson in the Cavendish Laboratory, in 1897, the historical background is indicated by a working demonstration of the successive stages through which an electric discharge in a gas passes as the pressure decreases.

Prof. Thomson's discovery of a new fundamental particle was first announced in a discourse on "Cathode-Rays" delivered at the Royal Institution on April 30, 1897. Explaining the curvature observed in cathode-rays acted upon by a uniform magnetic field, he stated that the path followed was that "which would be described if the rays marked the path of negatively electrified particles



*This illustration, which is the copyright of the Cavendish Laboratory, Cambridge, shows, J. J. THOMSON at work in his laboratory about 1899*

projected with great velocities from the neighbourhood of the negative electrode."

He then gave a demonstration with the apparatus illustrated in Fig. 1. This consisted of two co-axial cylinders, with slits

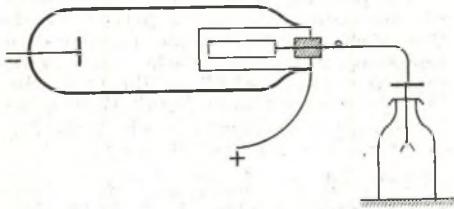


Fig. 1.—Diagram of the apparatus used by SIR J. J. THOMSON at his Royal Institution lecture in 1897

cut in them, the outer cylinder being earthed and the inner connected to an electrometer. The cylinders were so arranged that the cathode-rays did not fall on them unless deflected by a magnet. When a magnetic field was applied, however, the rays were deflected until they reached the slit and the electrometer became charged.

From this and similar experiments, Prof. Thomson concluded that "the rays are pouring a charge of negative electricity into the cylinder." He then performed a number of other experiments, one of which showed that cathode-rays were also deflected in an electrostatic field, and ended his paper with an account of work done in an attempt to establish the ratio of  $e$  to  $m$ . "These calculations," he said, "seem to favour the hypothesis that the carriers of the charges are smaller than the atoms of hydrogen."

It is interesting to recall that in THE ELECTRICIAN of May 21, 1897, in the course of a review of the Royal Institution paper, Prof. G. F. Fitzgerald spoke of Prof. Thomson's "by no means impossible hypothesis," and expressed the opinion that it might be "the beginning of great advances in science, and the results it would be likely to lead to in the near future might easily eclipse most of the other great discoveries of the nineteenth century."

In addition to the discharge tube displayed, the opening section of the exhibition demonstrates some of the properties of cathode-rays in Crookes tubes. An animated diagram explains the methods used by the French physicist, Perrin, in an experiment of 1895, from which he concluded that cathode-rays carry a negative charge, but which was open to many objections by upholders of the wave theory of radiation. Röntgen's discovery of X-rays (1895) is illustrated in another exhibit and

two of Thomson's experimental tubes are shown. Diagrams are used to explain the successively more accurate methods used to measure the charge on the electron.

The thermionic valve and the cathode-ray tube form the subject of the next section. A carbon filament lamp demonstrates the Edison effect in the form in which it was first discovered, and another demonstration shows how electron emission is increased by the use of oxide-coated cathodes. The evolution of the modern receiving valve is traced from examples of the original Fleming diode and the de Forest triode to a modern miniature fuze-type valve. Similarly, several examples of early and modern transmitting valves are shown, including Randall's first cavity magnetron and a klystron, the mechanism of the latter being explained in terms of a water-jet analogy. The cathode-ray tube is also represented in its earliest and most up-to-date forms. Other demonstrations in this section have been designed to show the working of a valve as a rectifier, amplifier and oscillator and to explain the principles used in modern applications such as television and radar.

The third section is devoted to photo-emission. The leakage of a negative charge from a plate irradiated by ultra-violet light and the varying response of photo-electric cells to light of various colours are demonstrated, and an animated diagram is used to explain the principle of the electron multiplier photocell. Modern apparatus relying on photo-emission is represented by the Super-Emitron television camera, the infra-red image converter and the G.P.O. speaking clock.

The theme of the next section is "the electron in the atom," and the five exhibits have been selected to show how the electron enters into the structure of the atom—illustrated by Mayer's floating magnets and Rutherford-Bohr atom models showing the relationship of atoms in the periodic table—the effect of the arrangement of the electrons in an atom upon its chemical and physical properties, and the relationship between electrons and atomic spectra. Various line spectra are demonstrated and spectrograms illustrate the application of line spectra to chemical analysis.

Wilson cloud track photographs in the fifth section illustrate the behaviour of the electron as a particle, while diffraction ring photographs, in contrast, typify those phenomena in which the electron is best considered as a system of waves. This section is concerned with wave aspects, and the examples of modern apparatus selected to show the applications of the wave picture include an electron diffraction camera, now widely used to study



the surface characteristics of a material, for which purpose the penetrating power of X-rays makes them of little value, and the first electron microscope to be built in this country. A modern commercial electron microscope is also shown and photographs illustrate some results obtained.

The main uses of X-rays to-day could be summed up as medical, material testing and analytical, and these three applications are dealt with in the sixth section. An animated diagram illustrates the production of X-rays by fast electrons and the development of tubes is shown by an early commercial version with an anti-cathode and concave cathode, a heavy duty "gas" tube with a water-cooled cathode and vacuum regulator, a Coolidge tube of 1913 and a more modern self-protected tube. One and two million V tubes for therapy and industrial radiography, too large for incorporation in the exhibition, are shown in photographs, and a modern method of producing X-rays with 100 million V electrons is represented by photographs of a betatron. Radiographs, photographs and models show some industrial applications.

A direct connection with Prof. Thomson's early work is made in the seventh section, which is devoted to the passage of electricity through gases, this time in its modern applications. The sudden increase in current at the ionisation potential in a gas-filled diode is made the subject of a working demonstration, and the use made of electric discharges for lighting purposes is illustrated by high-pressure mercury vapour lamps—an enlarged projected image of an arc shows the working of the discharge—sodium vapour and neon lamps and the low-pressure 80 W fluorescent tube. The removal of the coating along half the length of this tube demonstrates the increase in light efficiency provided by the fluorescent material. The same section deals with gas-filled rectifiers, these ranging from small rectifying diodes to a large glass bulb mercury pool rectifier. An application of gas-filled valves which may be seen working is "phase shift" thyatron control, a method relying on variations in phase between anode and grid voltages to regulate the anode current of the valve. An ignitron for welding is shown in section, and a Geiger-Müller counter detects  $\beta$ -particles in another working exhibit.

The last section of the exhibition deals with the motion of electrons in solids. A distinction is drawn between conductors, semi-conductors and insulators, and animated diagrams give a simplified picture of the function of electrons as carriers of current. Rectifiers, crystal detectors and surge diverters are also displayed, and the

last two exhibits show the application of a rectifier photo-cell to maintain the alignment of a cotton band feeding into processing machinery and the difference between fluorescence, phosphorescence and thermo-luminescence.

The portrait of Sir J. J. Thomson in his laboratory is the copyright of the Cavendish Laboratory, and permission to reproduce it in this article was kindly granted on their behalf by the authorities of the Science Museum, South Kensington.

Among the organisations who have provided exhibits are the following:

B.B.C., B.E.D.A., British Thomson-Houston Co., Ltd., Cinema Television, Ltd., Cosmos Manufacturing Co., Ltd., A. C. Cossor, Ltd., W. Edwards and Co. (London), Ltd., Electrical and Musical Industries, Ltd., E.L.M.A., Ferranti, Ltd., General Electric Co., Ltd., Haokbridge and Hewlett Electric Co., Ltd., Adam Hilger, Ltd., Hivac, Ltd., Marconi's Wireless Telegraph Co., Ltd., Metropolitan-Vickers Electrical Co., Ltd., M. O. Valve Co., Ltd., Mullard Radio Valve Co., Ltd., Pye, Ltd., Standard Telephones and Cables, Ltd., T.R.E., Westinghouse Brake and Signal Co., Ltd.

## Fire Protection

IT may now be announced that Benn Brothers, Ltd., Bouverie House, Fleet Street, London, publishers of trade and technical journals, have acquired from Lomax Erskine and Co., Ltd., the proprietorship of the monthly journal "Fire Protection and Accident Prevention Review," and of the "Fire Protection Year Book." The October number of "Fire Protection" will be issued under the Benn imprint.

Founded in 1938 with an eye to the need for a wider diffusion of up-to-date technical knowledge of fire fighting, and to assist the fire service in its task of reorganising to meet the expected ordeal of heavy air raids, "Fire Protection" has become well established as a paper for officers of the N.F.S., industrialists, business men and local and national Government officials interested in the better protection of life and property from fire. To the task of providing information and guidance on fire prevention and fire fighting and the administration of fire services, it has, since the war, added that of furthering safety and accident prevention in industry at large.

Mr. Basil H. Tripp, editor of "The Electrical Trades' Directory" and other Benn publications and a director of Ernest Benn, Ltd., who served in the Auxiliary and National Fire Services from 1938 to 1945, first as public relations officer to the Colsdon and Purley A.F.S., and later as a Company Officer in charge of fire stations in Croydon, has been appointed Editor.

# THE HEATING OF HOUSES

## EXPERIMENTS AT THE D.S.I.R. BUILDING RESEARCH STATION

**A**N experiment that should be watched with interest by the electrical industry is being carried out by a team of thirty scientists and technicians associated with the Building Research Station of the Department of Scientific and Industrial Research. The object is to ascertain how houses can be adequately warmed on the smallest consumption of fuel.

In London on Thursday, September 18, Dr. F. M. Lea, Director of Building Research, D.S.I.R., gave details of the experiment and said the results would be of importance not only to the occupants of new houses, but also to those of older dwellings for many of the appliances being tested were suitable for installation in existing houses.

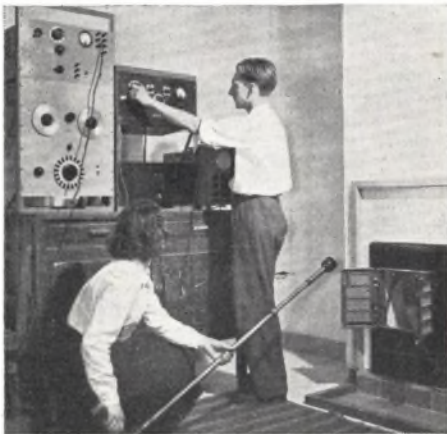
More coal is consumed for heating houses in this country than for any other single purpose. In 1938 60 million tons, or more than one-third of the total consumption, were used for domestic heating, cooking and so on.

Two large-scale investigations are being carried out by the staff of the Building Research Station to obtain precise figures for thermal conditions. The first is concerned with the thermal insulation of houses and is being carried out on eight specially built similar houses in which the insulation differs but the heating systems are the same. These houses have passed from the stage of being unoccupied laboratories and have been lived in by families for more than a year, while the experiments continue.

For the other investigation twenty houses of identical size and similar design have been erected at Abbots Langley in Hertfordshire. In these houses the constant factor is the thermal insulation, so that similar amounts of heat will be lost through the walls, roofs, floors, and so on, in every case. The variable factor is the method of heating. Some houses are fitted with complete central heating systems, others with devices to carry convected heat to the bedrooms, and all are fitted with a variety of stoves and open fires of modern design.

Each room in each house is fitted with many instruments, including thermometers of the ordinary kind and of special types for giving a continuous record over the 24 hours, arranged to register by means of electrical impulses passing over cables, at a central recording room. In the first stage of the experiment, which has commenced and will extend over several months, the houses will be empty. The

ventilation and opening of doors and windows will be carefully controlled, so as to keep conditions comparable between all the houses. All fuel used will be analysed,



*Using electronic equipment to measure the amount of noise travelling through ducts in the walls, which carry heat to the bedrooms*

weighed and carefully recorded. Times of stoking or switching on and off of appliances used will be noted, so that the amount of heat put into a house and the amount usefully used will be known. In all, 92 different appliances are being tested.

Two meteorological stations on the site give complete details of the weather, such as temperature, humidity, direction and force of wind and duration of sunshine. As soon as the results of the initial period are complete, tenants will move into the houses and the investigation will continue under the normal conditions of family life.

Results of the research will be made available to the building industry and to the public.

In one of the houses there are installed an electric tubular heater (under the window) which will provide background heat, topped up by a 1 kW electric fire in the living room; a portable electric convector in the hall and in each of the bedrooms; and an electric cooker in the kitchen. A domestic boiler will provide the hot water supply. In four other houses electric fires of the bar and spiral element types are used for topping-up or supplementing the heating. Three of these houses have electric cookers, and one has a 40 gal. electric water heater.



# PLUGS AND SOCKETS

by "SUPERVISOR"

BY now all concerned with plugs and sockets must be heartily sick of reading of these components, but recent developments make it impossible to drop the subject as of little further interest. The strongest advocates and warmest friends of B.S. 1363 must be a little shaken with the issue of Amendment No. 1 to the month-old specification—which applies also to B.S. 1362—and serves to emphasise a point upon which many have been seriously concerned.

It will be remembered that Clause 6 of B.S. 1362 says with reference to the fuse, "The breaking capacity rating shall be 1 000 A." All seem to agree that this is totally inadequate, for the prospective short which may have to be cleared can easily be in the neighbourhood of 10 000 A, or even higher. This view would now seem to be backed by the compilers of the specification, as the amendment reads "A fuse-link in a plug or in a circuit-fuse may not adequately protect an appliance connected to the plug or to the circuit. In such circumstances, an additional fuse is required for the protection of the appliance."

