# ELECTRICAL REVIEW

VOL. CXLI DECEMBER 26, 1947 NO. 3657





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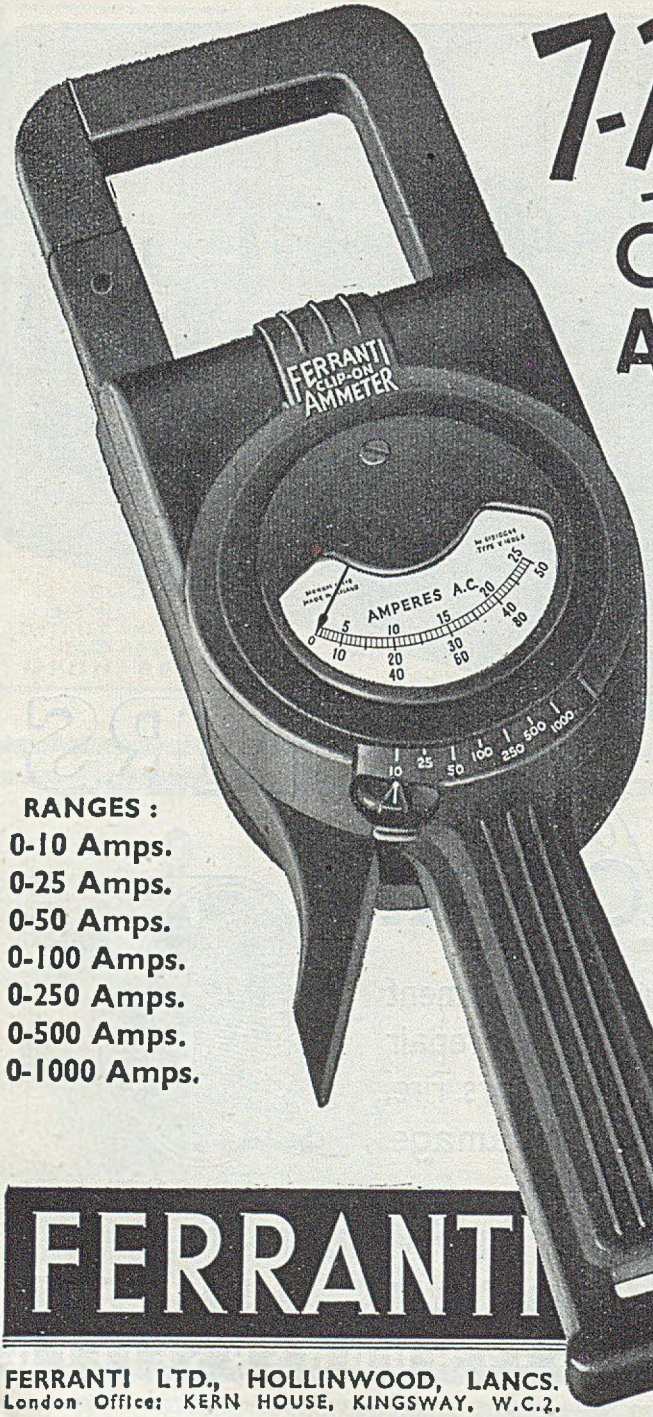


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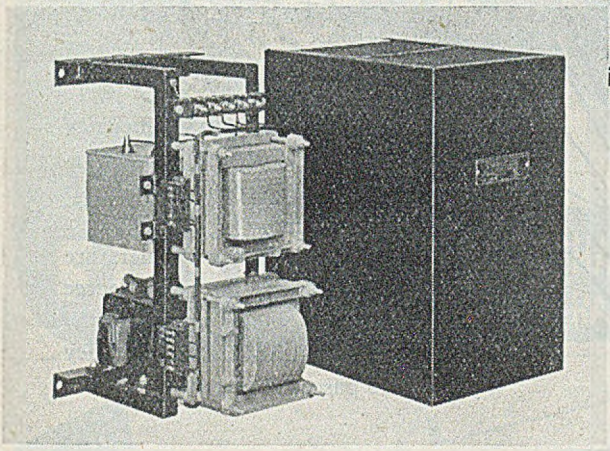

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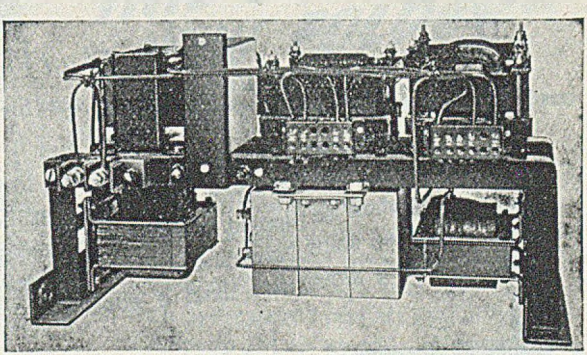

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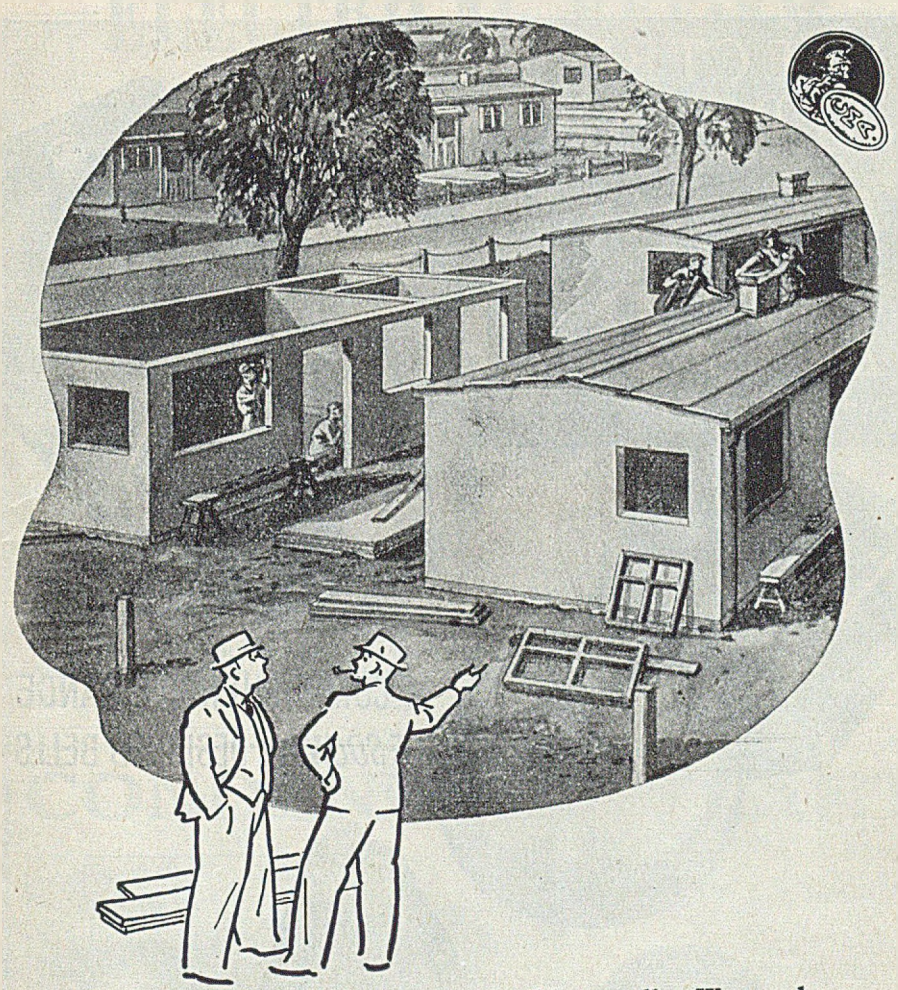

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# ELECTRICAL REVIEW

December 26, 1947

Managing Editor : Hugh S. Pocock, M.I.E.E.

Technical Editor : C. O. Brettelle, M.I.E.E.

Industrial Editor : J. H. Cosens

## Contents :—



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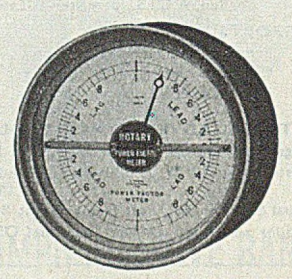


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# ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXLI. No. 3657 DECEMBER 26, 1947 9d. WEEKLY


# Progress Despite Frustration

## Close of a Strenuous Year

IN common with most of the other industries of this country, the electrical industries during 1947 have been "in the fell clutch of circumstance" but can fairly claim to have come through the year with heads unbowed.

The electricity supply section has been faced with two major issues—nationalization and plant and fuel shortage. As regards the first, the natural resentment which arose in both company and municipal circles has now (perforce) given way to acquiescence and general co-operation. This change of feeling has been encouraged by the nature of the appointments which have been made to the British Electricity Authority and the Area Boards. To a very large extent the future of the industry will be in the hands of men who have been responsible for building it up and continuity will thus be preserved—to the benefit of the public and of the industry's employees.

### Plant and Coal

We could have wished the new organization a better start than it is getting. Already short of plant, it is being deprived of a seriously large proportion of what has been considered necessary for the future. This seems to indicate that the nationalized industry will be able to make little headway for the next five years. Against this, the coal situation has improved in recent months and does not now give so much anxiety.

Turning to the manufacturing side we find the same shortage of materials acting as a brake upon a vital and lively industry, although it must be admitted that the industry has managed to secure a fair share of what has been available. Steel has been the scarcest commodity and the latest pronouncement on the subject by Sir Stafford Cripps was a warning that there would be insufficient to meet all the needs of the Government's production programme.

It is the home market which has had to bear the main consequences of the shortages, although electrical plant and equipment are essential in all forms of production. The electrical industry's case for the highest preference is incontestible and we hope that it will not be contested.

### Export Achievements

In no other industry has the conflict between home and export needs been so intense during the past year and we are sure that no other industry has done so well in either direction, let alone both. The 1947 export record has been remarkable: the monthly average this year has been in the neighbourhood of £6,000,000 as compared with about £1·8 million in 1938. Good as these figures are, electrical manufacturers have undertaken to do even better during 1948 and we have no doubt that they will be as good as their promise if they can be assured of the necessary materials and skilled labour.

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electrical installation has to be carried out and reputable contractors should find it possible to carry on in the hope of better times in a year or two.

Altogether the electrical industries can look back upon a year of good work carried out in the face of many difficulties and they may look forward to a gradual improvement in conditions as the effects of six years of war are overcome.

**Lighting in Mines**

WITH a view to raising the prevalent low standards of illumination of the coal face, the Reid Report recommended the adoption of mains lighting wherever permissible. The merits of this method are generally accepted, and but for certain difficulties its use would no doubt be more widespread. The scheme proposed by Professor H. Cotton, particulars of which are given on page 966, obviates the difficulties that arise out of higher voltage, the trouble of dismantling and re-erecting an installation, arcing, open circuits, maintenance of earth continuity and inflexibility in the spacing of lamps. Removal of these disadvantages should make the greater weight of the high-reactance transformer justifiable in many cases.