This might be fairly paraphrased as follows: "If you have any reason to believe that the fuse in the plug is not good enough for the job, you should put in an additional fuse." Surely this is a most disturbing addendum to a specification for a fuse in a 3 kW plug, which has presumably been designed to meet all possible needs within the prescribed rating? If the writer's interpretation of the addendum is incorrect, then the wording should be amplified to make its meaning clear beyond doubt. One technical publication seeks to explain the amendment by saying that the 3 A fuse may be too large to protect small appliances like radio sets, but surely this depends upon the operation of the fuse, especially the time and breaking capacity factors?

In any case, where is this additional fuse to be located? By the side of the 3 kW socket-outlet, which would appear to be the only place possible where ring mains are installed, and the expense and trouble of this would effectively damn the

new standard as of any value to installation progress. Possibly the compilers of the new specification have realised the fact that the fuse-link may be replaced by ordinary wires or pieces of metal in the plug, and are trying to overcome this risk by getting additional fuses installed. Anyway, it seems that some explanatory notes on the operation of the fuse in the plug should be issued, so that our minds are set at rest or our worst fears confirmed.

There is, too, another aspect of the matter which is being discussed amongst installation engineers, namely, that the new amendment appears to be tantamount to an official interpretation of the I.E.E. Wiring Regulations by the B.S.I. It will be noted that the amendment not only refers to fuses in plugs and sockets, with which it is properly concerned, but to a fuse-link in a circuit fuse. Every final sub-circuit must, according to I.E.E. Regulation No. 201, be fused, whether or not a fuse be installed in any subsequent plug or socket-outlet adaptor, and the conditions to apply when installing current-consuming appliances are set out in Section 7 of the Regulations. Neither in the regulation nor in the section is any requirement laid down that each appliance is to be fused separately.

To take the matter a little further—in the case of a circuit for, say, two electric radiators, this must be fused in accordance with Regulation No. 201; these radiators may then be separately fed through fused plugs. In the writer's reading of the amendment, if these fused plugs do not "adequately protect" the radiators—and who can definitely say what is, or is not, "adequate" protection—an *additional* fuse is required, and we are left to imagine where this additional fuse should be. This is clearly a B.S.I. and not an I.E.E. Regulation requirement.

As we know, however, all B.S.I. specifications are recognised as acceptable as complying with I.E.E. Regulations, and this addendum cannot escape being read as part of the Regulations, to the confusion of electrical contractors and others who naturally do not expect to look for

*In the article below, the author makes special reference to Amendment No. 1 to B.S. 1363. His views are based on many expressed in the installation trade and comment upon them is invited.*

interpretations of Regulations in B.S.I. specifications. This is a new development, and must be firmly nipped in the bud; it is hoped that the Wiring Regulations' Committee may have an official pronouncement to make at an early date.

What a sad and exasperating spectacle this domestic plug and socket-outlet standardisation has been. First, we have the standardisation of an untried and hurriedly-designed accessory — untried, that is, as regards the new standard, as 3 kW fused plugs along similar lines were experimented with and abandoned years ago—whereas the usual practice is to standardise along tried and well-tested lines with possibly years of practical experience in addition. We then find that the specification incorporates a fuse which is, in the experience of many, of totally inadequate breaking capacity, and open to the worst abuses that can befall fuse-links. Finally, the publication of an apparently hasty and ill-conceived second thought, under all the appearances of panic. What next?

As has been pointed out elsewhere, it will not be impossible for consumers to instal replacement cartridge fuses of completely inadequate capacity, as some of the

fuses to B.S. 136, cartridge fuses for domestic consumers' units, and to B.S. 646, low-voltage cartridge fuses up to 5 A capacity for plugs and radio equipment, will fit into the plug fuse clips. The consumer may well think he is doing the right thing by using a cartridge fuse, until something blows up.

The industry desperately needs a standardised domestic fused plug and socket outlet that will supersede existing standards and eventually lead to the utilisation of one size of plug and socket-outlet for all purposes. It does not need just another plug and socket-outlet which it seems to be getting at present, and surely it is not beyond the wit and inventive powers of the industry to provide this accessory? Are we to struggle along with amendment after amendment, or can we have one big bang at the problem and solve it altogether? We want a 3 kW fused plug that will prove adequate for 3 kW under all conceivable conditions of usage found in domestic and similar premises, with a fuse that can be installed and forgotten, and when necessary replaced by the consumer without risk to himself and his family. This rather postulates that we do not want B.S.'s 1362 and 1363.

## The Klip Power Station

**L**ARGEST of the power stations controlled by the Electricity Supply Commission of South Africa, Klip, on the Witwatersrand, last year sent out 2 614 328 036 units, a decrease of 1.086 per cent. from the previous year's figures, according to the annual report of the Commission. The whole output of the stations' twelve 33 MW generating sets, which may be seen in the illustration reproduced on this page, is sold to the Victoria Falls and Transvaal Power Co., Ltd., who also operate the station, for supply to the gold mining industry and other consumers in the locality.

The decline in units sold is accounted for by the transfer of off-peak loading to the Vaal station. Despite this, the average load factor calculated on 8760 hours running was 82.6 per cent., the maximum hourly demand being 361 350 kW. Situated adjacent to a colliery, from which coal is screened, crushed and delivered by conveyors to the station bunkers, Klip last year consumed fuel at an average rate of 1.801 lb. per unit and registered a thermal efficiency (units sent out) of 20.73 per cent. The average price of coal was 4s. 4d. per ton, against 4s. 2d. in 1945, and the average price per unit sold increased by 3.37 per cent. from

0.1049d. in 1945 to 0.1084d. last year. The station is steamed by 24 boilers delivering 180 000 lb. of steam per hr. at a pressure of 355 lb. per sq. in.



*The interior of the Klip station, showing 12 33 MW sets*

The newest of the Commission's stations is at Vaal, where generation commenced in January, 1945. There are at present four 33 kW A.S.E.A. sets, steamed by six 190 000 lb. per hr. boilers, and further extensions are contemplated.



# Electrical Personalities

*We are always glad to receive from readers news of their social and business activities for publication in this page. Paragraphs should be as brief as possible.*

DR. H. G. TAYLOR has been appointed by the Council of the British Welding Research Association



DR. H. G. TAYLOR

as a director of research in place of Mr. A. Ramsay Moon. As an apprentice electrician with Vickers, Ltd., Dr. Taylor obtained the firm's scholarship to the University of London, where he graduated in electrical engineering. A Royal Scholarship made possible a year's post graduate research at the City and Guilds College, resulting in the M.Sc.(Eng.) degree. He then joined the Metropolitan-Vickers Electrical Co., Ltd., as a college apprentice, and was posted later to the research department. In 1929 he joined the staff of the E.R.A. to commence investigations on the subject of earthing. This work, for which he was awarded the degree of D.Sc.(Eng.) by London University, was the cause of substantial changes in earthing practice. In 1937 Dr. Taylor was appointed electrical engineer to the Copper Development Association, and he then became technical adviser to Philips Industrial and manager of the industrial development department of Philips Electrical, Ltd., in which position he has been, for the last five years, closely concerned with arc and resistance welding. Dr. Taylor is a member of the I.E.E., and of the Society of Engineers, and is a Fellow of the Institute of Physics. He hopes to take up his new appointment by the beginning of November.

LT.-GEN. SIR RONALD M. SCOBIE has been appointed a director of British Insulated Callender's Cables, Ltd.

MR. C. W. BURBIDGE, who had been acting in a temporary capacity, has been appointed meter testing assistant in the Hammersmith electricity department.

MAJOR KENNETH GORDON has been awarded the Melchett Medal for 1947, by the Institute of Fuel, and this will be presented to him by the president, Dr. C. H. Larder, at Gas Industry House, 1, Grosvenor Place, London, on October 16,

at 2.30 p.m., when he delivers his Melchett lecture on "Hydrogenation in the Fuel and Chemical Industries."

MR. PERCY M. MAXWELL, electrical engineer to the Batley Corporation since 1931, has intimated his intention to retire at the end of the year. He has served the corporation for nearly 40 years.

MR. JOHN WILMOT, Minister of Supply, while spending a week's holiday in Co. Fermanagh, inspected the Erne hydro-electric scheme at Ballyshannon. He was accompanied by Mr. Harty, chief engineer, E.S.B., Dublin.

MR. G. E. HARTZ, representing the electrical machinery interests in the Federation of Danish Industries, was a member of the Danish Trade Mission which came to London on Monday and took part in discussions held under the auspices of the Federation of British Industries on Tuesday and Wednesday.

SIR ERNEST FISK, now resident in London as governing director of the E.M.I. group of companies, has been admitted to the freedom and livery of the Company of Glaziers. This is one of the ancient London guilds and admission entitles its members to claim the freedom of the City of London.

MR. J. E. M. JOHNS and Mr. D. F. HARRISON have been appointed joint general managers of the valve department of the Mullard Wireless Service Co., Ltd. Mr. L. A. Sawtell has been appointed commercial manager and will be responsible for distribution in the entertainments field.

MR. W. E. W. PETTER, chief engineer of the English Electric Co.'s aircraft division, Preston, has accepted the chairmanship of the newly-formed Preston branch of the Royal Aeronautical Society, which has a membership of 130. Mr. D. B. Smith, also of the English Electric Co.'s aircraft division staff, has been appointed honorary secretary.

MR. G. E. W. HIRD, who, as was announced in our last issue, has taken up the appointment of electrical engineer and manager at Brierfield, Lancs., was with Keighley electricity department for some nine years, during which time he was successively installation engineer, mains assistant, and technical assistant and

street lighting engineer. He went to Bingley U.D.C. in 1942, as mains superintendent.

SIR ROBERT RENWICK, chairman of the company, was presented with a Queen Anne one pint silver tankard, subscribed for by the employees of the group, at the third inter-company "Olympic" of the County of London Electric Supply Company and associated companies. The presentation was made by Mr. Young, of the Bournemouth company, who is the oldest employee, having completed 50 years' service. Mr. Young, in turn, was presented with a set of bowls, also from members of C.L.E.S.CO., by Sir Robert Renwick. Lady Renwick distributed the prizes at the sports.

The Registration Board of the National Register of Electrical Installation Contractors have decided that the time is opportune for the reconstitution of the Scottish Committee, and after consultation with the bodies concerned, it has been agreed that composition shall be made up of six

representatives from the supply industry, six from the contracting industry, of whom four are to be nominated by the E.C.A. of Scotland, and three independent members. The persons selected to fill the various classifications are: Messrs. J. S. Denholm, W. A. Smith, J. M. McLennan, R. A. Smith, nominated by the E.C.A. of Scotland; Messrs. J. F. Field, G. Morgan (I.M.E.A.); Mr. H. R. Taggart, Clyde Valley Electric Power Co.; Mr. J. C. E. Baillie, North of Scotland Hydro Electric Board, and Mr. A. B. Mavor, Lothians Electric Power Co.

MR. ERNEST T. GOSLIN, contracts manager for the Central Electricity Board from 1933 until his retirement two or three years ago, died at his home at Northwood, Middlesex, on Tuesday, September 23. He was with the Clyde Valley Electrical Power Co. before going to the C.E.B.

MR. F. E. HOCKLEY, for 28 years charge engineer at the Croydon electricity works, has died at the age of 62 years.

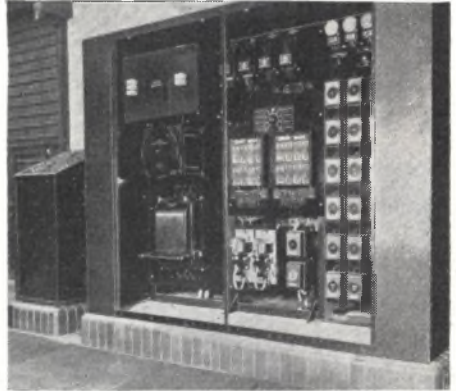
## Lighting Control in Ayrshire

WITH the restoration of street lighting, an extensive installation of "Rythmatic" ripple control equipment was brought into service in Ayrshire, lamps at such widely separated points as Largs, Ardrossen and Ayr being switched on from the central control point at Kilmarnock.

This system, installed by the designers and manufacturers, Automatic Telephone and Electric Co., Ltd., utilises the existing distribution network for performing distant switching operations from a central point.

The generating and transmitting station is located at Kilmarnock, radial feeders serving the area. Direct capacitor coupling for the ripple control current is applied to the two sections of the 11 kV system, the ripple frequency current being fed from the ripple alternator, via a line-isolation transformer and tuning inductors to the capacitors. The maximum transformation of the ripple current is 11 kV, 22 kV, 33 kV, 11 kV, 3.3 kV, 240 V, i.e., five transformations. The equipment has an initial capacity for eight different signals. Its principal applications will be the con-

trol of street lighting and load shedding of water heaters and the like. The lighting load totals 3 000 kW initially, and has



Control desk and auxiliary apparatus cubicle of the "Rythmatic" ripple control equipment, installed on the Ayrshire street lighting system

been divided into four zones. Each zone has a separate "on" signal, and the switching on is in sections to minimise the instantaneous load. Switching off is effected in two stages.

We are indebted to Mr. Wm. C. Bexon, general manager and engineer of the Ayrshire Electricity Board for permission to publish these details.

The Trade Union Side of the National Joint Industrial Council for the Electricity Supply Industry, on Tuesday, celebrated the inauguration of the British Electricity Authority, with a dinner at the Dorchester Hotel, London, with Mr. E. Shinwell, Minister of Fuel and Power, as chief guest.



# ATOMIC ENERGY AND STATE

## SIR ROBERT RENWICK ON GOVERNMENT RED TAPE

**I**N an address delivered at a luncheon meeting of the Society of Individualists and National League for Freedom in London, on September 18, Sir Robert Renwick, chairman of the County of London E.S. Co., Ltd., stated, after an attack on the Government for misuse of its powers, that atomic energy as a new source of productive power for industry, meant the birth of a second industrial revolution in which Britain could and should take the lead. Its development in this country was a State monopoly, and as such was wrapped in inevitable red tape. From time to time, some justifiably disgruntled scientist aired his views on the international and political aspect, but industry was, on the whole, in the dark as to this most vital activity.

### SCIENCE AND INDUSTRY

Progress on atomic energy development was being held up by a number of factors. The first was the inability of the Government to view the problem in its proper perspective and to bring the right degree of urgency to bear upon it. The second was reluctance, based on political prejudice, to take British industry fully into their confidence. As a result, scientists were being called upon to tackle engineering jobs, which was industry's function, instead of concentrating on fundamental research, which was the function of the scientist. The third factor was the Government's handling of what was, in essence, a scientific and industrial problem, as yet another essay in bureaucracy, and that was the surest and most certain way of stifling progress in a matter of that sort. The consequence was that we were a long way behind the Americans.

Mainly because of the Government's lack of drive, Britain had, until quite recently, no supplies of plutonium and in the present conditions there was little likelihood of the leeway being made up for several years to come. America, on the other hand, had for a considerable time been building up comparatively large stocks of that vital material. If, at the end of the war, 200 lbs. of plutonium had been made available to Britain, we could have started up a pilot plant for "breeding," or multiplying the supply of that material, and we would now be manufacturing all the plutonium which could usefully be employed for development and power production purposes. If, in addition, British industry had been brought into the picture in the same way as American industry in America, development would have been

pushed ahead faster than it had been.

Great Britain alone of all the European nations had a moral right to a supply of plutonium from America. It was we who sent America our whole team of atomic experts, who put every scrap of their hard-won knowledge unconditionally at the disposal of our ally.

Sir Robert was not holding up a vision of Britain immediately reclining in idleness while a few atomic plants did the work. The way out of our present predicaments would, he feared, be a hard one, though, given determination, a return to sound Government, hard work and purpose, Britain, in collaboration with the Empire surely would come through. With a full and not, as at present, a half-hearted and nerveless effort, and with industry to the forefront of all that was done, the release of 50 million tons of coal or more for export was possible through atomic power or an equivalent development. That, he was convinced, could be achieved within a period of years; how many years depending upon the effort now made.

Sir Ernest Benn, president of the society, was in the chair, and the gathering numbered 150.

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### *European Recovery Plans*

**A**CCORDING to the official summary issued after the signing of the report, on Monday, of the Committee set up to consider the Marshall offer, the 16 nations formulating the economic recovery programme to put Europe on its feet by the end of 1951 are planning to increase their combined generating capacity by 25 000 000 kW, or nearly two-thirds above the level of pre-war. An expansion of electricity output by 70 000 000 000 kWh per annum, representing an increase of 40 per cent. over the present year, is also proposed.

Projects, states the summary, are being developed for common planning of new sources of power. The plan selected by the Committee provides for the erection of a series of power plants to exploit the hydro-electric resources of the Alps, certain German lignite deposits and Italian reserves of geothermic energy. This work involves the co-operative development of resources cutting across frontiers, and the decisions are being taken without regard to national boundaries.

# Electricity Supply

**Douglas (I.o.M.).**—The installation of fuel oil burners for supplementary firing at the Pulrose power station is contemplated.

**Sheffield.**—A tender from Switchgear and Cowans, Ltd., for the supply of 11 kV, 150 MVA switchgear at the Neepsend generating station has been accepted, and the Corporation has also accepted a tender from Messrs. A. Reyrolle and Co., Ltd., for additional equipment required for the modification of the existing primary distribution switchgear. The Corporation has approved mains extensions, etc., at an estimated cost of £24 021, and distribution extensions necessary for statutory purposes, estimated to cost £11 860.

**Bedford.**—One of the 14 new generating stations to be built as part of the C.E.B.'s 1950-51 programme announced in our last issue will be located on a 130 acre site selected by Messrs. Merz and McLellan on the eastern fringe of the town. The station will have a final installed capacity of 120 MW, comprising four 30 MW turbo-alternators and five 300 000 lbs. per hr. boilers. In the first stage, two sets and three boilers are to be installed. The estimated costs are £2 894 320 for the first stage and £2 040 180 for the remainder. The town's existing station has a capacity of 23 300 kW.

**Middlesbrough.**—The annual report of the electricity undertaking shows a balance of £41 095, to which is added £8 458 brought forward from the previous year, making a total available sum of £49 553. From this sum is deducted £6 140 for interest, £22 232 for redemption, £3 296 for income tax and £235 for revenue contributions to capital, leaving £17 649 to be carried forward. Total costs amounted to £174 081, while the net amount received for electricity sold was £205 478. Electricity sold during the year amounted to 34 350 826 units, compared with 27 314 833 units in the previous year. Generation costs were £110 390 and distribution costs £21 598. The total costs amounted to 1.270d. per unit sold, compared with 1.222d. the year before and 1.304d. for 1938-39.

**West Ham.**—Total sales for the year ended March 31, 1947, of 172 770 275 units, an increase of approximately 22 million units over the previous year, are recorded

in the annual statement of the Engineer and Manager, Mr. J. W. J. Townley. The accounts show a net surplus of £72 951, compared with £53 534, and a gross revenue of £1 069 246. An interesting illustration of the growth of individual demand is provided with a comparison of the statistics for the year recently ended with those for 1939. In that year, with a total of 56 315 consumers, total connections were 201 109 kW and total sales, excluding traction and bulk supplies were 147 440 866 units. In 1947, only 44 382 consumers were connected, representing a total load of 193 598 kW, and sales had risen to 156 089 332 units. The maximum load on the generating station during the year was 58 100 kW, a decrease on 1946 of 5 300 kW. Generating capacity remained at 76 500 kW.

**Derby.**—A net surplus for the year of £32 270, compared with £5 072 in 1946, is shown in the annual accounts of the undertaking, presented by the Chief Engineer and General Manager, Mr. F. H. Pooles. The year's total revenue amounted to £721 936, an increase of £60 770, but, as working expenditure at £599 371 was £66 655 more than in the preceding year, the gross profit decreased by £20 045 to £122 565. Special expenditure decreased by £13 038 to £5 116. In total units sold there was an increase during the year of about 9½ per cent., to 171 979 255 units. Units sold for lighting, heating and cooking increased by nearly 18 million, against a fall in industrial sales of nearly three million units (5 per cent.). The average price per unit sold showed a reduction from .943d. to .934d. In the generating station, no major extensions were carried out during the year, the effective capacity remaining at 65 500 kW, with a total boiler capacity of 695 000 lbs. of steam per hr. Nearly 60 per cent. of the fuel delivered was opencast coal which travelled by road from sites in the neighbourhood. With a maximum demand on the generators of 66 400 kW (67 200 kW) and a station load factor of 42.9 per cent. (41.9), the undertaking generated 249 765 300 units (246 735 000) of which 57 194 400 units were exported to the C.E.B. Imports from the Central Board amounted to 14 709 000 units, compared with 6 844 200 in the previous year. Eighteen new transformers, with a total capacity of 35 585 kW, were added to the distribution system during the year.



# PUBLIC LIGHTING

## SOME NOTES ON DISCUSSIONS AT A.P.L.E. CONFERENCE

THESE were given in our last issue short abstracts of the papers read at the conference of the Association of Public Lighting Engineers, held at Southport, and below will be found some brief details of the discussions which ensued.

### LIGHTING AND SAFETY

The reading of the paper "Street Lighting in Relation to Road Safety, Traffic Problems and Crime Prevention," by Messrs. A. E. Marchant, electrical engineer, Barking, and Robert Bell, electrical engineer, Erith, was followed by the President mentioning that there were present, as guests of the association, 20 chief constables from Lancashire, Cheshire, and Yorkshire. The discussion was of a general character and an outstanding feature was the support which all the representatives of the police gave to the demand for increased public lighting, not only in relation to the present restrictions—which it was implied should be relaxed—but generally.

Mr. E. C. Lennox (North-Eastern E.S. Co., Ltd.) maintained that the claims for reduced lighting in order to conserve coal supplies were offset by the damage to the public morale, accidents to motor vehicles and the need for repairs, and the necessity for hospital treatment for accidents, added to which there was a loss of man-power through street accidents and a general waste of national resources. All these aspects, he maintained, resulted in a greater use of coal than was saved by reduced lighting.

Mr. W. Bicknell (Siemens Electric Lamps and Supplies, Ltd.), expressed satisfaction that, at the instance of the B.S.I., a sub-committee had been set up by the Road Research Board under the chairmanship of Sir Clifford Paterson, to consider the general question of street lighting in relation to road accidents.

For the rest, the speakers in the discussion all agreed with the need for improving public lighting and the removal of the present restrictions, and it was made clear that there is an increasing tendency for lighting authorities and the police to co-operate more than has been the case in the past. Mention was made of the fact that the problem of improved street lighting had been discussed for the past 25 years.

The paper, "Maintenance of Public Street Lighting," by Mr. J. Woodhouse (Sheffield), also promoted some discussion when Mr. A. G. Tookey (Bristol), opening

the debate, criticised the Sheffield system of maintenance and objected to the lamp attendants having to fill in so many forms.

Mr. R. S. Bradley (Portsmouth) criticised the paper for not giving enough information. It appeared from the paper that gas lighting was more costly to maintain than other forms and he asked those responsible for new installations to take note of that point.

Mr. R. Parker (Aberdeen) also said that there was not sufficient detail in the paper. The author had dealt with only the single-piece refractor which was open to the accumulation of dirt. There was now the two-piece refractor with sealed in prisms and also the non-ventilated refractor.

Mr. W. Hine (Y.E.P.Co.) said he was responsible to a number of lighting authorities throughout an area of some 3 000 sq. miles. In many cases it was impossible to carry out a routine inspection such as that outlined in the paper; as an instance, there was one village in his area which had only one street lamp—a mercury vapour lamp on a 30 ft. pole—and its maintenance necessitated sending a tower from Leeds 20 miles away.

Mr. L. A. Doxey (Leeds) acknowledging that manufacturers were giving assistance in regard to street lighting problems, suggested that before a new fitting was put on the market they should try and erect, say, 30 of them with a tower wagon on a very wet day. That would give them some idea of the problems of maintenance. He also urged manufacturers to try to produce a dust-proof fitting.

Mr. C. C. Smith (Liverpool) also felt that the question of filling in forms must be carefully watched; while Mr. J. H. Morrison (Bolton), acknowledging the readiness of manufacturers to co-operate with public lighting engineers, suggested that better results would be obtained if manufacturers consulted lighting engineers before putting new designs on the market.

### PHOTOMETRY

The paper on Wednesday morning was "Street Lighting Photometry" by Dr. S. English.

Dr. N. A. Halbertsma (Holland) opened the discussion and said that he disagreed with the idea of trying to measure candle power in certain directions in the street, in that it was difficult to prevent light from other sources affecting the measurement. He understood that the proposal to

measure in this way was made because of objections to measuring candle power in the laboratory, but in his view there were sources of error on the road which were worse than any encountered in the laboratory. Moreover, there was greater difficulty in ensuring constant voltage when measurements were taken on the road than when they were taken in the laboratory. Although Dr. English had spoken of the time when the foot-candle was condemned without anything else really being put in its place, he did not think that was a reason for giving it up. At the same time a great deal of work had yet to be done in connection with the measurement of brightness as distinct from illumination. A simple method of measuring brightness was put forward by an Italian named Peri in 1908 at one of the meetings of the International Commission on Illumination. One feature of all brightness measurements was that there were so many factors involved, but certain simplifications were possible which would lead to more rapid progress in dealing with the measurement of brightness.

#### LIGHT DISTRIBUTION

Mr. E. Stroud expressed the view that the suggestions in the paper made the draft specification more complicated and difficult to operate. All suggested testing the distribution curve of the lantern at the main peak angle through the vertical non-axial by  $10^\circ$  or  $12^\circ$ . Such measurements ignored the horizontal width of the beam and also the distribution closer to the lantern and, in his view, would be subject to the same criticism as the "test point" values of the original B.S. 307. For a road measurement of achievement, the type of test suggested in the draft specification, which took into account the lanterns beyond the one nearest the test point, was surely the most practical. At the same time, he agreed that it would be better if this measurement were taken, say, 2 ft. into the carriageway and not on the kerb. The brightness of a road surface with a given installation depended on the texture of the surface, which itself varied with time and repairs, and also upon atmospheric considerations. So long as there was sufficient light and the object was in contrast with the background, it was not of great importance that the background was of a definite high brightness. A great deal depended on the type of light source and the design of fitting. In this connection he illustrated an installation in Preston Road, Brighton, using a fitting designed by Mr. Pryce Jones, the electrical engineer at Brighton, in which three gas-filled lamps were used in line, the fitting being designed to give Type 3 distribution of the B.S. draft specification.

This gave very uniform lighting and, moreover, in the less busy periods the lighting could be cut down to two-thirds or one-third without spoiling the uniformity, as was the case when alternate lanterns were extinguished.

Mr. P. Hartill suggested that in any future specification or code of practice, it would be desirable to include some limitation in lantern brightness in certain directions. If this was not practicable, there should be some recognition of the merits of sources of low brightness. It was a matter of common observation that a 5 ft. fluorescent tubular lamp, for example, was not so glaring as a so-called point source of approximately the same candle-power, yet so far as he was aware there was no clause in the M.o.T. final report or in any B.S.I. specification which dealt with the brightness of a street lighting lantern.