**London Board Meets**

IT is fitting that the Area Electricity Board for the metropolis should be the first to be constituted and to meet. The London area is a special one, having the smallest extent and the greatest population, facts which make the Board's task easier from some aspects but more difficult from others. It includes an almost negligible rural area and the contiguity of the various boroughs will make price co-ordination a more immediate consideration here than in most other areas. The Board's main work would appear to be administrative rather than technical and the choice of Mr. H. J. Randall as chairman will be well justified from this angle.

**Vesting Date**

THE appointment of the London Board raises speculations regarding the vesting date for electricity supply undertakings which has yet to be announced. Clause 14 of the Electricity Act stipulates that this date must not be earlier than April 1st next; it must be not less than six months after the establishment of the Central Authority; and not less than three months after the establishment of all the Area Boards, and the definition of all the Areas. The British Electricity Authority was appointed in August and the Areas were defined last month. At the time of going to press only the London Area Board had been set up but there is still time for the others to be announced before the close of 1947 in which case it will be possible for the Minister of Fuel and Power to fix April 1st as the vesting date. This would be convenient, for the English municipal financial year begins on that date.

**Payment by Results**

IT is a condition of a new wages agreement which comes into force in the electrical contracting industry in the New Year that both employers and operatives shall do all possible to increase output. At an Electrical Trades Union conference last week it was decided to give the Executive Council permissive powers to introduce systems of payment by results after consultation with the sections of the membership concerned. Is payment by results practicable in installation work where craftsmanship is more important than "output"? Anything that can be done to speed up the work without sacrificing quality and safety is to be welcomed, but wartime experiments in payment by results in the shipbuilding section of the industry were not conspicuously successful.

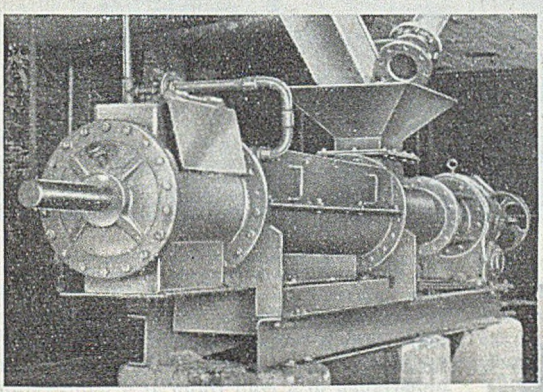
**Service Cables**

IN its final form the Code of Practice for service cables into houses for which the continuous maximum demand would not exceed 60 A at 240 V (C.P.322.101, 1s. post free, British Standards Institution) is an improvement on the draft circulated for comment. It provides for cables larger than 0·0225 and 0·04 sq in. for single- and two-house connections where voltage drop makes this desirable. For under-eaves wiring, the minimum spacing between the tops of lintels over upper windows and eave soffits is fixed at 6 in., and for cables laid in gardens the minimum depth is increased from 18 in. to 24 in. Early consultation between supply engineers and architects or builders is once more recommended regarding entry and control positions.

# Fish Oil Extraction

## Electricity Revolutionizes Methods at a Grimsby Works

THE substitution of electricity for steam as the motive power can be said to have revolutionized the methods of fish oil extraction adopted by C. T. Bowring & Co. (Fish Oils), Ltd., at their Pyewipe Mills, Grimsby. Not only has it made possible the carrying out more conveniently, economically and hygienically of the original operations but it has permitted the introduction of new processes which have both increased output and improved the quality of the finished product.

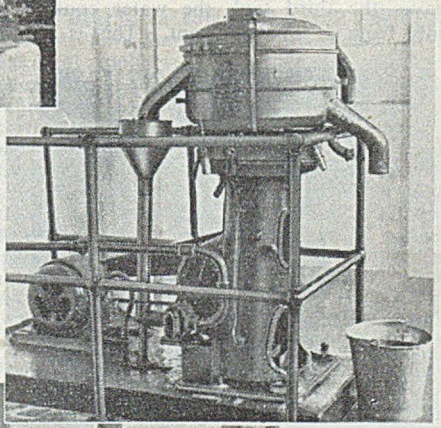


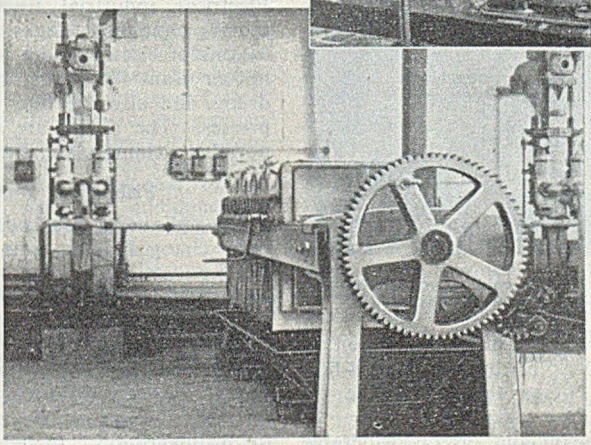
The successful working of this electrically operated press for extracting oil from fish depends largely on the accuracy of the control

Instead of the 70-h.p. steam engine which drove only line shafting providing power for pumps, hoist and stirring gear totalling 20 h.p., there are now sixty-seven electric motors totalling 140 h.p. in use. The boiler still provides steam for process work and, operating at a much lower pressure than required for motive power, has thereby had its useful life extended very considerably.

All types of fish oil are dealt with, but principally cod liver, whale and recently, to assist in maintaining margarine supplies, herring. Much of the oil arrives in its crude liquid form which contains a large proportion of water, but some has first to be extracted from raw fish. The latter is taken by means of an electric hoist to the top of the building where it is placed in large pre-cookers each holding about 7 tons. Here the fish is steam-heated for 20 minutes and mechanically stirred, chemicals being added to accelerate the disintegration process.

The opening of valves at the bottom of the pre-cookers permits the sludge to discharge into a hopper whence it is fed into a specially designed press driven by a 5-h.p., 750-r.p.m. Brook squirrel cage motor. Successful operation of this press is dependent to a great extent on accurate

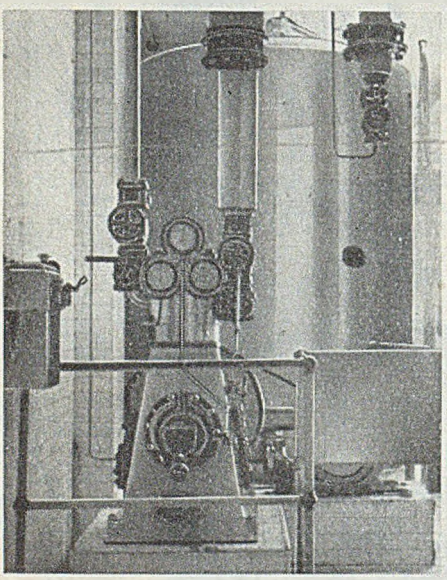




Above: Having left the settling tanks the oil is freed of residual water by means of centrifuges
Left: Filter pumps and presses for separating fat from the oil

control of speed which is achieved by means of a double reduction unit giving down to 4½ r.p.m. The liquid extracted (oil and water) goes to a receiving tank, the pulp being further processed into fish meal in another part of the factory to which we will refer again later.

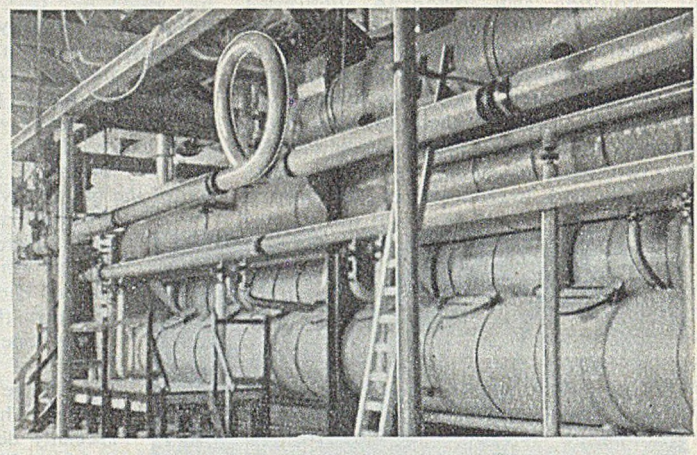
From the receiving tank the liquid is passed successively through a series of three steam-coil-heated settling tanks with electrically driven agitators at the top. Here the oil is separated out and rises to the top, water being removed from the bottom of the tanks. When the liquid leaves the third tank the water content is only from 2 to 5 per cent. This is finally



Compressor serving the cold room where the fat extraction process is continued

removed by "Titan" centrifuges driven at a speed of 5,700 r.p.m. by means of 4-h.p. Titan motors. Pumps then carry the oil away to the blending tanks.

At this stage the oil contains a considerable proportion of fat. For certain purposes this is removed by means of filter presses, the oil being forced through cotton twill



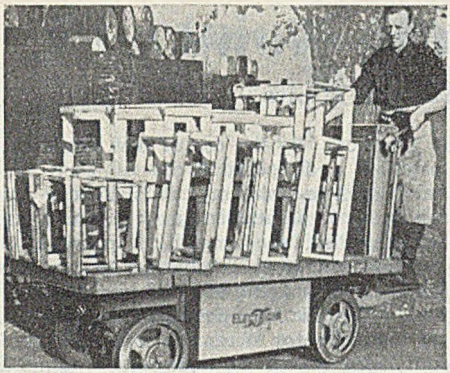
A single 30-h.p. motor drives all the conveyors in this latest continuous type of fish meal plant

filter cloths. When a very high degree of refinement is required this process is carried further by an additional pressing operation undertaken in a cold room at a temperature of 32 deg F (0 deg C). For this last process a compressor supplied by the Liverpool Refrigeration Co. is driven by a 12½-h.p., 935 r.p.m. Crompton Parkinson motor.

Leaving these final presses the oil is taken to a bleaching pan and then stored in tanks to await dispatch. Over fifty electric pumps, generally driven by 2½-h.p., 1,420-r.p.m. motors, are employed to transfer the oil from one process to another, and an Electricar industrial truck is utilized for moving containers, crates, etc. Other applications of electricity are to be found in the hot-air plant for drying both reconditioned drums and also the filter cloths used in the presses. The drums are spray painted. A portable welding plant is available.

### Fish Meal Production

The adjoining fish meal works, too, has been changed over from operation by a 150-h.p. steam engine to electric drive. Fish offal from the docks is unloaded into a hopper at a predetermined rate and goes through a hacker to be broken up. The fish is then taken by worm conveyor to the top of the concentrators where it is passed through a series of steam-heated cylinders for disintegration. In the latest type of fish



**An electric industrial truck moves containers, crates, etc.**

meal plant just installed (1½ tons an hour), the whole mechanical operation is carried out by means of a single 30-h.p. Crompton Parkinson slip-ring motor. Five other concentration plants (3 tons each) are operated through shafting by means of a 50-h.p. Brook slip-ring motor.

The finished material is taken by bucket conveyor either direct to bagging off apparatus or via a chute to a magnetic table to remove stray ferrous impurities. After being ground it is taken by means of a conveyor and elevator system for blending, riddling and bagging.

In both the fish oil and meal plants a considerable amount of water is required and all this is supplied by the company's own pumps. Additional Beresford submersible pumps are in course of installation.

We are grateful to Mr. A. G. Briggs, a director of the company, for explaining the operation of the plant to us.