Mr. H. S. Allpress (Simplex Electric Co.) supported Dr. English that the question of surface brightness, *per se*, had a very dangerous aspect and that it was necessary to consider an installation from the point of view of the job it had to perform. There was a good deal to be said for photometry as a means of ensuring that the installation was working with reasonable accuracy and the manufacturer had carried out his contract, but the checking of the actual performance was far better left to the laboratory.

Mr. L. T. Minchin said it was important for the lighting engineer to know what his lumens were doing, and although many thought it was more satisfactory to test in the laboratory, he felt there was a need for the man on the job to be able to see whether he had been given what he expected. One of the troubles of the specification was that it specified so many lumens per 100 ft. of road, no matter where they went.

#### ILLUMINATING SIDE STREETS

The paper "Side Street Lighting," by Mr. R. W. Steel (borough electrical engineer, Cheltenham), was read on Thursday morning and, opening the discussion, Mr. E. C. Lennox (Newcastle-on-Tyne) said he thought that the A and B class roads recommended by the M.o.T. Report sufficiently covered all needs. There was, however, room for sub-groups within those two classes. At the same time there was a necessity to limit, to some extent, the expenditure on side street lighting and there was no reason why non-traffic routes could not well be lighted with 120 ft. spacings, or perhaps somewhat less in the wider roads, with 150 W lamps. This would cost very much less than if discharge lamps were used. The saving thus effected might be used to improve the lighting of the



traffic routes. If saving in coal was the criterion in dealing with street lighting, then there was much to be said for the use of electricity in all places as against any other form of lighting.

Mr. C. C. Smith (Liverpool) spoke in favour of the use of cut-off fittings or partially cut-off fittings and said that although in the past the great argument against these fittings had been cost, that must not be allowed to be the deciding factor. Generally speaking, in narrow side streets every effort should be made to do away with poles and use brackets fixed to the houses.

Mr. H. Allpress (Simplex Electric Co., Ltd.) also suggested the greater use of brackets instead of poles. The question of the colour of the road surface, the trees, and the number of pedestrians using the road must be taken into account. As to the comparative cost of coal for gas and electric lighting, he would have liked to see it expressed as per ton of coal and per ton of steel in both cases and the probable lumens per £ sterling.

Mr. R. Parker (Aberdeen) disagreed with the author that there was need for any other classification than Class A and B roads. On the question of tree lined roads, he urged consultation between those responsible for laying out new estates and the lighting authorities.

Dr. N. A. Halbertsma (Holland) said that a paper on the influence of trees in relation to street lighting was to be read at the Convention of the Illuminating Engineering Society in America shortly, and he urged co-operation between the various departments concerned in this matter.

Mr. J. C. Christopher (General Electric Co., Ltd.) thought it unnecessary to have a third class of road. On the general question of side street lighting, the trouble was, he thought, that this was planned largely on the pattern of trunk road lighting, whereas side street lighting was primarily for the pedestrian and for police purposes, and should be planned accordingly.

Mr. L. T. Minchin expressed the view that cut-off lighting for side streets could be very good, provided it was properly applied.

Mr. J. A. Prowse said, with reference to the tables in the paper relating to electric and gas lanterns, that he had extended one sample of each to the following effect. An electric sodium lantern rated at 3 000 lumens in a dusk to dawn season used 548 units consuming 712 lb. of coal, say one-third of a ton; a comparative gas lantern rated in the table at 3 000 lumens consumed from 4.5 to 15 ft. of gas per hour, but if fitted with five No. 2 mantles it con-

sumed 250 therms per annum or 3½ tons of coal.

Counc. E. Roscoe (Worsley) spoke in favour of reducing street lighting rather than reducing the supplies of coal to industry, and Mr. H. T. Duke (Grimsby) suggested that side street lighting should be planned with an eye on the possibility that, in the future, particular side streets might become main traffic routes.

Mr. F. C. Smith (Gas Light and Coke Co.) said that a school of thought was growing up which was in favour of two or more mounting heights due to the



*The G.E.C. demons rayon lighting in H.gho<sup>n</sup> Street, Southport, described last week*

difference in the character of side streets. He would have liked, however, the conference to have turned attention to the real problem of side street lighting. These roads could not necessarily be legislated for in terms of main roads. The problems were entirely different, but it was up to the B.S.I. Committee to consider again the peculiar problems of side streets.

On the Thursday afternoon, Mr. A. B. Knapp-Fisher (Royal Fine Art Commission) addressed the conference on "The Royal Fine Art Commission and Lamp Columns." In this he dealt with the aesthetics of lamp columns with special reference to the work of the Commission. He pointed out that the Commission had neither the powers nor the inclination to force their ideas or ideals upon street lighting authorities, but they tried to ensure that their recommendations were not only practical but realistic. The Commission had wide powers and was charged with safeguarding the improvement of what were called, for want of a better word, the public amenities. But the Commission carried out its work by co-operation, and it needed the support of an educated public and of all those engaged in industry. He emphasised that co-operation between the Commission and the electricity supply industry had brought about a much better design of power

stations throughout the country; other instances not connected with electricity or gas were also mentioned. Coming to what he termed "street furniture," Mr. Knapp-Fisher said that the essential quality in sound design was "fitness for purpose," and the considerations in regard to lamp columns were both technical and aesthetic, the latter meaning refinements after due consideration had been given to technical demands. It was the wish of the Commission to approve all designs in the general interest of the whole country and he expressed his satisfaction with the manner in which the designers and manufacturers of lamps had responded to this desire and the manner in which they were endeavouring to put on the market not only a readily saleable article but one whose design would do credit to the neighbourhood. Complete standardisation

should be avoided and there should be closer co-operation between manufacturers and lighting authorities. Summing up, he said the essentials appeared to be (1) for the manufacturers to get a good designer, (2) there must be co-operation and goodwill and understanding between all concerned, and (3) the education of public opinion, because it was impossible to legislate much in advance of public opinion.

A resolution was proposed and seconded, protesting against the cut of 50 per cent. in public lighting, but strong objection was taken by many present that it was not fair to put such a resolution at the end of the conference when many had already left. Eventually, an amendment "That the question be not put" was declared by the President to be carried on a show of hands.

## Street Lighting Development

Annual Luncheon of the Association of Public Lighting Engineers

THE annual luncheon of the Association of Public Lighting Engineers was held at Southport on September 17, when Dr. N. A. Halbertsma, adviser to the Dutch Ministry of Works on matters relating to public lighting, proposed the toast of the association. He said, among other things, that as far back as 1667 Jan van der Heyden invented a street lantern using oil, which was subsequently adopted in Amsterdam and many other cities in western Europe. Later, this same inventor improved the lantern, and subsequently became the first city inspector of lighting in Amsterdam. Another pioneer of street lighting was Lavoissier, who unfortunately lost his head under the guillotine during the French revolution. But for his early end it was likely that there would have been greater developments in street lighting. Then there was Mr. A. P. Trotter in this country, one-time Editor of *THE ELECTRICIAN*, who designed the first refractor lantern in 1883 to improve the distribution of arc lamps. Referring to sodium and mercury vapour lamps, Dr. Halbertsma expressed the view that these would not have developed for street lighting as they had if they had been first introduced for home lighting, as their failure for that purpose in the early stages would be undoubted. Thus it was to street lighting experiments that the present position of these lamps was due. He emphasised that public lighting was not just a branch of illuminating engineering, but a separate profession in itself, for the public lighting engineer had not only to deal with technical difficulties but human problems, not only in regard to the public but also

in regard to the staffs that were necessary for the supervision and maintenance of installations. Commenting on the use of gas and electricity for street lighting and the competition between them, he said he might parody Rudyard Kipling and say: "Gas is gas, and electricity is electricity, and never the twain shall meet," and although, generally speaking, that was true, there was a closer relationship between those responsible for the two forms of illumination. It was now the endeavour to secure the best from both, and in this lighting engineers were setting an excellent example in co-operation.

The President, Mr. T. Wilkie, responding, said that the present restriction on public lighting was greatly hampering social life and social intercourse and, therefore, was bound to have a bad result in the long run. Public lighting authorities were restricted to 50 per cent. of their pre-war lighting. In round figures that represented 500 000 tons of coal a year, which seemed a lot but, in fact, it was not. Put in another way, it was about the amount that had been lost during the recent Grime-thorpe strike, or about two weeks' output of outcrop coal. Whilst the amount of coal saved by the restriction on public lighting was relatively small, it must also be remembered that there were other factors brought in by the restriction as, for instance, the increase in road accidents and in crime.

Mr. A. E. N. Taylor (Ministry of Transport) said that the decision to cut street lighting by 50 per cent. was not taken by the Ministry, but was taken by the Government as a whole.



# Industrial Information

## Scottish Exhibition Extended

"Enterprise Scotland" Exhibition will not close at the end of this month as intended, but will continue till the middle of October and possibly longer.

## E.I.B.A. Ball

The E.I.B.A. ball will be held on the second Friday in November. Gifts of prizes will be extremely welcome and applications for tickets, accompanied by appropriate cheques, can now be received by the Secretary at 32, Old Burlington Street, London, W.1. Tickets are 30s. each.

## National College of Horology

The opening of a National College of Horology and Instrument Technology, accommodated at the Northampton Polytechnic, St. John Street, London, should do much to foster the watch and clock and scientific instrument industries in this country. Diplomas and scholarships are to be awarded. The autumn terms opens on October 6. For the present training in watch and clock repair work will continue to be undertaken by the Polytechnic as heretofore.

## "Brush-Bred" Battery Electric Car

When the Government announced the proposal to abolish the basic petrol ration, Brush Coachwork, Ltd., of Loughborough, immediately designed a battery electric vehicle which would enable people otherwise immobilised, to continue to do those things which are not officially considered essential, as for instance, shopping, trans-

accommodate 11 adults, apart from the driver, with room at the rear for luggage.



"Brush-Bred" battery electric car

As a school 'bus it can be adapted to carry about 20 small children. Its range is 40 miles a day on one charge. Smaller models are being built.

## B.E.A.M.A. Contract Price Formulae

For purposes of calculating variations in (a) rates of pay, the rate of pay for adult male labour at September 13, 1947, shall be deemed to be 110s.; (b) costs of material, the index figure for intermediate products last published by the Board of Trade on September 13 is 226.9 and is the figure for the month of August.

## Dining Hall Lighting

An interesting installation of fluorescent lighting is to be seen in the dining hall at the Middleton Tower holiday camp, near Morecambe. The hall, a converted aircraft hangar, is 175 ft. long by 78 ft. wide, and has a service capacity of 2 500 guests at one sitting. The ceiling is 12 ft. above table level and is covered with satin-polished aluminium sheeting; the friezes are panelled in corrugated aluminium sheets with the corrugations vertical. The design of illumination was entrusted to Miller-Hepworth, Ltd., of Lee Street, Oldham. It was decided to use the standard Miller-Hepworth fluorescent fitting, type 33, twin-tube, direct-lighting model, embodying two 80 W fluorescent tubes mounted in a moulded opal "Perspex" reflector with streamlined end cowlings of pressed aluminium,



View of one half of the dining hall at Middleton Tower holiday camp, Morecambe, illuminated by fluorescent lamps in Miller-Hepworth fittings

port for school-children, and so on. A prototype vehicle is illustrated and, built on the lines of the "shooting brake," it will

spray-finished in a deep blue enamel. The cowlings house all the electrical control gear and have quick-release cover plates for ease of servicing. The fitting is designed to give 75 per cent. direct reflective lighting and 25 per cent. upward transmitted light. Each half of the dining hall was allotted two rows, each of 16 fittings, spaced at 10 ft. 6 in. centres on axes of 17 ft. centre to centre. The complete installation consists, therefore, of a total of 64 fittings suspended by chromium-plated tubes 3 ft. below the ceiling, achieving the requirements of 15/20 ft.-candles of virtually shadowless illumination. To obtain the maximum even distribution of light, the fittings are equipped with Perspex diffusing grilles. The suppliers for the installation were Electrical Accessories (Lancaster), Ltd.

### British Efficiency Exhibition

The British Efficiency Exhibition is to be held at the Empire Hall, Olympia, London, from October 1 to 11.

### Diesel Electric Sets for Bottlers

Diesel electricity generating sets are being supplied by Arthur Guinness, Son and Co., Ltd., to a number of their principal bottlers in this country.

### L.E.P. Co.'s News Bulletin

Issued on the eve of the nationalisation of the supply industry, the current issue of the "News Bulletin" of the Lancashire Electric Power Co., in its editorial, raises the question of its future. The "Bulletin" has appeared without a break for twelve years and has served a very useful purpose in keeping the employees informed of their own and the company's activities, and giving them the satisfaction of knowing how their work has contributed to the progress made. With everything in the melting pot, it is difficult to say what will be the position of this and similar house journals, but there is no doubt that in the new organisation they can, if permitted to do so, continue their functions to the benefit of the employees and the industry generally.

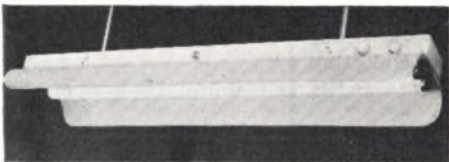
### Radio Industries Ball

Prizes valued at £400, consisting of radio sets and a radiogramophone, have been presented for the lucky programme draw at the Radio Industries' Ball, Royal Albert Hall, on October 3. Proceeds from the sale of programmes will go to the Electrical Industries Benevolent Association. Companies who have given prizes are: British Insulated Callender's Cables, Ltd.; Bush Radio, Ltd.; E. K. Cole, Ltd.; A. C. Cossor, Ltd.; the Decca Record Co., Ltd.; E.M.I. Sales and Service, Ltd.; Ferranti, Ltd.; the General Electric Co., Ltd.; McMichael Radio, Ltd.; Murphy Radio,

Ltd.; Philco Radio and Television Corporation of Great Britain, Ltd.; Pye, Ltd.; Ultra Electric, Ltd.