# Progress in Queensland

## Spreading Electricity Throughout the State

DEVELOPMENT works on a greater scale than ever before are planned in Queensland. In the tenth report of the State Electricity Commission details are given of its activities, which have been directed to increasing generating facilities in all parts of the State and the construction of main transmission lines to bring electricity to new areas, eliminating small uneconomic undertakings.

During the past financial year £1,263,945 was spent on development by electricity authorities in the State, £617,908 by publicly owned and £646,037 by privately owned undertakings. At the date of the report publicly owned undertakings had works estimated to cost over £8,000,000 in hand of which more than half is likely to be spent by the end of the current year. Three new generating stations are under construction at Howard, Rockhampton and Townsville ; others are planned for Brisbane, Goondiwindi and Charleville, and surveys are advanced for a hydro-electric station at Tully.

In South Eastern Queensland the principal undertakings are those of the City Electric Light Co., Ltd., and the Brisbane City Council. A joint investigation has shown that, to cater for the next fifteen years, two additional generating stations each of about 150,000 kW, will be required.

Administratively, a point of interest is the publication of the first annual reports (as appendices to the Commission's report) of four of the five Regional Electricity Boards set up under the Regional Electric Authorities Act of 1945. These Boards cover an area of 96,000 sq miles (248,700 sq km) and embrace local authority areas involving the amalgamation of 23 supply authorities.

The Boards, in conjunction with the Commission, have implemented plans for selling electrical appliances to consumers, and have adopted a uniform trading policy, including hire-purchase schemes. It is stated that owing to the inability of Australian manufacturers to meet the requirements, 1,000 electric stoves have been purchased in England and the first shipment has already arrived. The report adds that it may be necessary to explore the British field further if supplies from Australian sources are not forthcoming. The importance of making electrical appliances available to all at reasonable prices is stressed.

Dealing with Western Queensland, the report says that expensive subsidization appears to be necessary. The Queensland Government has already approved special subsidies of 50 per cent of the capital cost of all electrical works undertaken in that area, but the problem is a national one and it is thought that assistance should be granted by the Commonwealth Government.

Reference is made to the Clarence River Gorge scheme, an inter-State hydro-electric project. Investigations have been put in hand by the New South Wales Government.

The Commission's report does not include overall statistics for the past year. In 1945-46 electricity authorities sold 388 million kWh (including supplies resold). Consumers numbered 888,419, and excluding street lighting, water pumping and special bulk supplies, the average sale per consumer was 1,727 kWh. Revenue aggregated £2,638,315, averaging 1·631d. per kWh sold, with a margin of profit of 0·242d. It has not been necessary so far to introduce power cuts as elsewhere in Australia.

# Views on the News

## Reflections on Current Topics

VERY serious effects upon chicken hatcheries may ensue from power cuts. The Chick Producers' Association has told the Electricity Commissioners that most hatcheries use machines with a capacity for 16,000 eggs and there are chickens to the potential value of £1,000 in each. Many hatcheries have more than a dozen of these machines. This consideration gives weight to the Commissioners' request to electricity authorities to maintain the supply to these establishments if they can. The undertakings are also asked to ensure, if possible, that dairies using electric milking machines are not cut off at milking time.

* * *

Evening power cuts are bound to have a serious effect upon cinemas and so they are interested in securing continuity of supply. That this is fully realized is evident from the decision of the Cinema Exhibitors' Association to take an active part in the fuel economy campaign. One proposal is that a one-minute film shall be produced and exhibited at all cinemas. Each member of the Association is to be asked to contribute 15s. towards the cost. This is a case of enlightened self-interest which will be of considerable public benefit.

* * *

Domestic electrical appliances need very little selling these days but I heard recently from America of a striking method of demonstrating the efficiency of refrigerators and electric blankets which sales staffs might think worth remembering for the perhaps not-so-distant time when the "buyers' market" returns. An electric blanket was placed inside a refrigerator and both appliances were switched on. It is stated that both proceeded to perform their functions satisfactorily, the blanket feeling pleasantly warm to the touch, while the air around it remains at a low temperature.

* * *

I always have my doubts about multi-purpose electrical appliances. Usually they are very complicated mechanically and the services they perform can be more conveniently carried out by separate units. There may, however, be something to be said for a new all-purpose lamp just produced in America. By the use of new fluorescent materials and special types of glass that transmit ultra-violet rays it is claimed that any desired characteristics of the lamp can be intensified, thus making it possible not only to illuminate the kitchen but to deodorize it, kill bacteria and give the housewife a sun tan. I suppose it might also be possible to use the lamp for sterilizing food and drink containers, or for increasing the vitamin D content of certain foodstuffs.

* * *

Some amusing newspaper correspondence on power economy is reproduced in "An Electrician's Diary" in the *New Zealand Electrical Journal*. One writer suggested that "millions of kW" could be saved by restricting household and shop lighting to 110 V. Congratulating him on his bright plan, a second correspondent remarked that, to save costly alterations entailed in the scheme put forward, the authorities might reverse the line and load sides of the supply so that they could feed the units back to the generators. This plan, he added, would have untold advantages in the summer, as the lines being reversed, the electric range could be used as a refrigerator.

* * *

One of my pet aversions, as my readers know, is the robbing of electricity funds for the local rates. I am glad to say, however, that I have never been called upon to protest against the charging of a deficit on a pageant against an electricity surplus. A public inquiry was recently held at Bradford into a proposal of the Corporation to use profits from its gas undertaking to pay for the loss on the centenary pageant held during the summer. I have not yet heard the result of the inquiry.

* * *

A *News Chronicle* headline, "Police to be lit up when power is cut," does not apparently refer to that cheering inner glow which would make the policeman's lot a happier one when condemned to point duty in the icy darkness. Disappointingly, it only means that to avoid traffic stoppage when street lamps are extinguished, Peterborough constabulary are to wear helmets with a "Police" sign illuminated by a battery.—**REFLECTOR.**

# Electrical Developments in Metallurgy

**By L. Sanderson**

ALTHOUGH the modern blast furnace does not employ electrical plant to a marked degree, the precipitron is being increasingly adopted for cleaning the air blown into it. In some instances enough metallic and carbon dust has been found in the neighbouring atmosphere to cut the propeller blades of the turbo-blower, and the expense of renewal may on occasion warrant electrostatic cleaning.

An example of the use of d.c. for rolling mills is provided by a merchant mill having fourteen 600-V motors driving different stands. For transforming a.c. to d.c., a six-phase ignitron is employed, which in addition to being more efficient than a motor-generator has considerable momentary overload capacity. The motors are accelerated to their usual speed by variable voltage which is obtained by phase control of the ignitron.

*Among the subjects referred to by the author are magnetic inspection, electrolytic etching, gauging the concentricity of coatings on welding electrodes, electrical sorting of metals, spectrographic analysis and rotating arc furnaces*

The annealing of welds on site, especially of high-pressure pipe lines, is being simplified by the employment of a mobile electric resistance heater, which has the advantages of a shorter heating time, easy handling and exact control of the entire process, as well as lower cost.

Magnetic inspection is being increasingly employed, using rectified a.c. or storage-battery current. Two methods of magnetizing are employed, the circular and the longitudinal, the one chosen being governed by the kind of flaw anticipated. A magnetic field is built up in and about the part under observation, and if a crack or discontinuity is present, north poles are formed on one edge and south poles on the other, thus creating lines of force. When a magnetic material, such as iron filings, is introduced, the discontinuity is outlined. There are two other methods, the residual and the continuous.

Iron-nickel sheets are being produced by the electrolytic deposition of the two metals in alternate layers each about 0·003 in. thick, and their electrical and magnetic properties have been investigated. By annealing for a brief period (approx. 20 min.) at 1,000 deg C, a homogeneous alloy is produced possessing valuable magnetic properties.

Electrolytic etching is of considerable value to metallurgists in providing consistently good micrographs from metals and alloys normally hard to etch by ordinary chemical processes; these include aluminium, copper and nickel-base alloys. The reagent produced for nickel-base alloys has also been found satisfactory for austenitic chromium-nickel steels.

A number of methods of gauging the concentricity of coatings on welding electrodes has been developed. Among these are micrometer and optical measurement, X-ray shadowgraphs, methods based on measurement of the magnetic flux, dielectric measurement of the coating thickness and, finally, a bridge method in which the core wire and the coating are employed as resistances and capacitors in a universal-bridge circuit.

The intermittent a.c. arc technique has been applied to the spectrographic analysis of materials in which the elements are not present in the metallic condition. Two variants have been developed. One is for very small samples of one or two elements in simple conditions. The other is for larger amounts of a number of common elements. In general, an accuracy of about $\pm 5$ to 10 per cent of the proportion of the element present is attainable by either method.

Two modifications have improved the efficiency of a magnet for lifting scrap. One consists of closing the gap between the pole ring and the housing. The other comprises welding a special central pole shoe to the housing, the shoe being designed to withstand impacts when lowering the magnet to the scrap.

An electrical method of sorting metals has been introduced (tribo-electrification), which is based on the measurement of the potential produced when a specimen of unknown origin is made to vibrate against a reference specimen. If the specimens are identical, no potential is produced, but if they are not, the millivoltage and polarity indicate

differences in metal composition or structure. Industrial vacuum furnaces have been developed considerably of recent years. They were at first employed in the laboratory for 0·5-kg melts, but their size has increased from small brick-lined resistance furnaces, through low-frequency units, to the modern, high-frequency type taking a 5-ton charge. These furnaces are chiefly employed for preparing special alloys, particularly from readily oxidized compounds but not often for melting steel.

### New Welding Electrodes

A new type of welding electrode has a heavy coating, the principal ingredients of which are calcium carbonate and calcium fluoride. It is claimed that by its means high-carbon steel, cast steel, enamelling steel and cast iron can be readily welded. A nickel electrode has also been developed for welding cast iron, which is claimed to lessen the need for special treatment of the casting before and after welding.

The examination of electrodeposits has been rendered simpler by the electrographic method. This consists of impregnating a pad of folded paper with a suitable reagent, applying the pad to the surface to be tested and passing a current through the metal and pad by touching the outer surface of the pad with a graphite rod, which is made the cathode, whereupon a coloured spot is formed on the pad.

Considerable attention has been paid to the obtaining of maximum power in the electric arc furnace for any specific voltage tap, especially during the melting down period. The electrical input is regulated by the operator as a result of adjustment of the quantity of current each electrode takes. If the operator should adjust this particular control to obtain a current above 50,000 A, the furnace would absorb less heat than could be obtained at the maximum point. Some operators believe that they are increasing the input when they raise the current to its maximum value. To obviate this error, furnace controls are now being installed to restrict the input to the maximum kW possible for each furnace tap, which is likely to contribute towards economy of operation.

The "electric eye" is being widely employed in a number of rolling mills to activate mechanism for turning hot bars over on run-out tables as well as to transfer bars from one table to the other. For the most part the mechanism is quite simple, and it has succeeded in cutting down the number of men needed for operation.

The successful hardening of a layshaft with four gears is one of the achievements of high-frequency induction heating. The heating times for the four gears were 15, 18, 20 and 30 sec. Extremely accurate measurements were taken, both in advance of and after hardening. In no case was a difference of 0·0006 in. (0·015 mm) exceeded. The maximum spacing error from tooth to adjacent tooth was increased by 0·0003 in. (0·0075 mm). The cost of the process compared very favourably with that of cyanide hardening.

An injection type of casting machine has been introduced for the accurate production of finished steel castings weighing up to about 15 lb (6·8 kg). The steel is supplied from a high-frequency induction furnace, and a ram with a tungsten carbide face forces it through a nozzle $\frac{3}{8}$ in. (9·53 mm) in diameter into the metal die. The ram and one half of the metal mould are moved by hydraulic power.

### Manganese Production

Recent progress in the electrolytic production of manganese has been considerable. Anodes of lead-silver alloy are being used, which eliminates oxidation and the precipitation of manganese oxides, and allows the cells to be designed with anodes inside the diaphragms, while the catholyte can be recirculated, its volume increased, and its pH maintained at a lower value. Aluminium is being used for the cathodes, as it excels stainless steel in electrical conductivity, smaller solubility in the electrolyte and ease of cleaning. The cathode is also being covered with powdered aluminium to make the removal of the manganese easier. Finally, hydrolysis of the manganese in the catholyte is being prevented by additions of a carefully controlled quantity of ammonium sulphate.

An important means of driving main rolls is the employment for the first time of twin motors on a large reversing four-high plate finishing mill—a method which has hitherto been applied only to large slabbing mills. The doubt was whether the two motors would synchronize sufficiently closely to effect the delivery of plate as thin as $\frac{3}{16}$ in. without causing it to curl up in the air or feed down between rollers on the main tables. The system has now been working

long enough to indicate that this difficulty has been effectively overcome. Smooth working is achieved with only a small amount of backlash in the drive, and there is no possibility of obtaining pinion marks on the plate from the worn gears.

### Furnace Developments

A new form of control has been developed employing rotating regulators that match the current input in electric arc furnaces per electrode against the voltage across the arc. Three independent motor-generators (one for each electrode) furnish power to an electrode motor and rotating regulator in each case. All electrical connections to the rotating regulators are made through a receptacle indicated on top of the sets. A regulating set can be inserted in the circuit simply by removing the jack connector block and inserting it in the spare set. This allows of examination and repair without interference with the working of the furnace.

The advantages of the basic electric furnace process for making steel are being increasingly recognized. The latest tendency is to use the swing roof, top-charge type, having shell diameters of 16 and 17 ft (4·88 and 5·18 m) and charging capacities of 40 and 50 tons. Production with all-cold charging ranges from 8 to 12 tons per hr, and can be increased to as much as 20 tons per hr by means of the duplex and triplex processes.

A rotating arc furnace has lately been developed in Norway. It has three electrodes which move in the vertical plane only, while the body of the furnace, mounted on a turntable, is slowly caused to rotate. The speed is adjustable between 6 hr and 9 hr per revolution. The furnace has three tap holes and one movable tapping bridge, which follows the rotating movement. A comparison has been made of the costs of making 75 per cent ferro-silicon in this furnace and in one of stationary type. The former produced 17 per cent more than the stationary furnace with the same power consumption.

Precision regulation and hydraulic-electric control of the movement of the electrodes in modern carbon arc melting furnaces are being adopted. In the Söderberg system the electrodes are made above the furnace itself, in which the carbon mixture and binding material are passed into a sheet-metal cylinder and moved down into the furnace.

An investigation into the effects of different forms of heat treatment on the electrical and magnetic properties of five grades of steel containing from 0·65 to 4·25 per cent silicon has demonstrated that any treatment causing over-annealing increases the watt losses. The finishing temperature in the rolling of the sheets affects the structure and requires modification of the annealing treatment. The larger the grain size, the lower the watt losses and the greater the permeability. The best annealing temperature for steels with 0·6 to 3·5 per cent of silicon is 800 to 850 deg C and, for transformer steel, annealing at 950 to 1,000 deg C shows the lowest watt losses. The permeability of silicon steel decreases with the silicon content.

A simple a.c. inductance bridge has been developed to determine the magnetic character of materials of very low magnetic susceptibility. An apparatus for measuring the electrical contact resistance in the spot welding of sheet metal is another recent device. In the Sperry supersonic reflectoscope for detecting flaws in billets and blooms up to 20 in. (50·8 cm) square, the position of defects is determined by measuring the difference between the times at which reflections of waves of supersonic frequency transmitted from one side of the billet are received from the opposite surface and from the defect.

## Change in Electrical Units

IN view of the change on January 1st from the "international" system of electrical units to the "absolute" system derived from the centimetre, gramme and second (particulars of which were given in the *Electrical Review* of July 18th), the Electricity Commissioners have issued a memorandum regarding its bearing on the Electricity Supply (Meters) Act, 1936. The effect will be negligible on integrating meters and indicating instruments. Allowances must, however, be made when using potentiometers and their accessories.

Current-measuring resistors will vary by nearly 0·05 per cent, thus exceeding the permissible limits of inaccuracy in many cases. Those now in use or made after January 1st will be subject to requirements in regard to marking or adjustments. Corrections must be made in test rooms of supply undertakings for apparatus that has not been re-tested by the National Physical Laboratory. The new absolute value for standard cells equals the existing international value + 0·00035 V, and for standard resistances for current measurement the international value + 0·049 per cent. Correction factors are also given for standard potentiometers, voltage standardizers, d.c. voltmeters to be used with potentiometers, Cambridge reflecting wattmeters and Shotter-Elliott a.c.–d.c. comparators. A method of maintaining the standard cell at a temperature between 20 and 25 deg C (68 and 77 deg F) is described.

# Industry and the House

## Prospects for 1948

By F. J. Erroll, M.A., A.M.I.E.E., M.P.

BEFORE the House rose for the Christmas Recess, the Government tried hard to send away its supporters with songs in their hearts. There has been a welcome increase in production during the first part of the winter in many fields of industry. Ministers have not been slow to take advantage of this bright spot. Mr. Herbert Morrison's suggestion on the B.B.C. that we were rounding "Recovery Corner" was quickly taken up by the Minister of Fuel and Power on December 17th when he announced an improvement in the production of coal which would permit moderate exports in the New Year. Because output had been greater than expected, and consumption somewhat less, stocks, he said, accordingly stood at a higher level than had been expected. A small increase of about 20,000 tons per week would be available for domestic consumers. To this extent therefore the load on generating stations may, it is hoped, be reduced. If the supplies of coal to householders can be further increased there should be a considerable easing of peak load demand, and so the postponement of part of the Central Electricity Board's programme announced on the same day may not prove to be too serious.

### Fuel Oil Position

Mr. Gaitskell did not himself refer to the deteriorating fuel oil position, which he left to his Junior Minister, Mr. Alfred Robens, to explain to the Press on the following day. As had been long suspected the Government is going to find it difficult to maintain supplies of fuel to oil-burning installations in the coming months, either by reason of tanker shortage or lack of dollars. Every effort will be made to maintain supplies to existing installations. This statement seems to have been made without reference to the reply of Mr. Silkin to Sir Arnold Gridley about Bankside power station six days earlier. He confidently asserted that the fuel oil which the new station would burn should have no deleterious effects on buildings in the neighbourhood.

Not to be outdone in the spate of good news, Mr. Morrison announced on Thursday last week, the formation of a new Committee on Industrial Productivity. This will advise on the form and scale of research effort in the natural and social sciences which will best assist an early increase in industrial productivity. The main Committee under the chairmanship of Sir Henry Tizard will work through a number of panels and overlapping with other bodies already carrying out similar work will be avoided.

Sir Stafford Cripps gave the final message of good cheer to the supporters of the Government. In a debate originally intended to discuss the cuts in capital investment, but widened to cover Britain's general international trade position, he outlined the encouraging increases in production which are taking place in several important industries. Britain was on the move, he said, and the people were responding magnificently. But those who stayed to listen learnt that the "terms of trade" have moved further against us, and our trading deficit remains extremely serious, with only a few months between us and international bankruptcy.

### Export Handicaps

Great and growing contributions are expected from the electrical manufacturing industry. Nevertheless difficulties increase as importing countries bar our exports. Three days earlier Mr. Irving (North Tottenham) referred to "a radio factory at Perivale" which would have to close because it could not reach its export target. The Minister of Supply replied that the factory was closing because it was hoping to arrange for more economical production elsewhere, and consequently be in a better position to accept export orders.

Sir Stafford Cripps did admit that the prices of British exports were in many cases too high, but added that our exports were not necessarily banned on this account. But a ban is a ban whatever the price of the goods offered.

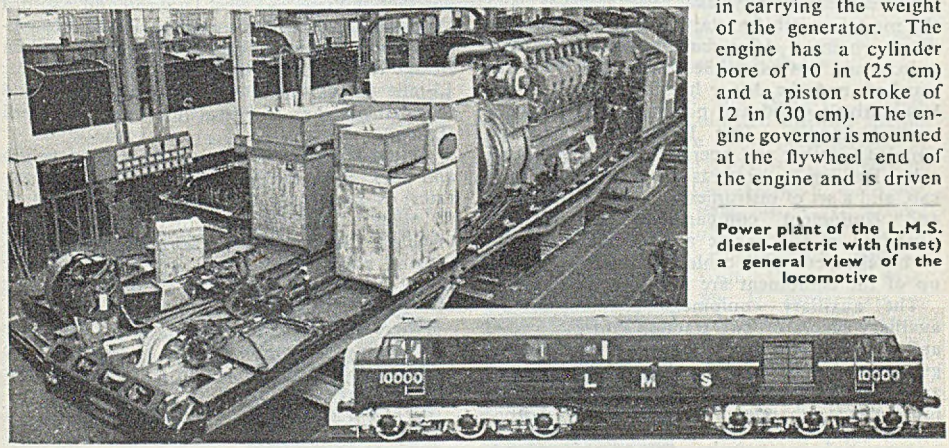
The right of employees of the British Electricity Authority to offer themselves as candidates at local government elections was upheld by Mr. Morrison, answering on behalf of the Prime Minister. The employees of nationally-owned corporations are not debarred in any way.

An important matter of principle also arises in connection with the Control of Turbo-Alternators Order referred to a fortnight ago. This Order, tabled on November 13th, is made retroactive to cover all contracts placed on or after November 1st, 1946. An Order may not have retrospective effect unless it is specifically stated in the Act that that is allowable. This Order was made under Defence Regulation No. 55 which contains no such provision, and the retrospective effect of the Order, despite the Minister of Supply's facile explanation, is apparently not legal. The Minister said that November 1st, 1946, was chosen as the operative date since, owing to the production time cycle, the specifications for orders placed on or after that date could still be altered to conform to the new standards. Nevertheless a Treasury Circular issued in June, 1946, to all Departments stated that Orders, unless specifically permitted under the controlling Act, could not be made retrospective, and if purporting to be so made would be *ultra vires*. Sir John Mellor (Sutton Coldfield) has therefore tabled a Prayer to annul the Order on January 20th, the date on which the House resumes.

# Diesel-Electric Locomotive

## New L.M.S. 1,600-h.p. Unit

THE first diesel-electric locomotive to be constructed for experimental main line service in Great Britain has just been completed at the L.M.S. works at Derby, and is now undergoing tests. It is powered by a 16-cylinder, 1,600-h.p. diesel engine, which, together with the whole of the control equipment, has been designed and manufactured by the English Electric Co., Ltd.