### New Lighting Fittings

Six new industrial lighting fittings—three for single and three for two 40 W



*Philips "Albany" fitting, with opal Perspex reflector for two 40 W fluorescent lamps*

fluorescent lamps—have been introduced by the lighting department of Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2. Features of the fittings are: detachable reflectors of opal Perspex or enamelled steel, alternative mountings, easy installation and maintenance.

### Improved Airport Lighting

A greatly improved system of runway lighting is now being installed at London Airport. The Ministry of Civil Aviation states that the new system, which has been designed and manufactured by the General Electric Co., Ltd., and is known as high intensity contact lighting, will provide two beams of light with a peak intensity of about 5 000 candle-power along No. 1 runway in both directions. The new lights will be sunk into the concrete along both sides of the 9 000 ft. of No. 1 runway. Lights will be spaced 80 ft. apart longitudinally and 150 ft. laterally, that is, 75 ft. on either side of the centre line of the runway, which is 300 ft. wide.

### World Engineering Conference

Representatives from twenty-five nations attended the meeting of the Council of the World Engineering Conference at Zurich on September 9, 10, and 11. The Council resolved, on the motion of the British delegation, to set up a permanent committee for the study of the effects of technological development on social and international relations; and to form immediately another committee to study the effects of power production in the world to-day. The next World Technical Congress will be held in Cairo, in March, 1949.

### Electrical Machinery Traders

In their "Bulletin," the Association of Electrical Machinery Traders announce that the Council have elected the following as members of the Standing Com-



mittee: Messrs. T. A. Atkinson (Dynamo and Motor Repairs, Ltd.), G. H. Holding (Stewart Thomson and Sons (Liverpool), Ltd.), H. F. K. Dearlove (Fyfe, Wilson and Co., Ltd.), E. J. Ferguson (Britannia Manufacturing Co., Ltd.), R. H. Gill (Midland Dynamo Co., Ltd.), R. C. Hull (Universal Electrical Co.), A. F. Stokes (Burdette and Co., Ltd.), and H. Vernon (Thos. W. Ward, Ltd.), with Mr. W. E.

Lawton (Industrial Electrical Co., Ltd.) as chairman. A deputation from the association met officials concerned with the disposal of Government-owned surplus equipment and drew attention to features of sales with which dissatisfaction had been expressed. The second annual dinner and dance of the association will be held at the Mayfair Hotel, London, on Friday, December 5.

## Lamp Sales Publicity

**E**XTENSIVE Press advertising, new window display backgrounds and a selection of showcards will form the new season's campaign for Osram lamps. Space has been taken in the principal London newspapers, the leading provincial evening papers, the popular magazines and in the motoring journals. These will be backed by advertisements in the industrial technical Press.

Two original backgrounds have been produced for the Osram window dressing scheme which will be operated for the General Electric Co., Ltd., by the City Display Organisation. The first incorporates a new departure in that the main display panel is suspended by cords stretched across the window. Thus the retailer can display material in the front of the window without obscuring the panel. The second consists of an attractive screen, brightly printed in eight

colours. "Osram" is in red on a yellow background. Each of these displays makes use of a neat cardboard cut-out em-



*Display piece incorporating the Metrovick slogan*

bodily the new design of the Osram lamp carton.

Some of last season's outstanding showcards have been retained, while a new one has been introduced for Osram photographic lamps. In addition, there is an effective one-piece stack of cartons.

The Metropolitan-Vickers Electrical Co., Ltd., this autumn is again using the slogan "When daylight fades . . . switch to Metrovick and Cosmos Lamps." Press advertisements, in addition to displaying pictures of lighting installations designed by the company's illuminating engineers, will carry reproductions of black and white sketches emphasising the slogan.

Catalogues, folders and leaflets are again available, including the familiar orange covered lamp catalogue. As prices and designs become stabilised, more extensive catalogues are replacing the leaflets and folders started as a war-time makeshift. Window display materials are scarce, so that a small quantity only of displays will be available.

This year the well-known lamp calendar is breaking its long tradition by introducing a charming brunette, accompanied by a friendly "Scottie" dog, smiling and cheerful against a background of blue sky.



*Osram window display, with suspended panel*

# Contracts Open

**WE** give below the latest information regarding contracts for which tenders are invited. In the case of overseas contracts, particulars are to be had from the Board of Trade, Millbank, London, S.W.1 (corner Horseferry Road), unless otherwise stated:—

**Southport**, September 27.—Supply and delivery of oil-cooled static transformers. Specification from Borough Electrical Engineer, 188, Lord Street, Southport.

**Weymouth and Melcombe Regis**, September 27.—Supply and delivery of transformers. Specification from Borough Electrical Engineer and Manager, Electric House, Westham Road, Weymouth.

**Winchester**, September 27.—Supply and installation of a complete central heating system for west wing of the Guildhall, the existing coke-fired boiler to be replaced by either electric, oil or coke-fired boiler, and new piping and radiators to be installed. Specifications from the City Engineer, Guildhall, Winchester; deposit, £2 2s.

**Silsden**, September 30.—Supply, delivery and erection of 25 cwt. electric lift at gas works. Specification from Gas Engineer and Manager, Gas Works, Silsden.

**Edinburgh**, September 30.—Supply of p.i. cables for 12 months commencing January 1, 1948. Specifications from the Engineer's Office, Dewar Place, Edinburgh.

**Portsmouth**, September 30.—Supply, delivery and erection of:—(a) one (alternatively two) 15 MVA, 33/11 kV, type O.N. transformer; (b) four 5 MVA, 33/11 kV, type O.N. transformers; (c) one earthing transformer; (d) seven liquid type neutral earthing resistors. Specifications from Engineer and Manager, 111, High Street, Portsmouth.

**Bristol**, September 30.—Installation of self-starting synchronous electric clock control (approx. 11 000) for street lighting. Particulars from City Engineer, 7, College Fields, Bristol, 8.

**Plympton St. Mary**, October 6.—Works as follow: (a) supply, delivery, laying and jointing of .15 sq. in., 33 kV and .30 sq. in., 6.6 kV underground cables, with pilots and telephone cables; (b) supply, delivery and erection of: 1.—one 18 panel, 6.6 kV, 250 MVA switchboard, consisting of two 800 A and fifteen 400 A units and a bus section switch; 2.—one eight panel, 6.6 kV, 250 MVA switchboard, consisting of one 800 A and six 400 A units and a bus section switch; 3.—one 11 panel, 6.6 kV, 250 MVA switchboard, consisting of two 800 A and eight 400 A units and a bus section switch; (all switchgear to be of the com-

pound-filled type); (c) supply and delivery to site of three 33/6.6 kV, three-phase, 7 500 kVA transformers, type O.N. Specifications from Clerk to the Council, Council Offices, Plympton, S. Devon.

**Poplar**, October 9.—Supply and delivery of nine 500 kVA transformers, 6 000/415 V. Specification from Borough Electrical Engineer and General Manager, London, E.14.

**Pretoria**, November 11.—Supply, delivery and erection of: (a) piping equipment and (b) circulating water pumps and equipment, for first stage of "B" power station. Specifications from City Electrical Engineer in Pretoria or from the consulting electrical engineers, Messrs. Merz and McLellan, Carliol House, New-castle-on-Tyne, 1; deposit, £2 2s.

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## *Meeting the Winter Demand*

**A**CCORDING to a statement made by a Ministry of Fuel spokesman at a Press conference on Wednesday afternoon, the position in regard to the supply of electricity is likely to be worse in the coming winter than it was last winter. The anticipated demand at the December-January peak is 12 000 000 kW—an increase of 1 000 000 kW on last winter's peak demand—and 9 500 000 kW of plant will be available to meet that demand, as against 9 000 000 kW last winter, leaving a gap of 2 500 000 kW. For various reasons, from 13 to 14 per cent. of the total installed plant will not be available.

As to coal stocks, if the winter is very severe, and fog or icy conditions prevail on roads, there will be a danger of power station stocks of coal running down. Although the position is better than last year and stations hold five or six weeks' supply, as against three weeks in 1946, the Ministry does not regard those stocks as being up to safety level yet.

Industrial load spreading is to become operative during the first week in October, but there are still many arrangements to be made and it is not yet possible to give an overall picture of the results that are likely to be achieved.

The idea of any rationing scheme for domestic consumers has been rejected, and the Ministry is going to rely upon appeals by local Fuel Saving Committees to induce householders to reduce the consumption of gas and electricity voluntarily. A fuel saving campaign on a national basis has been abandoned, because it had become evident that people were disinterested, or did not understand what was required of them.



# Company News

**SILENTBLOC, LTD.**—Consolidated prft. to May 31, £81 947 (£75 166), less dirs.' fees £2 365 (£2 550), depreen. £7 223 (£8 261), tax £38 108 (£37 833), lvg. net prft. £34 251 (£26 522). To prov. for future tax £6 660 (£5 750), additl. prov. for tax £1 087 (£5 379), fin. ord. div. 16½% (12½%), mkg. 29½% (25%) £26 469 (£21 656), fwd. £18 017 (£17 982). Cons. bal. sheet shows current assets £331 076 (£406 424). Current liabilities £195 570 (£235 871).

**NEWTON BROS. (DERBY), LTD.**—In the course of his remarks at the annual meeting, the Chairman (Mr. P. C. Cooper-Parry) said that with full knowledge of the difficulties which had existed over the year the Board was well satisfied with the trading results shown. Before the war they had a wide range of products required for specialised commercial electrical needs, and their war-time developments were fortunately in the same range. The present position was that the quantities required were only fractional compared with war-time requirements, and much more varied. Over the last 12 months an average of 21½ per cent. in value of their products had been for export either direct or after incorporation in equipment produced by their customers. While the net profit showed an increase over the previous year of £1 287, the trading profit, before charging taxation, showed a reduction of approximately £21 000. The early months of the year under review were especially difficult; it was not easy, the Chairman said, to find within a year or two alternative markets for products which for so long had been absorbed almost wholly by Government service departments.

**KALGOORLIE ELECTRIC LIGHT AND POWER CORP., LTD.**—Speaking at the annual meeting, the Chairman (Mr. A. J. Fipboard) said that in the year under review there had been a return, in some measure, to more normal working conditions on the Kalgoorlie Goldfield as labour was released from the Australian Forces. This resulted in an anticipated increase in demand for power, and additional sales were reflected in the revenue account. Despite the prevailing difficulties, not the least of which was labour shortage coupled with continual increases in wages, the company had been able to give uninterrupted service to consumers. Rising demands for power, however, made an increase in generating capacity a matter of urgent importance. It was expected that the renewal of their concession for a period of 21 years, which

was completed last November, would have enabled them to proceed with the proposals outlined in his statement last year, but he regretted to say that conditions of uncertainty were such that they had been unable to get firm prices for plant or definite dates for delivery. Owing to the difficulties indicated and the serious position which would have been created by the fact that the plant required could not have been put into commission until, at the earliest, 1952, it was decided to ascertain whether there was any alternative, and, as a result, they had been able to secure two 12 500 kW turbo-alternators manufactured by C. A. Parsons and Co. and these are now being prepared for shipment to Australia. Additional boilers had been ordered from Messrs. Babcock and Wilcox, Ltd., but they were up against a difficulty with regard to the exact method of firing, for as in most countries, Australia was suffering from an insufficiency of available coal. The proposals in hand would entail the erection of an entirely new building on the existing site and the transmission and distribution pressure would be increased to 11 000 V. These proposals would involve an expenditure of over £200 000.

## Metal Prices

	Monday, Price	September 22 Inc. Dec.
<b>Copper—</b>		
Best Selected ... .. per ton	£130 10 0	— —
Electro Wire bars ... .. "	£132 0 0	— —
H.C. Wires, basis ... .. "	£149 10 0	— —
Sheet ... .. "	£173 10 0	— —
<b>Bronze Electrical quality</b>		
<b>1% Tin—</b>		
Wire (Telephone), per ton	£172 5 0	— —
<b>Brass (60/40)—</b>		
Rod basis ... .. per lb.	1s. 1½d.	— —
Wire ... .. "	1s. 6½d.	— ¾d.
<b>Iron and Steel—</b>		
Pig Iron (B. Coast Hematite No. 1) ... .. per ton	£8 19 0	— —
Galvanised Steel Wire (Cable Armouring) basis 0.104 in. ... .. "	£34 5 0	— —
Mild Steel Tape (Cable Armouring) basis 0.04 in. ... .. "	£21 15 0	— —
<b>Lead Pig—</b>		
English ... .. "	£91 10 0	— —
Foreign or Colonial ... .. "	£90 0 0	— —
<b>Tin—</b>		
Ingot (minimum of 89.9% purity) ... .. "	£442 10 0	— —
Wire, basis ... .. per lb.	5s. 6¾d.	— —
Aluminium Ingots ... .. per ton	£80 0 0	— —
Spelter ... .. "	£70 0 0	— —
Mercury (spot) ... .. per bott.	£16 0 0	— —
<i>(ex. warehouse)</i>		

Prices of galvanised steel wire and steel tape supplied by C.M.A. Other metal prices supplied by H.I. Callender's Cables, Ltd.