**Power plant of the L.M.S. diesel-electric with (inset) a general view of the locomotive**

The locomotive, No. 10000, is designed to work either independently, or, when coupled to a second unit (No. 10001, now under construction) to form a 3,200-h.p. locomotive capable of working the heaviest L.M.S. long-distance expresses and of attaining a maximum speed of 100 m.p.h. (161 km.p.h.). Assembly has been carried out in a new workshop which is the first of its kind to be established exclusively for the construction and repair of diesel and diesel-electric locomotives. This innovation follows the company's successful experience over several years of the application of the diesel-electric principle to shunting locomotives.

The diesel engine and main and auxiliary generators form one unit on cross stretchers in the main frame. Auxiliary spring supports are also provided to assist in carrying the weight of the generator. The engine has a cylinder bore of 10 in (25 cm) and a piston stroke of 12 in (30 cm). The engine governor is mounted at the flywheel end of the engine and is driven from one of the camshafts; it regulates the fuel pumps by means of a servo piston operated from the lubricating oil system, and automatically stops the engine in the event of a failure in the lubricating system. The governor controls the engine at all speeds. Four British Brown Boveri exhaust-gas turbo-chargers, each serve four cylinders.

The engine is started by motoring the main generator from the batteries, and the connections are so arranged that the electrical circuit cannot be completed until pressure has been built up in the engine lubricating system by means of a motor-driven pump. A trip automatically

stops the engine whenever a pre-determined speed is exceeded. Furthermore the turbo-charger air delivery pressures operate a fuel limiting device, which automatically reduces the maximum power which can be developed if the pressure falls owing to a turbo-charger failure.

Power from the main generator is transmitted to the road wheels by means of six axle-hung nose-suspended traction motors connected in three parallel groups of two motors permanently connected in series. The main generator, a single-bearing machine directly coupled to the engine crankshaft, is of the d.c. self-ventilated type, provided with two separately excited field windings and a series decompounding winding which is used also when the generator is motored from the battery for engine starting purposes. The traction motors are d.c., series-wound reversible force-ventilated machines.

### Control System

With the exception of the master controller which is mounted in each cab, the control equipment, consisting of electro-magnetic and electro-pneumatic contactors, relays and reverser, is mounted in a single, dust-tight main control frame situated in the generator compartment. The master controller includes the main control handle, the reverser lever, and the master switch for starting and stopping the diesel engine. After having set the master switch and reverser, these are then left untouched, and the driver has full control of the locomotive's speed and power in a single main control handle. Two locomotives may be coupled together and operated from one driving cab. Driving instruments are provided in each cab, and a set of instruments in the engine room and equipment compartment enables the condition of the engine and electrical circuits to be checked. All cables used in the wiring up of the equipment are fire- and oil-proof.

The auxiliary equipment consists of an auxiliary generator, two traction motor blowers, and the radiator fan motor. The auxiliary generator is overhung on the main generator, and supplies current for the control circuits, for battery charging, for operating motor-driven compressors (for control gear, sanding and horn valves), exhausters and traction motor blowers, and for locomotive lighting. The lead-acid battery which starts the diesel engine also operates the locomotive lighting and supplies power to the control circuits until the engine is started.

In the driver's cabs at each end of the locomotive are de-frosters and electric heaters. The dashboards with indirect lighting to the various instruments give the crew information on the working of the engine and equipment.

At a demonstration of the locomotive on December 18th Sir Robert Burrows, chairman of the L.M.S. Railway, said that it would help to convince foreign buyers that we in this country could make as fine a diesel engine as any in the world. Sir George Nelson, chairman and managing director of the English Electric Co., Ltd., declared that the construction of the locomotive was a tribute to the country's virility since less than eight months had been taken to design and build it. Sir Cyril Hurcomb, chairman of the British Transport Commission, was among those who travelled in the driver's cabin on the demonstration run from Euston to Watford and back.

## Contractors' Notes

### Extended London Area

WE recently reported that the London area, for the purpose of wages in the electrical contracting industry, had been extended from 12 to 15 miles radius from Charing Cross. New working rules have now been issued to members of the National Federated Electrical Association by the director, Mr. L. C. Penwill.

These specify a number of areas which are deemed to be within the area although not wholly within the 15-mile radius. They are as follows:—Bushey Urban District, Borough of Watford, civic parish of Ruislip-Northwood, part of Uxbridge Urban District south of the G.W. and L.N.E.R. main line, the civil parishes of Yiewsley, West Drayton and Ashford (Middlesex), part of the civil parish of Walton-on-Thames north and east of a line from Walton Bridge to Walton station, thence E.N.E. to the 15-mile radius line, Borough of Dartford, and the civil parishes of Hornchurch and Romford (Essex.)

Actual fares are to be paid from shop to job and back again but travelling time (at ordinary rates) is paid only for distances in excess of 15 miles. Country and other allowances are to be paid when the job reasonably necessitates lodging away from home, irrespective of the actual distance between the shop and the site of the job.

Where a site is cut by the 15-mile radius line the building or work is deemed to be within the Grade "A" area, subject to a limit of ¼ mile from the line.

It has been agreed that the amount of "abnormal conditions" money shall be raised from 1s. to 1s. 6d. per day as from the third pay-day in February next.

## Killed in Rescue Attempt

GOING to help a workmate, Edward Ashcroft (23), an employee of the Belmont Bleaching & Dyeing Co., Bolton, received a fatal electric shock. It is understood that an electric cable was severed by a chain being used to move a large tank. A fitter who had received a shock was lying on the floor when Ashcroft came in and, apparently thinking that the man's feet were trapped beneath the tank, took hold of the chain to try to lift the tank, and was killed.

# PERSONAL and SOCIAL

## News of Men and Women of the Industry

THE first of the fourteen Area Electricity Boards to be established by the Minister of Fuel and Power under the Electricity Act, 1947, held its first meeting last Friday afternoon. Appropriately it was the No. 1 Board, which covers the London area. All nine members of the Board were able to be present at the meeting, which was held at the offices of the City of London Electric Lighting Co., Ltd., at Falcon House, Aldersgate, London, with the chairman, Mr. H. J. Randall, presiding.

We also reproduce the portrait of **Mr. D. H. Kendon**, M.I.E.E., who has been invited to become the deputy-chairman of the Midland Area Electricity Board. Mr. Kendon has been general manager of the Shropshire, Worcestershire & Staffordshire Electric Power Co. since 1939.

**The London Area Electricity Board at its first meeting last Friday. Left to right: Mrs. G. H. Dunbar, Alderman I. J. Hayward, Mr. G. C. R. Eley, Alderman C. W. Dixon, Mr. W. A. Jones, Mr. W. J. H. Wood, Mr. E. A. Mills (deputy chairman), Mr. H. J. Randall (chairman) and Dr. P. Dunsheath**

**Mr. H. C. Waters**, A.M.I.E.E., who as we reported in last week's issue is the deputy-chairman-designate for the Eastern Area Electricity Board, is general manager of the East Anglian Electric Supply Co., Ltd., the Bedfordshire, Cambridgeshire and Huntingdonshire Electricity Co., and the Newmarket Electric Light Co., Ltd. After serving for eleven years as draughtsman and designer of rotating electrical plant with Crompton Parkinson, Ltd., he was for five years managing director of Bull Motors, Ltd. For twenty years he was chief assistant to the general manager of the East Anglian Electric Supply Co., becoming general manager of the company and the Bedfordshire and Newmarket Companies two years ago. He has served on the Stowmarket U.D.C. and has been a member of a number of local bodies.

**Two Area Board deputy-chairmen: Mr. H. C. Waters (*Eastern*) and Mr. D. H. Kendon (*Midland*)**

In connection with the merger whereby Edison Swan Cables, Ltd., and Cosmos Manufacturing Co., Ltd., are to be incorporated in another A.E.I. subsidiary company, the Edison Swan Electric Co., Ltd., reference to which was made in our last issue, **Mr. C. G. Seeley**, who has more than forty-four years' service with the A.E.I. group, is retiring on pension from December 31st. **Mr. H. Butterworth** is appointed managing director of the Edison Swan Electric Co., Ltd., as from January 1st, and the board of the company will be reconstituted as follows:—Messrs. I. R. Cox (chairman), H. Butterworth (managing director), J. S. A. Bunting (general manager—cables), T. Hands (general manager—valves), A. G. Everett, F. E. C. Miller, V. L. J. Plascott, J. W. Ridgeway, E. Y. Robinson, Sir George E. Bailey, and Dr. H. Warren. Mr. A. G. N. Dixey will continue to be the secretary of the company.

**Sir George E. Bailey**, C.B.E., M.Sc., M.I.E.E., M.I.Mech.E., on assuming the office of full-time deputy chairman of Associated Electrical

Industries, Ltd., will relinquish his position as managing director as from January 1st next. **Mr. H. W. H. Warren**, D.Sc., M.I.E.E., M.I.Mech.E., the present deputy managing director, will be appointed managing director of the company.

**Mr. E. H. Ball**, M.I.E.E., deputy managing director of the British Thomson-Houston Co., Ltd., will be appointed managing director of that company from January 1st.

**Mr. S. Slingsby**, A.M.I.E.E., has been appointed works manager by Gresham Transformers, Ltd., Hanworth. Previously, as the manager of the Transformer Department of Chamberlain & Hookham, Ltd., he was well-known for his work on instrument transformers and with B.E.A.M.A. and the B.S.I. Technical Committees.

Mr. S. Slingsby

At a meeting of the Stockton-on-Tees Corporation Lighting and Power Committee last week the question of the salary of **Mr. N. Hunter**, the borough electrical engineer, was considered and it was resolved that it should be in accordance with the National Joint Committee's schedule.

**Mr. H. Norton** has been appointed national negotiating secretary of the Electrical Power Engineers' Association. Mr. Norton, who was Northern Area assistant secretary, has been with the Association since 1944 and before that was assistant claims superintendent with the Sheffield Corporation.

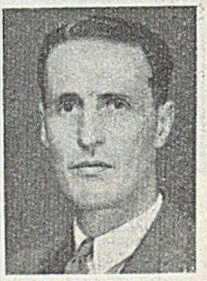
**Mr. C. L. G. Fairfield**, M.A., A.M.I.E.E., A.M.I.Mech.E., Barrister-at-Law, has joined the Mullard Wireless Service Co., Ltd. The applications of Mullard research and development work to industrial problems will be one of Mr. Fairfield's many activities, in which he will act as assistant to the directors of the company in a technical capacity. Mr. Fairfield was formerly with Balfour, Beatty & Co. and held a position similar to the one he at present occupies. Previously he was for a time with the Midland Counties Electricity Supply Co. After taking the tripos in mathematics and mechanical sciences at Cambridge University, he served a college apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd., and was later on the staff of that company's Erection Department in various London power stations. From 1937 to 1945 he was with the Central Electricity Board.

Mr. C. L. G. Fairfield

**Mr. D. Jackson** has been appointed joint managing director of Mavor & Coulson, Ltd., with special direction of works and all technical and production matters. **Mr. J. R. Mavor** has relinquished his position as joint managing director but remains chairman.