# Commercial Information

## Mortgages and Charges

**NOTE.**—The Companies Act of 1908 provides that every mortgage or charge shall be registered within 21 days after its creation, and that every company shall, in its annual summary specify the total amount of debt due from it in respect of mortgages or charges. The following mortgages and charges have been registered. The total debt prior to the present creation, as shown in the annual summary, is given—marked with an \*—followed by the date of the summary, but such total may have been reduced.

**ELECTRICAL APPARATUS CO., LTD.,** St. Albans.—July 18, mortgage and charge, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on lands, hereditaments and premises or some part or parts thereof known as Beacon Works, Harbour Road, Oulton Broad, and fixtures, etc.; general charge. \*Nil. January 14, 1947.

**MORGAN, OSBORNE AND CO., LTD.,** Warringham, radio apparatus manufacturers.—July 21, series of £1 000 debentures, present issue £500; general charge.

**DAVIS MYER AND CO., LTD.,** London, E.C., electricians.—July 16, mortgage, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on certain contract moneys. \*Nil. December 31, 1943.

**G. B. ELECTRICAL SERVICES, LTD.,** Ilford.—July 22, debenture, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. \*Nil. January 14, 1947.

**L. B. MUNDIN, LTD.,** Northampton, manufacturers of radio sets.—July 2, debenture, to Barclays Bank, Ltd., securing all moneys due or to become due to the bank; general charge. \*—, February 6, 1947.

**DYNOWORKS, LTD.,** London, S.W., dynamo lighting set manufacturers.—July 21, debenture, to Olds Discount Co., Ltd., as trustee for itself and nine other companies securing all moneys due or to become due to the holders; charged on 199, New King's Road, Fulham, S.W. (subject to etc.), and general charge. \*£1 150. December 20, 1946.

## Release of Liquidator

**GREAT EASTERN ELECTRIC CO., LTD.,** 73, Houndsditch, Bishopsgate, E.C.3. Court: High Court of Justice. Liquidator's name: Hugh Parker Naunton, Senior Official Receiver and Liquidator, Columbia House, Aldwych, London, W.C.2. Date of Release—August 25, 1947.

# Coming Events

## Friday, September 26 (To-day)

**ILLUMINATING ENGINEERING SOCIETY, BIRMINGHAM CENTRE.**—Rugby. Special Meeting. I.E.E.—London. Electron Jubilee Celebrations. "Electrons in Research." Sir G. Thomson, 10 a.m., and "Electrons in Industry." Dr. T. E. Allibone, 11 a.m.

**INSTITUTE OF PHYSICS.**—At the Science Museum, London, S.W.7. Electron Jubilee Exhibition. Opening 3 p.m. Until January, 1948.

## Sunday, September 28

**I.E.E., LONDON STUDENTS' SECTION.**—Ramble to Box Hill.

**I.E.E., N. EASTERN STUDENTS' SECTION.**—Newcastle-on-Tyne. Annual Outing. 9 a.m.

## Monday, September 29

**ELECTRICAL POWER ENGINEERS' ASSOCIATION, MIDLAND TECHNICAL GROUP.**—Birmingham. At the Grand Hotel. "Gas Turbines," by R. G. Voysey. 7 p.m.

## Tuesday, September 30

**E.L.M.A. LIGHTING SERVICE BUREAU.**—London. Illumination Design Course. To October 3.

**YORKSHIRE TECHNICAL LIAISON COMMITTEE.**—Leeds. At the Museum Lecture Hall, Park Row. "The Housing Problems of a Large Industrial City," by R. A. H. Livett. 7 p.m.

**LEICESTER ELECTRICAL SOCIETY.**—At the City Electricity Department. "The Recon-

struction of Freeman's Meadow Generating Station," by D. H. Parry.

## Wednesday, October 1

**BUSINESS EFFICIENCY EXHIBITION.**—London. At Olympia. Until October 11.

**NATIONAL RADIO EXHIBITION.**—London. At Olympia. Until October 11.

**I.E.E., SOUTHERN CENTRE.**—Southsea. At the Council Chambers. Chairman's Address by D. D. Rayner. 6.30 p.m.

**I.E.E., N. EASTERN CENTRE, TEES-SIDE SUB-CENTRE.**—Middlesbrough.—Chairman's Address by E. H. Jordan. 6 p.m.

**JUNIOR INSTITUTION OF ENGINEERS, MIDLAND SECTION.**—Birmingham. At the James Watt Institute, Great Charles Street. Annual General Meeting. 7 p.m.

## Friday, October 3

**ILLUMINATING ENGINEERING SOCIETY, BIRMINGHAM CENTRE.**—At the Crown and Cushion Hotel. Buffet Dance.

**ROYAL STATISTICAL SOCIETY, INDUSTRIAL APPLICATIONS SECTION.**—London. At the E.L.M.A. Lighting Service Bureau. "The Organisation of a Market Research Department," by A. S. Wharton. 6 p.m.

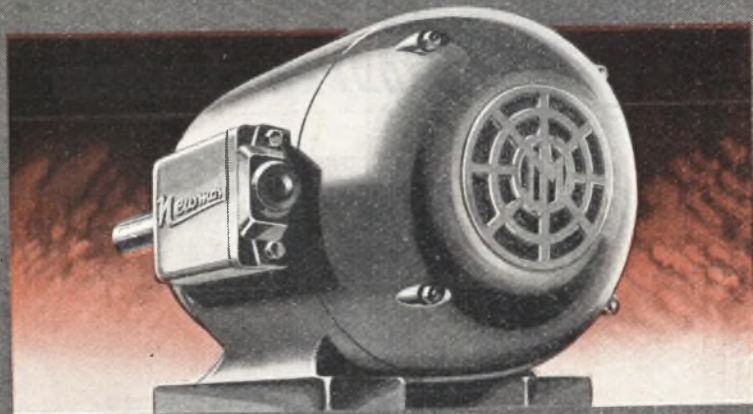
**LEICESTER ELECTRICAL SOCIETY.**—At the Trocadero Ballroom. Dance.

**SCOTISH ENGINEERING STUDENTS' ASSOCIATION.**—Edinburgh. At the Royal British Hotel. Address by V. P. Mackay. 7.30 p.m.

**JUNIOR INSTITUTION OF ENGINEERS.**—London. Informal Meeting. 6.30 p.m.



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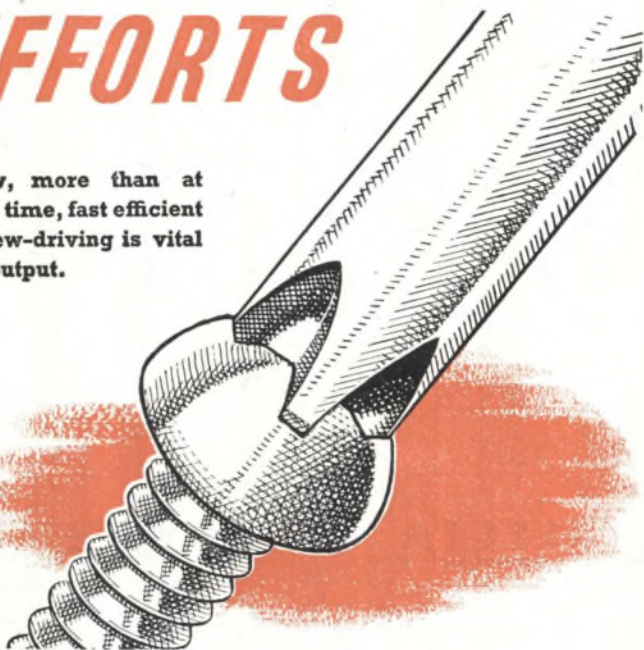
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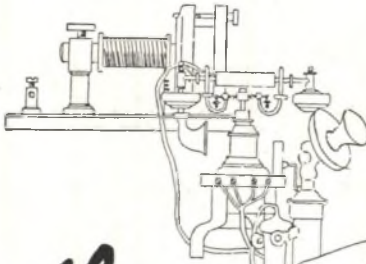


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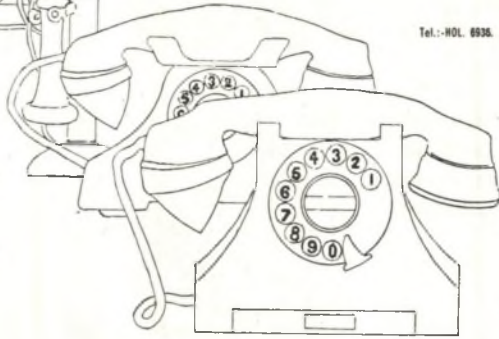


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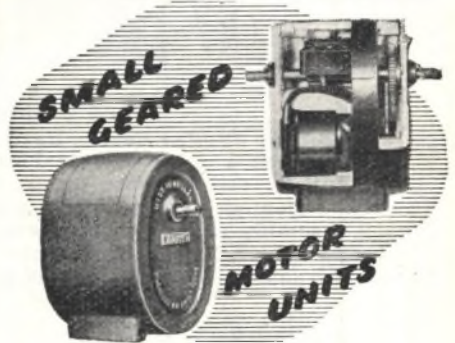
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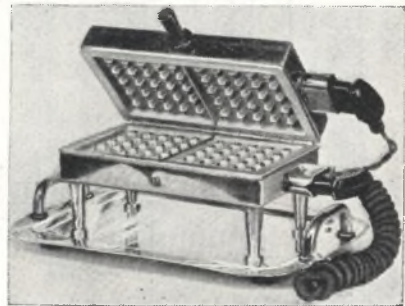
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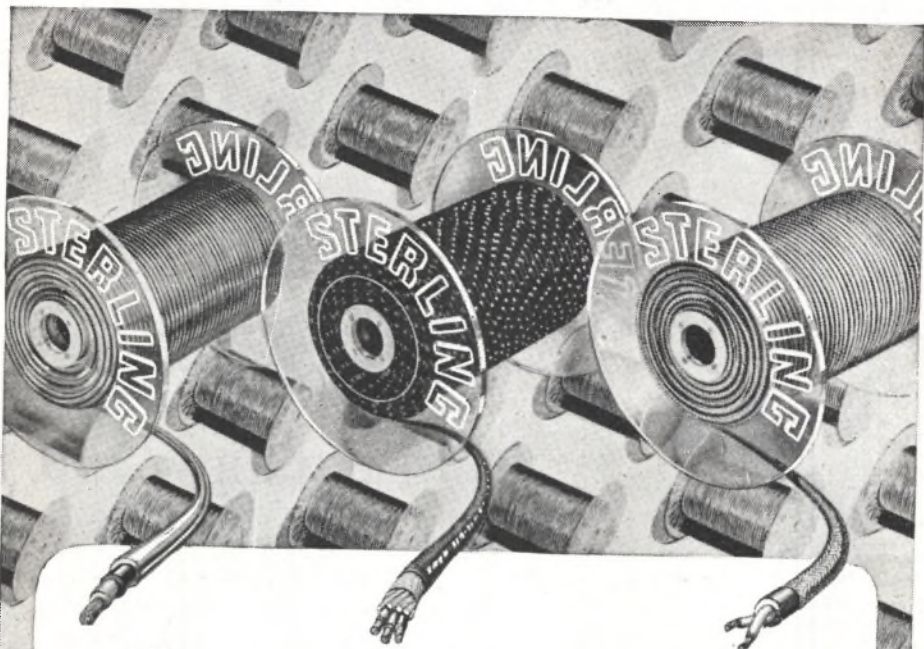
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# CLASSIFIED ADVERTISEMENTS

## TENDERS

### CITY OF BIRMINGHAM ELECTRIC SUPPLY DEPARTMENT.

#### DOMESTIC ELECTRICAL APPARATUS.

THE Electric Supply Committee invites Tenders for the following Domestic Electrical Apparatus to be delivered as required for a period of 12 months from the date of Contract:—

Specification No.	Item.
APP.40	Electric Kettles.
APP.41	Electric Cookers.
APP.42	Electric Washboilers.
APP.43	Electric Circulator Water Heaters.
APP.44	Electric Cooker Control Units.
APP.45	Electric Circulator Water Heater Control Panels.

The General Conditions of Contract (which include the Corporation's Fair Wages and Conditions of Labour Clause), Specifications and Forms of Tender may be obtained on application to the undersigned, stating the Specification(s) required.

Scaled Tenders, enclosed in the official envelope provided and endorsed for the purpose, must be delivered to the undersigned not later than 10 a.m. on Monday, October 20th, 1947, when they will be opened.

Tenders not complying with the foregoing will be rejected.  
**F. W. LAWTON, M.I.Mech.E., M.I.E.E.,**  
 Chief Engineer and Manager.  
 14, Dale End,  
 BIRMINGHAM, 4. (203)

### STOKE-ON-TRENT CORPORATION ELECTRICITY DEPARTMENT.

#### CITY GENERAL HOSPITAL.

#### Contract No. 4724.

TENDERS are invited for the purchase of used electrical plant comprising one Oil Engine direct coupled to D.C. Generator, 15 kW, 200 volts, with switchgear, and one D.C. 12 h.p. Motor-driven Booster Set.

Specification and tender form can be obtained on written application to the General Manager, Electricity Department, 31, Kingsway, Stoke-on-Trent.

Contractors are required to conform to the Standing Orders of the City Council relating to contracts.

Tenders must be delivered in the envelope provided so as to be received by the undersigned not later than the first postal delivery on Friday, October 17th, 1947.

**HARRY TAYLOR,**  
 Town Clerk.  
 (196)

## SITUATIONS VACANT

**DIESEL ERECTORS** required. Used to erection of large sized diesel generator equipment.—Write giving full particulars to G. N. Haden & Sons, Ltd., 19/29, Woburn Place, London, W.C.1. (184)

**DRAUGHTSMEN** required by switchgear engineers experienced in contract work, protective gear diagrams or design.—Applications in writing, with full particulars, to: Ferguson, Pailin Ltd., Manchester, 11. (84)

**JUNIOR Switchgear Estimating and Sales Engineer** required by company in N.W. London area.—State age, experience and salary required to: Box L.G.W., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4. (186)

## SITUATIONS VACANT

### BRITISH ELECTRICITY AUTHORITY.

#### CHIEF ENGINEER.

#### DEPUTY CHIEF ENGINEERS.

APPLICATIONS are invited for the appointments of the CHIEF ENGINEER and DEPUTY CHIEF ENGINEERS in the above Authority. The posts will carry the following salaries:—

(a) Chief Engineer, £4,750 per annum.

(b) Deputy Chief Engineer, £3,000 per annum, rising by £100 annual increments to £3,500.

The above salaries will be subject to deductions for superannuation.

Candidates should have held responsible engineering posts and have a wide experience in the technical and economic aspects of electricity generation and extra high voltage transmission. Applicants should state age, qualifications, experience, present salary and personal references. Such applications, which will be acknowledged and treated as confidential, should be sent before October 7th next to the Acting Establishment Officer, British Electricity Authority, c/o Ministry of Fuel and Power, 7, Millbank, London, S.W.1. (207)

### COUNTY BOROUGH OF CROYDON. ELECTRICITY DEPARTMENT.

#### SHIFT CHARGE ENGINEER.

APPLICATIONS are invited for this position at the Corporation's Generating Station—a "Selected" Station of 88 MW capacity.

Candidates must have had a good practical and technical training in mechanical and electrical engineering and experience in operating power station plant.

Salary in accordance with N.J.B. Schedule, Grade 8, Class H, at present £532 per annum. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and terminable by one month's notice on either side, and the successful candidate will be required to pass a medical examination.

Applications, stating age, training, qualifications and experience, with copies of three testimonials, endorsed "Shift Charge Engineer," are to be delivered not later than noon on Thursday, October 9th, 1947, to the General Manager, "Electric House," Wellesley Road, Croydon.

Canvassing will disqualify.

**E. TABERNER,**  
 Town Clerk.  
 (200)

September 17th, 1947.

### IMPERIAL CHEMICAL INDUSTRIES LTD.

#### WILTON WORKS.

#### Advertisement—Ref. No. ICI/X/32.

**CONSTRUCTION MANAGER.** IMPERIAL CHEMICAL INDUSTRIES LTD., WILTON WORKS, invite applications for the senior appointment of CONSTRUCTION MANAGER. The successful candidate will be directly responsible to the Chief Engineer for construction of a new chemical works, involving the setting up of a complete organisation, and the execution of the civil, mechanical and electrical work by Contractors and direct labour. He must be fully conversant with modern methods of construction, and control of large numbers of men. Considerable experience in this or similar types of construction work is essential.

The successful candidate will be appointed to the established staff. Applications, giving full details, should be submitted to the Personnel Manager, I.C.I. Wilton Works, P.O. Box 54, Middlesbrough, quoting advertisement reference No. ICI/X/32. (165)



## SITUATIONS VACANT

### IMPERIAL CHEMICAL INDUSTRIES, LTD., WILTON WORKS.

ADVERTISEMENT REFERENCE No. 1G1/X/33.

**CONSTRUCTION ENGINEERS, IMPERIAL CHEMICAL INDUSTRIES LTD., WILTON WORKS**, invite applications for the following appointments:—

(1) **SENIOR MECHANICAL CONSTRUCTION ENGINEER** to supervise the installation of mechanical equipment in connection with large scale chemical plants. Applicants should be fully conversant with modern construction equipment and methods and should have experience in the installation of general plant equipment and pipework. Experience essential in the control of site workers of the various trades.

(2) **BOILERS CONSTRUCTION ENGINEER** to supervise the erection by contractors of water tube boilers and auxiliary equipment. Experience essential in the erection of H.P. boiler plant. Preference will be given to applicants with some experience with pulverised fuel and oil firing equipment.

(3) **ELECTRICAL (PLANT) CONSTRUCTION ENGINEER** for the erection of plant electrical installations including motors, starters, distribution boards, cables and lighting. Experience essential in erection and installation of above equipment in large chemical or engineering works.

The successful candidates will be appointed to the established staff. They will be responsible to the Construction Manager and may later be transferred to the maintenance staff. Applications, giving full details of experience, qualifications and salary required, should be submitted in writing to the Personnel Manager, Imperial Chemical Industries Ltd., Wilton Works, P.O. Box 54, Middlesbrough, Yorks, quoting advertisement reference No. 1G1/X/33 and appropriate vacancy. (197)

### LONDON AND HOME COUNTIES JOINT ELECTRICITY AUTHORITY.

APPLICATIONS are invited for the appointments of **PUBLIC LIGHTING ATTENDANTS** at DORKING and at LEATHERHEAD.

Wages 2s. 0½d. per hour, in accordance with the scheduled rates of wages of District Council (No. 9) for the Electricity Supply Industry.

The persons appointed will be required to pass a medical examination by the Authority's medical adviser, and to become subject to the Authority's Superannuation Scheme, which applies generally the provisions of the Local Government Superannuation Act, 1937, including the provisions of that statute relating to transfer values.

Applications, stating age, qualifications and experience and endorsed "Public Lighting Attendant," accompanied by copies of not more than three recent testimonials, must be sent to the District Manager, 56, South Street, Dorking, so as to reach him by not later than October 7th, 1947.

Canvassing, directly or indirectly, will be a disqualification.

A. L. BURNELL,  
Clerk of the Authority.

5-6, Lancaster Place,  
Strand, W.C.2.  
September, 1947.

(187)

### MIDDLESBROUGH EDUCATION COMMITTEE. CONSTANTINE TECHNICAL COLLEGE.

APPLICATIONS are invited for appointment as full-time Laboratory Steward in the Electrical Engineering Department of the College, to commence duty as early as possible. Candidates must have had a good practical training in industry or in a technical unit of H.M. Forces, and have technical knowledge of electrical engineering, up to City and Guilds Intermediate or Ordinary National Certificate standard.

Salary scale £255 x £15 to £300, plus cost of living bonus (at present £60 per annum). Application forms and further information obtainable from the undersigned, to whom the completed forms should be returned as soon as possible.

STANLEY HIRST,  
Director of Education.

Education Offices,  
Woodlands Road,  
MIDDLESBROUGH.  
September 18th, 1947.

(206)

## SITUATIONS VACANT

### LONDON AND HOME COUNTIES JOINT ELECTRICITY AUTHORITY.

APPLICATIONS are invited for the appointment of **ASSISTANT MAINS ENGINEER**.

Candidates must have had experience in the erection and maintenance of 11 kV and L.T. overhead lines and substations, and hold the Higher National Certificate in Electrical Engineering.

The salary will be £413 per annum, in accordance with the scales of salaries of the National Joint Board for the Electricity Supply Industry, Class F, Grade 8A.

The person appointed will be required to pass a medical examination by the Authority's medical adviser, and to become subject to the Authority's Superannuation Scheme, which applies generally the provisions of the Local Government Superannuation Act, 1937, including the provisions of that statute relating to transfer values.

Applications, stating age, qualifications and experience, and endorsed "Assistant Mains Engineer," giving names and addresses of not more than three persons to whom reference may be made, must be sent to the District Manager, 56, South Street, Dorking, so as to reach him by not later than October 7th, 1947.

Canvassing, directly or indirectly, will be a disqualification.

A. L. BURNELL,  
Clerk of the Authority.

5-6, Lancaster Place,  
Strand, W.C.2.  
September, 1947.

(193)

### METROPOLITAN BOROUGH OF ISLINGTON. Electricity Department.

APPOINTMENT OF TECHNICAL ASSISTANT.

APPLICATIONS are invited from Corporate Members of the Institution of Electrical Engineers for the above permanent appointment at a salary in accordance with Class G, Grade 5, of the National Joint Board Schedule, at present £601 18s., rising to £634 4s. per annum, and having a good experience of the following:—

- The operation and maintenance of a large transmission system not less than 33 kV and preferably underground.
- The carrying out of short circuit calculations on an extensive scale.
- The preparation of estimates, specifications and technical reports.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and to a satisfactory medical examination. Candidates are required to disclose in writing whether to their knowledge they are related to any member of, or holder of any senior office under the Council. Canvassing either directly or indirectly will be a disqualification. The Council are unable to make any arrangements for the provision of housing accommodation for the successful candidate.

Application forms for the above position may be obtained from the Engineer and General Manager, Electricity Department, 341-3, Holloway Road, London, N.7, and should be completed and returned to him endorsed "Technical Assistant," not later than noon on October 8th, 1947.

H. DIXON CLARK,  
Acting Town Clerk.

Town Hall,  
Upper Street,  
LONDON, N.1.

(174)

### SOUTHERN RAILWAY.

ELECTRICAL DRAUGHTSMEN.

APPLICATIONS are invited for two Senior Draughtsmen in the London area.

Applicants must be qualified in Electrical Engineering with workshop training and having experience of the layout and design of electrical traction equipment.

Successful candidates will be engaged on a temporary basis, but will be eligible, if suitable, for appointments to a progressive permanent position.

Salary according to age and qualifications.

Apply, in writing, stating age, qualifications and experience, to:—

CHIEF ELECTRICAL ENGINEER.

Southern Railway,  
15, St. Thomas Street,  
London Bridge, S.E.1.

(192)

## SITUATIONS VACANT

### SHEFFIELD CORPORATION ELECTRICITY DEPARTMENT.

#### APPOINTMENT OF ENGINEERING ASSISTANT (ELECTRICAL).

APPLICATIONS are invited for the position of Engineering Assistant (Electrical) in the Construction Department of this Undertaking.

The duties relate principally, but not exclusively, to power stations. They include preparation and checking of drawings and diagrams, preparation of wiring and cabling schemes for execution by direct labour or by contract, obtaining tenders for electrical equipment, and site supervision and testing as required.

Applicants must have a sound technical training, preferably with experience in the manufacture of power station equipment, and must be experienced in the layout of switchgear, plant, cabling, station auxiliaries and auxiliary supplies.

The salary will be in accordance with Class "M." Grade 9, of the N.J.B. Schedule, present commencing value £521 per annum.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937. Applicants must preferably be not more than 40 years of age, or have had previous Local Authority service carrying transfer value within the meaning of the Act.

The selected candidate would be required to pass a medical examination.

Applications, on forms to be obtained from the undersigned, to be received, with copies of not more than three testimonials, by Monday, October 20th, 1947.

Canvassing, or any communication, to a member of the Council, either directly or indirectly, is prohibited and is a disqualification.

JOHN R. STRUTHERS,

General Manager and Engineer.

Sheffield Corporation Electricity Department,  
Commercial Street,  
SHEFFIELD, 1.  
September, 1947.

(205)

ELECTRICIANS, D.J.I.C., Grade B conditions and rate, 29.25d. an hour, with experience of domestic and business installations.—Apply with full details of apprenticeship, training and experience to: The East Anglian Electric Supply Co., Ltd. (L.R.S.), Finborough Hall, Stowmarket, Suffolk. (202)

WANTED for Engineering Office, Electrical Engineer, recent graduate or H.N.C. standard with test bed or similar industrial experience. Work is in connection with Power Plant for Telephone Exchange Contracts and alternative experience could be in connection with Exchange Equipment if technically qualified on the power side. Applicants should give full particulars of education and technical training with chronological outline of any experience, and state what salary they regard as commensurate therewith.—Ref. 231, Siemens Brothers & Co., Ltd., Woolwich, S.E.18. (185)

## FOR SALE

A NUMBER of New Switchboards from surplus disposal at low prices: 25 for 110 v. D.C. 5/20 amps., complete; 25 for use with alternators up to 5 kW, 230/300 v., 1-ph., 50 cycles, with automatic voltage regulators. All panels complete with costly apparatus.—Full details from: The Electroplant Co., Wembley, Middlesex. (120)

A.C./D.C. Motors can be supplied from stock or at short notice.—JOHN PHILLIPS AND CO. ELECTRICS 31, Fortune Green Road, N.W.6. Hampstead 8132. (150)

ALTERNATORS, all sizes from 2-120 kVA, for quick delivery.—Apply to: The Electroplant Company, Wembley, Middlesex. (119)

APPROX. 250 Commutators, deep copper section, 45 section, 2½ in. diam., 1½ in. wide, ¾ in. bore, 8s. each or £30 per 100.—J. Bateson Ltd., Gibraltar Works, Parkinson Lane, Halifax. (188)

## FOR SALE

BRAND new Electric Cable. Flat low Twin 3/029.250 volts., V.I.R., T.B. & C., £17 15s. 1 000 yards. Sample 100 yards, £2. Discounts quantities. Also Auto, Ignition, Flexs, Radio and Starter Cables at big savings.—Ref. 5002, M.W. & C. Co., Ltd., 82-94, Seymour Place, London, W.1. (190)

BRITISH Electric Co. (Beco) Ltd. can supply most types of A.C. and D.C. Motors from stock.—British Electric Co. (Beco) Ltd., Electra House, 25-29, Lower Road, Rotherhithe, S.E.16. Bermondsey 3449. (20)

CONDENSERS (small block), 1 mfd., 200 v. (tested 350 v.), 20 000. Voltmeters 0-40 v., 4 000. Cable 44/012. Uniflex 19. Unisheathmet 4. Unimet 4. Unicel 37 (135/012). Large stocks EF50, U.S.A., 5-pin Valveholders. 5 000 ohm. Potentiometers, 5 000.—Martin, 17, Woodman Road, Brentwood, Essex. (195)