**Mr. V. H. C. Phillips**, B.A. (Hons. Oxon.), has been appointed sales manager of Kent Bros. Electric Wire Co. & E. H. Phillips, Ltd., as from January 1st, 1948. Mr. Phillips who has been with the company since December, 1945, took up an appointment in the banking world when he left Oxford in 1933, and from 1939 to 1945 served in the Royal Tank Regiment.

**Mr. H. M. Mathews**, C.I.E., M.I.E.E., Electrical Commissioner with the Government of India and chairman of the Central Technical Power Board, has recently resigned his appointments and is expected in the United Kingdom in February. Before joining the Government of India, Mr. Mathews was with Merz & McLellan for fourteen years and during that period he was mostly in London, but he also spent a good deal of time overseas on assignments in India, Canada, South Africa and West Africa. He went to India in 1940 as electrical adviser to the Ministry of Supply Munitions Mission and attended the Eastern Group Conference. In 1941 he commenced the task of setting up the Electrical Commissioner's Office for the Government of India, an office for the co-ordination of the public electricity supply industry in India, and in December, 1944, he became chairman of the Central Technical Power Board, a Government agency charged with the responsibility of planning major power projects in India.



Mr. H. M. Mathews

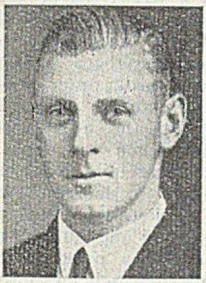
**Mr. W. L. Patterson** has been appointed manager of the Manchester office of C. A. Parsons & Co., Ltd. **Mr. W. F. Waddingham** retains his position as district engineer, Manchester office.

**Mr. L. D. White** was appointed on December 1st as an illuminating engineer of Ekco-Ensign Electric, Ltd., operating from the company's London office.

**Mr. E. L. Merigan** has been appointed electrical engineer in charge of the State Electricity Commission of Victoria (Electrical Branch) in succession to the late Mr. W. A. Potts. Last year he visited England, Continental countries and America to investigate the latest practice in high-voltage transmission.

**Mr. G. W. Giffin**, M.B.E., general works manager of Siemens Bros. & Co., Ltd., has been appointed a director of the company.

**Mr. P. G. Murphy**, B.Sc., M.E., M.I.E.E., M.I.Mech.E., has been appointed chief engineer in charge of all the technical departments of the Electricity Supply Board, Eire, as from January 1st next. After some years with J. F. Crowley & Partners, the London consultants, Mr. Murphy joined Siemens-Schuckert, Berlin, and he was later engaged on the construction of the Shannon power works. He went to the Electricity Supply Board on its formation in 1927 and since 1931 has been the chief design engineer. He was chairman of the Irish Centre of the I.E.E. from 1943 to 1945.



Mr. P. G. Murphy

The Sunco Social and Sports Club (Sun Electrical Co., Ltd.) entertained over sixty children of members of their staff to a Christmas party at their London showrooms on December 13th. An excellent entertainment was arranged and the children all received gifts.

**Mr. L. J. Serjeant**, manager of the English Electric Co., Ltd., Bradford, recently presented the prizes at the works annual presentation to apprentices. Mr. Maurice Webb, M.P. for Central Bradford, said it was through the superior talent and skill of British craftsmen, especially scientists and engineers, that this country would survive.

**Mr. J. Barnett**, of the Tottenham Lamp Works of Thorn Electrical Industries, Ltd., has recently had the degree of Doctor of Philosophy conferred upon him by the University of London. Dr. Barnett worked for a number of years at the research laboratories of the G.E.C., and later with Metropolitan - Vickers. He is responsible for "Atlas" fluorescent lamp production and is works manager of the incandescent lamp factory.

Dr. J. Barnett

**Mr. J. G. W. Pawlyn**, A.C.A., financial director of Ransomes, Sims & Jefferies, Ltd., was elected to the Council of the British Engineers' Association at the annual general meeting of the Association, held at the Waldorf Hotel, London, W.C.2, on December 11th.

The St. Pancras Borough Council is recommended to retain the services of **Mr. Robert Lee** as chief electrical engineer and manager in a temporary capacity for a further year.

In their second round match of the C.M.A. Football Cup, Johnson & Phillips lost to Southern United Telephone Cables, Ltd., by the odd goal after extra time. The game was played on the J. & P. ground at Kidbrooke before a good crowd from both sides. After the match the teams were entertained to tea by the management of J. & P. followed by a musical evening in the J. & P. clubhouse.

The Traction Division of Crompton Parkinson, Ltd., Chelmsford, held their Christmas party on December 6th. **Mr. F. H. Beasant**, the manager of the Division, and about fifty of the staff and their friends met for dinner in London, and afterwards attended a performance at the Adelphi Theatre of "Bless the Bride."

## Obituary

**Mr. F. A. Pucknell**, A.M.Inst.C.E., superintendent of the Large Electrical Machine Department of the Metropolitan-Vickers Electrical Co., Ltd., died suddenly on December 7th, at the age of fifty-five. Mr. Pucknell was educated at the City and Guilds Engineering College and the Imperial College of Science and Technology, after which he went to William Beardmore & Sons, and later, Ruston & Hornsby. He joined the M-V organization in 1921, but in 1935 he became works manager to George Richards, Broadheath, Cheshire. Mr. Pucknell returned to M-V in 1938 as superintendent of the Process and Rate Department. Before the outbreak of war he served, in addition to his normal duties, on the Manchester Area Government Defence Programme Sub-Committee, and in 1941 he was lent to the M-V Aircraft Factory. He returned to the M-V main works in 1944 as superintendent of the Plant and Motor Departments.

**Mr. A. Scammell.**—We regret to record the death, on November 30th, of Mr. A. Scammell, of the London office of the Metropolitan-Vickers Lamp Department since 1924. Mr. Scammell had been in the service of the company for more than forty years.

**Mr. A. Mayor.**—The death occurred on December 10th, after a short illness, of Mr. A. Mayor, for forty-five years a member of the staff of the Metropolitan-Vickers Electrical Co. He was sixty-nine.

**Mr. W. R. Hunt**, whose death occurred on December 13th at Birmingham at the age of seventy, joined Falk, Stadelmann & Co., Ltd., in 1897 and retired in 1937. From 1921 until his retirement he was manager of the Birmingham branch and for eleven years he was a member of the Birmingham City Council.

**Mr. F. R. Wix**, a director of the Phosphor Bronze Co., Ltd., died on December 9th. His son, Mr. G. F. Wix, who has acted as his understudy for the past two years will take over Mr. Wix's activities on behalf of the company.

# PARLIAMENTARY NEWS

## By Our Special Reporter

IN the House of Commons on December 18th the Postmaster-General (Mr. Paling) told Mr. Grimston that the reduction in the labour "ceiling" and the restriction of capital expenditure would seriously affect Post Office capacity to provide telephone buildings, exchange equipment and local cables. Some of the plant had already exceeded its normal life; it could only be kept working with great difficulty and would have to be replaced, involving new buildings or extensions. Additional plant in the exchanges and additional cables were needed to cater for the continuing growth of trunk traffic and this work would be given first preference. Next preference would be given to the maintenance of the local telephone service. Normal maintenance had been seriously restricted. There was now need for a complete overhaul to get rid of intermittent faults and to improve the standard of service. Many manual exchanges due for conversion to automatic working would have to remain in service for some years, although they were giving a good deal of trouble.

The margin of spare plant was now so low that the provision of service to new subscribers usually involved the construction of new plant, either ducts and cable or equipment in the exchange or both. The Government would continue to provide such new plant within the limits of the resources where service was required for essential users. A larger proportion of labour and materials would be devoted to the provision of service to farmers. In future they would provide service, if exchange and cable capacity permitted, where an individual extension would not require more than 15 poles. If more were required the case would be decided on its merits after consultation with the Ministry of Agriculture. They had at present 11,000 orders from farmers outstanding and he was hopeful that it would be possible to meet the bulk of these in the course of the next two years.

After meeting these demands there would be little spare capacity available in local exchanges or cables for the provision of service to other applicants, such as the residential subscriber. They would take steps to exploit more fully the utilization of existing plant by such devices as party line service. He was also arranging, as far as possible, to accelerate delivery of kiosks, with their associated components to provide more public telephone facilities.

### Coal-Oil Conversion

In answer to Mr. Fernyhough the Minister of Fuel and Power (Mr. Gaitskell) said that it became necessary in the early autumn to ask a number of firms to defer the final stages of conversion to fuel oil on account of a shortage of rail tank cars. In recent weeks the tanker position had become increasingly difficult and although all possible steps were being taken to increase the available tonnage, there was a danger that if the conversion programme proceeded in 1948 as originally planned, it would not be possible to meet all the additional demands for fuel oil as and when they arose. Accordingly all firms who were in process of converting were being asked to inform the regional representative of the Petroleum Board of the stage reached in ordering and obtaining equipment. This would enable a programme to be drawn up for bringing these schemes into operation in an orderly manner as additional supplies of oil became available. Firms who had been authorized to convert but had not yet begun to do so were advised not to proceed until further notice.

### Poplar Power Station

In reply to Mr. Marples, Mr. Gaitskell said the ultimate planned capacity of the new Poplar generating station would now be 315,000 kW. He was informed that site limitations precluded any extension beyond that figure.

### Cable Production

Mr. H. Lewis Austin asked the Minister of Supply whether he was satisfied that the output of the electric cable making industry, particularly in relation to production for mine mechanization, power stations and exports, was not being handicapped by shortage of steel tape and armour wire.

Mr. George Strauss said he was not, but urgent action was being taken to increase the supply of steel wire and tape.

### Scottish Power

The Secretary of State for Scotland (Mr. Woodburn) told Mr. Gallacher that, on the assumption that the flow of materials would not become more difficult than it was and that the quantity and quality of labour would be reasonably adequate, it was estimated by the North of Scotland Hydro-Electric Board that the capacity added in the next few years would be about 20,100 kW in 1948; 223,100 kW in 1949; 223,500 kW in 1950; 172,500 kW in 1951; and 128, 500 kW in 1952.

The Board was already making arrangements to supply electric power to certain local industries in the Highlands. Proposals for new industries requiring supplies of electric power were also under consideration.

### Christmas Recess

The House adjourned on December 19th and will re-assemble on January 20th.

# A.C. Network Analysis—II*

## Use of the Graphical Steady-State Method

**By Dr. L. Tasny-Tschiassny,**
*University of Sydney (Australia)*

THE star or tee of conjugate admittances arranged between the nodes 1, 2, and 3 of a network (see Fig. 8) is to be transformed into an equivalent mesh (delta or pi) between the same nodes. The formula for $\overline{Y_c}$, e.g., can be written in the form

$$\overline{Y_c} = \frac{\overline{Y_1}}{\overline{Y_1}+\overline{Y_2}+\overline{Y_3}} \cdot \overline{Y_2} = \frac{\overline{Y_2}}{\overline{Y_1}+\overline{Y_2}+\overline{Y_3}} \cdot \overline{Y_1} \quad (7)$$

and similarly for $\overline{Y_a}$ and $\overline{Y_b}$. The construction for finding the three values of $\overline{Y_a}$, $\overline{Y_b}$, and $\overline{Y_c}$ is shown in Fig. 9. First $(\overline{Y_1}+\overline{Y_2}+\overline{Y_3})$ is constructed, then the angles $\alpha'$, $\beta'$, $\gamma'$, and $\delta'$ are made equal to the angles $\alpha$, $\beta$, $\gamma$, and $\delta$ respectively. If the three branches of a Y are given as impedances, it is best to convert them into conjugate admittances and then to proceed as described.