ELECTRIC HOIST BLOCKS, capacity 5 cwt. to 7 tons. Reasonable delivery.—A. Morgan and Co., 50, Wilkin Street, London, N.W.5. Telephone: GUL 1147. (24)

ELECTRIC MOTORS, A.C. and D.C. We supply all types and sizes of Electrical Machinery: Slow Speed Reduction Gears can be supplied to customers' requirements with short deliveries.—Send your enquiries to The Electropower Co. Ltd., 3, Retreat Close, Kenton, Middlesex. Tel.: WORDSWORTH 4928. (14)

ENAMELLED COPPER WIRE, 21, 22, 23, 28, 39, 40, 41, wanted urgently. Any quantity. Cash immediate.—C.V.S. Co., 215, London Road, Mitcham, Surrey. (209)

FLUORESCENT LIGHTING UNITS, 5 ft. Reflector or Swallow, £5 18s.; 4 ft. Reflector, £4 18s. 6d.; 4 ft. Batten, £4 9s. 6d. All self-contained and complete with new tubes. Call or write for September lists. Also 80 watt silent tapped Chokes, 27s. 6d.; 40 watt ditto, 25s. Bi-pin Holders, P/F Condensers, 4 ft. Tubes.—MOSS BROS., 53, Goucester Street, W.1. Mus. 5385. (TC114)

FLUORESCENT Lighting. 4 ft. and 5 ft. single, double and triple lamp fittings manufactured by B.T.-H., G.E.C. Siemens, Ediswan, Crompton, etc., complete with ring gear and lamps, supplied immediately from stock ready for installation, or can be installed by us (in London area only). All fittings and gear fully guaranteed. Full range demonstrated in our showrooms.—Apex Industries Limited, 27, North Audley Street, W.1 (near Selfridges). Mayfair 0618-8960. (89)

FLUORESCENT Starter Unit. New single unit type, Long life obviating renewals. Used with any fitting. Samples and prices from sole manufacturers.—E. W. Engineering Co., Ltd., 407, Nether Street, Finchley, N.3. Finchley 5974. (109)

FOR SALE. Large quantity of new Starter Cable 61/036 at £12 per 100 yards.—Apply: G. A. Day Ltd., London Road, Portsmouth. (168)

JUNCTION Electric Irons, complete with Stand, Switch connector, and Flex, again available, very prompt deliveries (beautifully chromium plated). The finest of its kind in the world, A.C., D.C., in all voltages, with wide range of electrical accessories.—Distributors: Brooks and Bohm Ltd., 90, Victoria Street, London, S.W.1. (27)

KICK SWITCHES, 15 amp., suitable for fires, convectors, wash boilers, etc. Send 3s. P.O. for sample.—SEDWAY ELECTRIC LTD., 80-81, Gt. Hampton Street, Birmingham, 18. Phone: NORTHERN 2084. (TC110)

LADDERS, Trestles, Steps and Hand Carts from Ramsay and Sons (Forfar) Ltd., Forfar. (10)

LAMPS, large stock of SEDWAY LAMPS, 25 W to 150 W, available from stock. Also SEDWAY 1 kW and 2 kW reflector FIRES, and 12 in. rod ELEMENTS. Send for price list.—SEDWAY ELECTRIC LTD., 80-81, Gt. Hampton Street, Birmingham, 18. Phone: NORTHERN 2084. (TC109)



## FOR SALE

MERCURY Switches, all types. For details apply manufacturers, Quicksilver Tube Mfg. Co., The Grays, High Street, Harlington, Middlesex. (60)

METRO-VICK Mains Transformers, new and unused, ex-Ministry of Supply, 4 kVA, oil-filled, input 230 v., 50 cycles, output 18 000 v. packed in manufacturer's crate, £15 carr. fwd.; 3½ kVA, oil-filled, input 230 v., 50 cycles, output 21 000 v., £15 carr. fwd. Substantial discounts can be given for quantity orders.—Wireless Instruments (Leeds) Ltd., 54-56, The Headrow, Leeds, 1. Tel. 22262. (66)

QUANTITY of 3-way S.P. and Neutral, 500 v., 15 amp., 1/C. Fuseboards. Also quantity of 5 ft. Fluorescent Tubes, D/B, used one month only for exhibition lighting, 20s. each.—MOSS BROS., 53, Goodge Street, W.1. Mus. 5385. (TC115)

SACKS and Bags in excellent condition for all commodities, as low as 6d. each.—Write: John Braydon Ltd., 230, Tottenham Court Road, W.1. Tel. No. Museum 6972. (8)

SELF-PRIMING ELECTRIC PUMPS, 300 g.p.h., £15 15s.—JOHN E. STEEL, Bingley, Yorks. Phone 1066. (TC112)

STANDARD Fuses, 15 amp., vit. porcelain body, arranged for front wiring and back busbar connection, or completely assembled units as required for incorporation into fuse boards. Available from stock or short delivery for larger quantities.—"Renas," 107, Albert Road, South Norwood, S.E.25. Phone: Addiscombe 6055-6-7. (179)

STRONG WOOD BOXES. 14 in. × 8½ in. × 7½ in., also 11 in. × 8½ in. × 6½ in. and 12 in. × 8½ in. × 8½ in. inside measurements, all complete with lids, 2s. 6d. each; reduction quantities. Ex works. Sample of any size box, passenger train, 3s. 6d.—F. Turner & Co., Colliery Buildings, Bredbury, Cheshire. 'Phone: Woodley 3106. (182)

SWITCH Boxes for conduit or rubber covered. One to four switch. Special boxes for plugs, etc. Loose lids for standard metal boxes.—Garside, Dept. S.B., 33, Midland Road, Frizinghall, Bradford. (177)

SWITCHPLUGS, 15 amp., 3-pin. We are now accepting orders for delivery December-January. Price on application. All other types of accessories held in stock. Write for our 1948 price list.—L. Benn & Co., Ltd., 81, City Road, London, E.C.1. (178)

T.R.S. Telephone Cables, 4-core to 52-core. Samples on request.—L. E. Butler, 225, Cheney Manor Road, Swindon. (189)

TIME SHEETS. Our stock-printed Time Sheets are remarkably cheap compared with specially printed ones. On decent quality 8 in. by 10 in. paper: 100, 3s. 6d.; 500, 15s.; 1 000, £1 7s. 6d. Post free. Send for sample.—F. H. Brown Ltd., P.O. Box 26, Burnley, Lancs. (16)

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## E.A.W. CERTIFICATE FOR DEMONSTRATORS AND SALESWOMEN.

**THE E.A.W. EXAMINATION IN ELECTRICAL HOUSE-CRAFT** (Theoretical) will be held on Thursday, December 18th, 1947, from 6 p.m. to 9 p.m., at various centres in Great Britain.

Full particulars may be obtained from:—

Examinations Department,  
The Electrical Association for Women,  
35, Grosvenor Place,  
London, S.W.1.

**IMPORTANT:** The final date of entry for the Examination is November 6th, 1947. (199)

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On TUESDAY, SEPTEMBER 30th, to FRIDAY, OCTOBER 3rd, at 11 o'clock precisely (in the British Legion's Rooms, Cornholme).

**ANNOUNCEMENT of Sale by Auction without Reserve of INDUSTRIAL, ELECTRICAL and MISCELLANEOUS EQUIPMENT and STORES,** including Gas Heating Furnaces, Electric Tempering and Muffle Furnaces, Rotary Ovens, Therm Gas Producer Units, Electric Motors, Dust Extracting Plant, Centrifugal Oil Purifiers with 3 h.p. Motors, large assortment of component parts of large and small Box Girder Bridges, also parts Pontoon Bridging Sets, Degreasing Plant, Unpolished Lenses, Field Disinfectors, Drill Jigs, Solder, Mallets, Electric Heating Ovens, Wood Pulleys, Oil Cans, Fuse Boxes, Grindstones, Telescope Bodies, Brass Screws, Spreading Machines, Galvanised Tanks, Milling Cutters, Emery, Blankets, Petrol Pump, 4 Snow Ploughs, Cranes, Cloth Rolling and Examination Tables, Parallel Rulers and

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**View Days:** 24th, 25th, 26th and 29th September, between the hours of 10.30 a.m.—4 p.m.

**Admission** by Catalogue only. One Catalogue will admit two persons on View Days, one on Sale Days. Catalogues (price 6d. each, Postal Orders only) may be had, when prepared, from the AUCTIONEERS, 1, LORD STREET, HALIFAX. (Tel. 4179 Hx.) (Mark envelope S.S.) (140)

G.  R.

By Order of the Minister of Supply.

**M.O.S. DEPOT, No. 127, HALLBURN AERODROME, LONGTOWN.**

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Electric Crane by King, OH type, 36 feet span, degreasing plant, Oxyacet., cutting and welding equipment, riveters, chain and geared blocks up to 10 tons capacity, winches, etc. 12,000 feet GRAVITY ROLLER CONVEYORS, 15 inches width, 4 inch pitch, etc.

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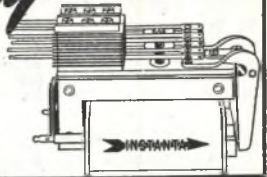
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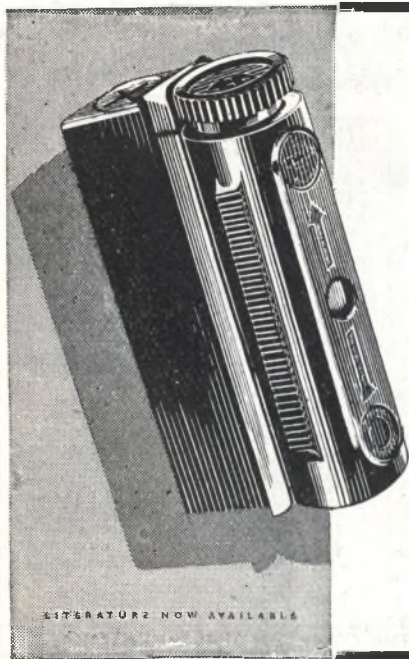
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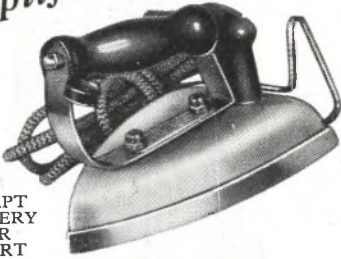
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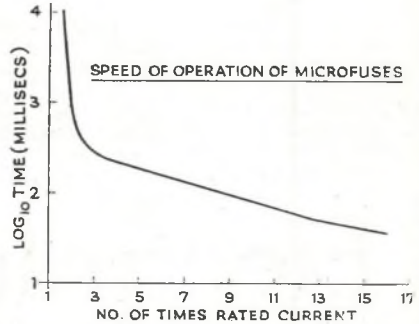
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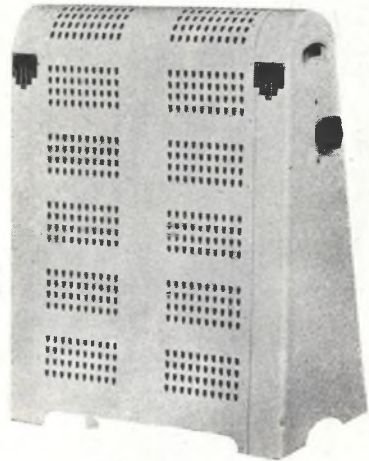
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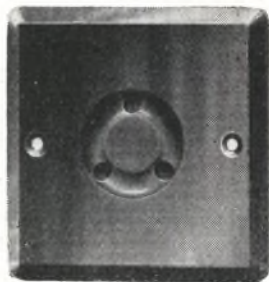
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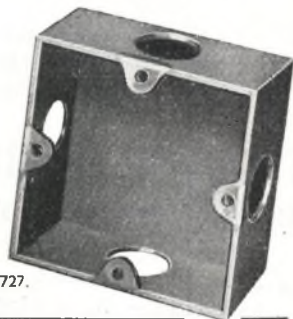
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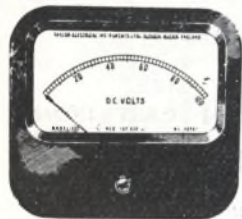
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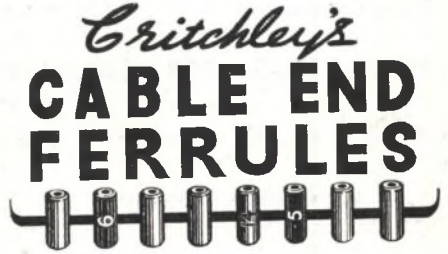
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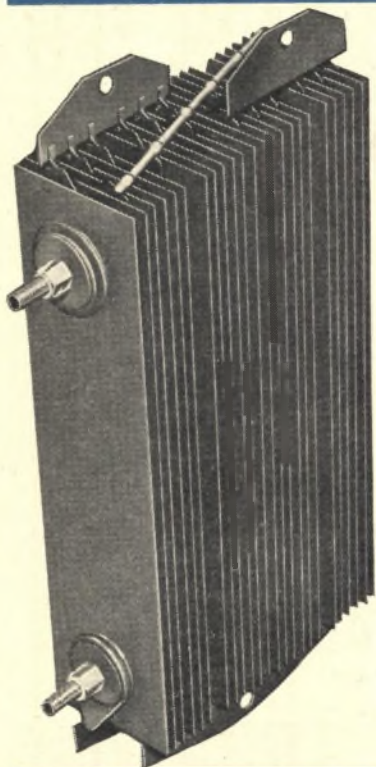
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