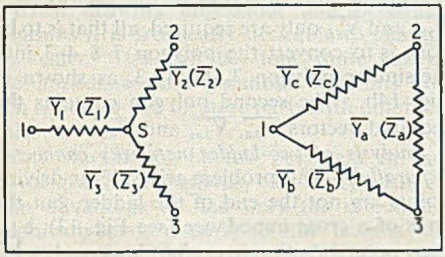



**Fig. 8.—Equivalent Y-T or star-delta networks**

In the practical applications of the graphical network analysis, it will be necessary to find the potential of the star point S, if the potentials of the nodes 1, 2, and 3 and the conjugate admittances $\overline{Y_1}$, $\overline{Y_2}$, and $\overline{Y_3}$ of the star branches are given. If an arbitrary point O is selected as the point of the potential of reference, the formula

$$\overline{V_{0S}} = \frac{\overline{V_{01}} \cdot \overline{Y_1}' + \overline{V_{02}} \cdot \overline{Y_2}' + \overline{V_{03}} \cdot \overline{Y_3}'}{\overline{Y_1}' + \overline{Y_2}' + \overline{Y_3}'} \quad \ldots(8)$$

can be easily derived from the condition that the sum of the currents in the three branches equals nought where $\overline{Y_1}'$, $\overline{Y_2}'$, and $\overline{Y_3}'$ are the actual admittances. By making the point O coincide with one of the nodes 1, 2, or 3, a simple construction results, which is shown in Fig. 10 for the case where the point O coincides with the node 2. Since we are working with conjugate admittances, the angles are to be transferred in the reverse direction, as shown in Fig. 5. The endpoint of the vector $V_{2S}$ (Fig. 10) gives the position of the node S in the potential diagram.

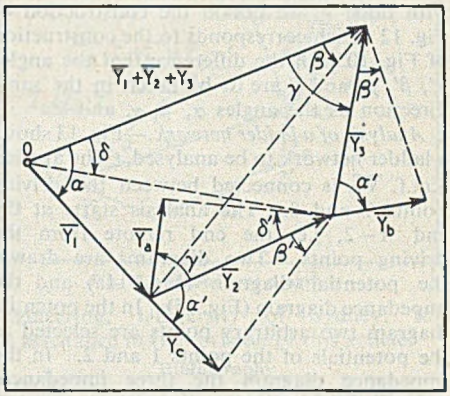



**Fig. 9.—Star-delta transformation**

*Delta-star (pi-tee)—Transformation of impedances.*—With the notations of Fig. 8 we obtain for $\overline{Z_1}$ the formula

$$\overline{Z_1} = \frac{\overline{Z_b}}{\overline{Z_a}+\overline{Z_b}+\overline{Z_c}} \cdot \overline{Z_c} = \frac{\overline{Z_c}}{\overline{Z_a}+\overline{Z_b}+\overline{Z_c}} \cdot \overline{Z_b} \quad \ldots(9)$$

and similar formulæ for $\overline{Z_2}$ and $\overline{Z_3}$. The construction of $\overline{Z_1}$, $\overline{Z_2}$, $\overline{Z_3}$ from $\overline{Z_a}$, $\overline{Z_b}$, $\overline{Z_c}$ (Fig. 11) is the same as the construction of $\overline{Y_a}$, $\overline{Y_b}$, $\overline{Y_c}$ from $\overline{Y_1}$, $\overline{Y_2}$, $\overline{Y_3}$. The potential of the star point can be also found directly from the impedances $\overline{Z_a}$, $\overline{Z_b}$, $\overline{Z_c}$. By substituting in equation (8) the value

$$\overline{Y_1} = \frac{\overline{Z_a}+\overline{Z_b}+\overline{Z_c}}{\overline{Z_b} \cdot \overline{Z_c}}$$ and similar expressions

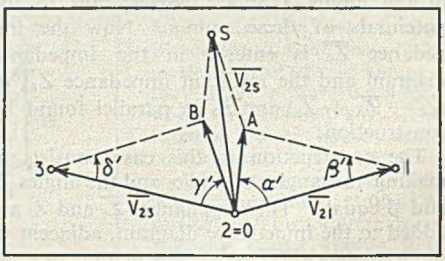



**Fig. 10.—Potential of star point for star-delta transformation**

* The first part appeared in last week's issue.

for $\overline{Y_2}'$ and $\overline{Y_3}'$ we obtain after a few transformations

$$\overline{V_{os}} = \frac{\overline{V_{01}} \cdot \overline{Z_a} + \overline{V_{02}} \cdot \overline{Z_b} + \overline{V_{03}} \cdot \overline{Z_c}}{\overline{Z_a} + \overline{Z_b} + \overline{Z_c}} \quad \ldots\ldots(10)$$

Assuming again that the point O coincides with node 2, we obtain the construction of Fig. 12 which corresponds to the construction of Fig. 10 with the difference that the angles $\alpha'$, $\beta'$, $\gamma'$, and $\delta'$ are to be taken in the same direction as the angles $\alpha$, $\beta$, $\gamma$, and $\delta$.

*Analysis of a ladder network.*—Fig. 13 shows a ladder network to be analysed. The applied e.m.f. $\overline{V_{78}}$ is connected between the driving points 7 and 8. The analysis starts at the end 1–2, i.e. the end remote from the driving points. Two diagrams are drawn, the potential diagram (Fig. 14a) and the impedance diagram (Fig. 15). In the potential diagram two arbitrary points are selected as the potentials of the points 1 and 2. In the impedance diagram the three impedances $\overline{Z_b}$, $\overline{Z_a}$, $\overline{Z_c}$ and their vectorial sum are entered as shown in Fig. 15. A polygon

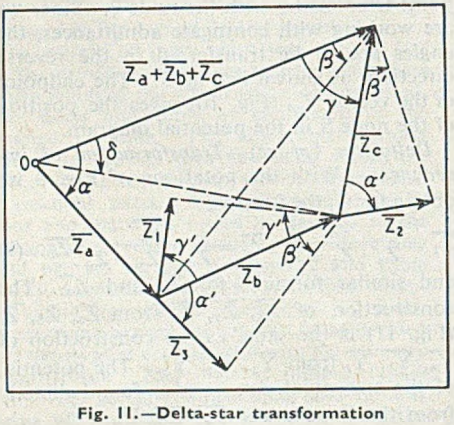



Fig. 11.—Delta-star transformation

3–1–2–4 is drawn in the potential diagram similar to the polygon 3′–1′–2′–4′ formed by the impedance diagram. Obviously the position of the points 3 and 4 corresponds to the potentials of these points. Now the impedance $\overline{Z_d}$ is entered in the impedance diagram and the resultant impedance $\overline{Z_{34}}$ of $(\overline{Z_b} + \overline{Z_a} + \overline{Z_c})$ and $\overline{Z_d}$ in parallel found by construction.

The construction in this case consists in making the angles $\alpha'$ and $\alpha$ and the angles $\beta'$ and $\beta$ equal. The impedances $\overline{Z_e}$ and $\overline{Z_f}$ are added to the impedance diagram, adjacent to the impedance $\overline{Z_{34}}$, as shown in Fig. 15. A polygon 5–3–4–6 is drawn in the potential diagram similar to the polygon 5′–3″–4″–6′ formed by the impedances $\overline{Z_e}$, $\overline{Z_{34}}$, $\overline{Z_f}$ in the impedance diagram. The sides 3″–4″ and 3–4 correspond. The points 5 and 6 in the

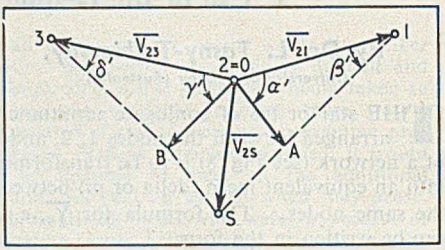



Fig. 12.—Potential of star point for delta-star transformation

potential diagram represent the potentials of the nodes 5 and 6 of the ladder. The construction is continued in a similar way (not shown in Figs. 14 and 15), until we arrive in the potential diagram at the points 7 and 8, corresponding to the driving points 7 and 8. If now the magnitude and direction of the driving voltage $\overline{V_{78}}$ are given by the vector $\overline{V_{78}}$ as shown in Fig. 14b and, for example, the magnitude and direction of the vectors $\overline{V_{34}}$, $\overline{V_{73}}$, and $\overline{V_{84}}$ only are required, all that is to be done is to convert the polygon 7–8–4–3 into the similar polygon $7_0$–$8_0$–$4_0$–$3_0$ as shown in Fig. 14b. The second polygon contains the required vectors $\overline{V_{34}}$, $\overline{V_{73}}$, and $\overline{V_{84}}$.

*Analysis of two-ladder networks connected in parallel.*—This problem arises, if the driving points are not the end of the ladder, but the ends of a cross impedance (see Fig. 13), e.g., the points 3–4 across the impedance $\overline{Z_d}$. The two ladder networks are analysed separately and two potential diagrams are obtained. These are combined in such a way that the lines 3–4 of the individual diagrams

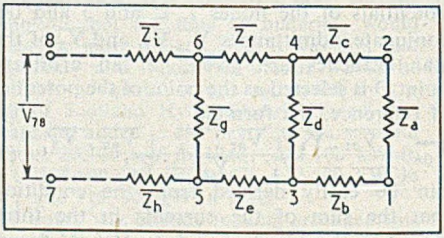



Fig. 13.—Ladder network

are made to coincide with the given voltage vector $\overline{V_{34}}$, representing the given driving point voltage.

*Analysis of a general network.*—By suitable star-delta or delta-star transformations and

combinations of series impedances or parallel conjugate admittances respectively the given network is converted into a ladder network or a combination of parallel ladder networks. The potential diagram of this simplified network or combination of networks is found, as before. Then, if required, the potentials of those points of the original network which had been dissolved by the transformations are found by the constructions described in Figs. 10 or 12.

If all advantages of a graphical network analysis are to be utilized, one has to think in terms of directions and magnitudes of impedances and conjugate admittances and not in terms of real and imaginary components of these quantities. It has been found advantageous to characterize impedances and conjugate admittances semi-graphically, i.e. by arrows which indicate the direction and which are marked by figures indicating the lengths. Transferring directions is made easy with the aid of the angle rule, and lined drawing paper, that is paper with a sufficient number of parallel horizontal lines (about 3 to 4 lines per inch).

When drawing impedance and potential diagrams it is frequently desirable to change the scale. This can be done quite easily. The impedance and potential diagrams are then split into two or more parts with different scales.

One should not be too persistent in the use of graphical methods. In many cases it is an advantage to find only the directions graphically and to compute the lengths on the slide rule. If the components of a star or a delta are simple resistances or reactances, it might be simpler to use the transformation formulæ arithmetically and then to proceed graphically.

The author is indebted to his colleague, Mr. A. G. Doe, Senior Lecturer in Electrical Engineering, University of Sydney, for his assistance in the revision of this article.

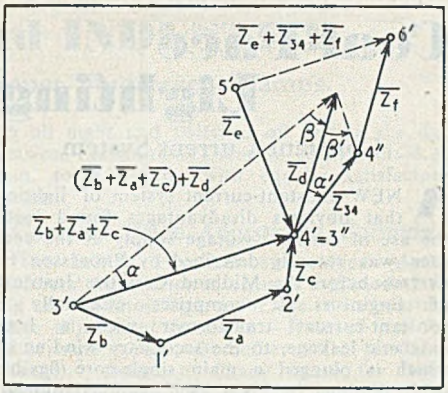



Fig. 15.—Impedance diagram

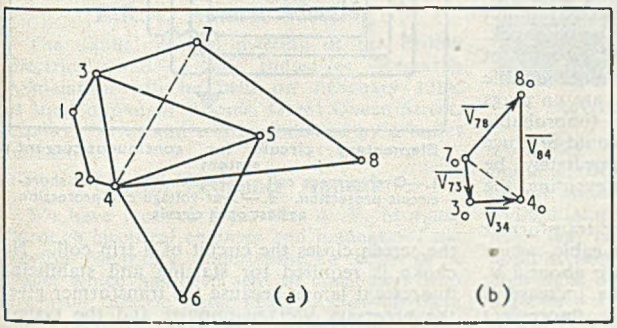



Fig. 14.—Potential diagram

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## Swiss Water-Power Scheme

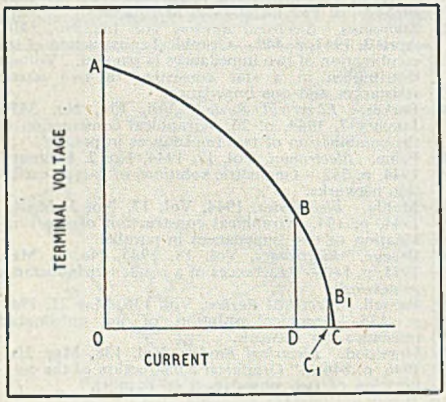
AMONG projects for increasing hydro-electric power in Switzerland, the latest to be put forward provides for harnessing the Brenno, a tributary of the Tessin. The scheme comprises three underground power houses, Luzzone, Olivone and Biasca, the total fall being 1,920 metres, spread over 33 km, and the total power developed would be 274,000 kW. The Luzzone power house would comprise two 27,500-kW horizontal shaft groups; the Olivone station three 31,000-kW vertical shaft turbo-alternators; and the Biasca station four 31,500-kW groups. The average output would be 890 million kW annually.

# Coal-Face Lighting

## Constant-Current System

A NEW constant-current system of lighting that obviates disadvantages found with the use of constant-voltage supply at the coal face was recently described by PROFESSOR H. COTTON before the Midland Counties Institute of Engineers. It comprises essentially a constant-current transformer with a high magnetic leakage, to the secondary winding of which is plugged a main single-core flexible cable doubled back on itself, and a lamp fed from the secondary of a shell-type transformer with the top half of the yoke detachable so that the main cable can easily be inserted to form a one-turn primary.

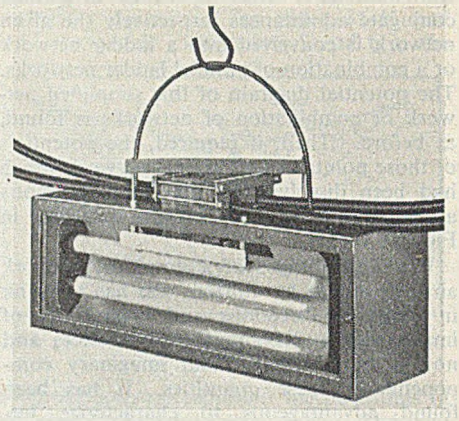
With this system there is no overloading with consequent dangerous temperatures. A long coal face can be adequately illuminated at not more than 25 V, removing danger from shock. Lamp connections are magnetic instead of electric, lighting units can be slid along the cable to any desired position, and there are no plugs and sockets. A short circuit (improbable because the main cable is single) could produce only a spark which would immediately be quenched, the fall in voltage preventing the maintenance of a power arc.




**Characteristic curve for constant-current transformer**

OA, open circuit terminal voltage; BC, working range; B, voltage with all lamps on; $B_1$, voltage with no lamps on; OC, short-circuit current; OD, current with all lamps on; $OC_1$, current with no lamps on; $DC_1$, current regulation

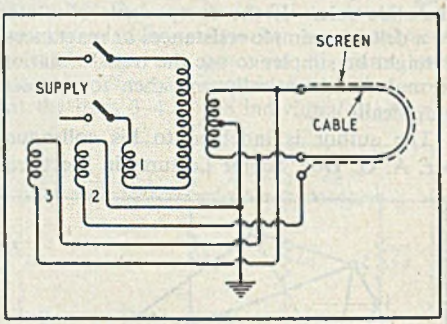
When no lamps are in circuit the transformer supplies only the volt drop in the cable, which for 160 A (a value found suitable) is about 7 V. For each 25-W filament lamp the increase is 0·3 V, or for a unit of two 18-in. fluorescent lamps 0·5 V. Thus a face 150 yd long with



**Fluorescent lamp with local one-turn-primary transformer**

lamps of the latter type spaced at 10 yd would require 15 V at the transformer terminals or, say, 20 V to cover contingencies. By earthing the mid-point of the secondary, the voltage to earth would be 10 near the transformer falling progressively to zero at the far end.

Severance of the cable might cause the transformer voltage to rise to four or five times the normal full-load figure—not enough to form an arc at atmospheric pressure with the falling voltage. As a safeguard a voltage coil can be connected to the terminals for actuating the primary main switch, which would also be protected by a simple overload release. Earth-leakage and short-circuit protection can be secured by earthing the mid-point of the transformer secondary and by screening with copper the main cable so that contact between it and the screen closes the circuit of a trip coil. No choke is required for starting and stabilizing fluorescent lamps because the transformer gives the necessary voltage impulse and the system is self-regulating.




**Elementary circuit for continuous-current system**

1.—Over-current coil. 2.—Earth-leakage and short-circuit protection. 3.—Over-voltage coil protection against open circuit

# COMMERCE and INDUSTRY

## Research in Industry. Cheaper Fluorescent Lamps.

IN the House of Commons last week Mr. Herbert Morrison announced that he had decided to set up a Committee on Industrial Productivity to supplement the work of the Advisory Council on Scientific Policy. The chairman would be Sir Henry Tizard and other members of the Committee would be Sir William Stanier, Prof. S. Zuckerman, Sir George Schuster, Dr. A. King, Sir Edward Appleton, Sir Claude Gibb, Mr. H. Weeks, Mr. R. Hall, Mr. E. M. Nicholson, Mr. G. B. Blaker and Mr. E. D. T. Jourdain (secretary). The terms of reference of the Committee were " to advise the Lord President of the Council and the Chancellor of the Exchequer on the form and scale of research effort in the natural and social sciences which will best assist an early increase in industrial productivity, and further to advise on the manner in which the results of such research can best be applied."

### Rise in Employment

In his first report on the operation of the Control of Engagement Order, covering most of October last, the Minister of Labour and National Service says that the total number in civilian employment rose by 95,000, against an average monthly increase during the earlier part of the year of 55,000. Among the " first preference " vacancies filled by employment exchanges during October were 501 (71 women) in the production of generating plant for electricity undertakings, 274 in power station construction, and 203 in Scottish hydro-electric schemes.

### Fluorescent Lamp Price Reductions

The Electric Lamp Manufacturers' Association has announced that as from January 1st next the list prices of fluorescent lamps will be lower. The 5-ft, 80-W lamps will be reduced from 24s. to 20s. and the 4-ft, 40-W lamps from 17s. 6d. to 16s. 6d.

### E.R.A. Annual Meeting

The annual general meeting of the British Electrical and Allied Industries Research Association will be held on February 13th, at the Connaught Rooms, Great Queen Street, London, W.C, and will be followed by a buffet luncheon.

### Leyton Economy Appeal

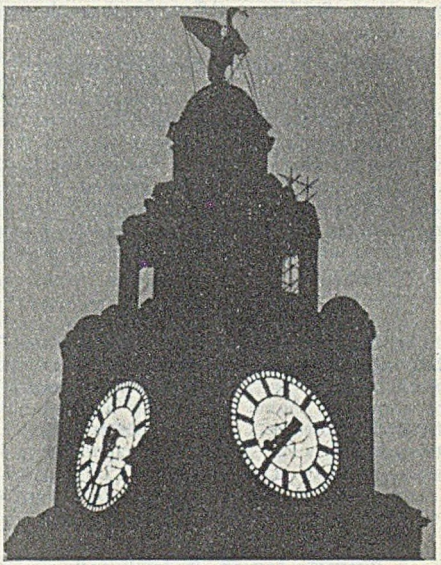
We have received from Mr. A. E. Morgan, borough electrical engineer and manager of the Leyton electricity undertaking, a copy of a leaflet which has been sent to consumers who are using electric water heaters, showing them how they can keep off the electricity peak. It points out that water heaters may be switched on all night and switched off during the day between the hours of 7 a.m. to 10 a.m. and 3.30 p.m. to 6.30 p.m. with equally satisfactory results.

### Contract Price Adjustment Formulæ

The British Electrical and Allied Manufacturers' Association informs us that the following are the latest figures for use in its contract price adjustment formulae:—Rate of pay for adult male labour, December 13th, 110s. (no change). Board of Trade figure for intermediate products, December 13th, 239·0 for the month of November (against 234·1 for October).

### Lighting of Large Electric Clock

After eight years of blackout, the Royal Liver Building Clock, famous landmark of Liverpool is illuminated once again. Its relighting, after months of experimental and constructional



**Royal Liver Building clock, Liverpool**

work, was achieved by the architects of the building, Briggs, Thornley & McLaughlin, in co-operation with Philips Electrical, Ltd., whose sodium lamps have been used for the lighting of this, the largest electric clock in England. Sodium lamps were chosen because of their high light output and visibility at long range, together with their comparatively low wattage. It was found that six Philips " SO/H" 140-W lamps, installed symmetrically around each of

the four faces with opal screens to ensure good diffusion considerably increased the visibility of the clock. Now the faces of the clock can easily be seen from Wallasey, Birkenhead, the west side of the river, and from many parts of Liverpool. Each of the four dials is 25 ft (7·62 metres) in diameter, 2½ ft (0·762 metre) wider than those of Big Ben.

## Changes in Export Licensing Control

The Board of Trade has made the Export of Goods (Control) (Consolidation) Order, 1947 (S.R.O. 1947 No. 2683), which comes into operation on December 31st. The Order consolidates the current Export of Goods (Control) Orders and makes some changes in the list of goods for which an export licence is required. Among the items which have been released from export licensing control are electric boiling and heating plates and grill boilers. Items which have been added to the export licensing list, and for which licences will be necessary in future for their export to all destinations include unassembled stampings and laminations of electrical sheet steel for incorporation in electrical machinery and apparatus. Copies of the Order can be obtained (price 5d.) from H.M. Stationery Office, or through any newsagent.

## Five-Day Week in Supply Industry

At a meeting of the National Joint Industrial Council for the Electricity Supply Industry on December 18th a resolution was adopted that as from March 1st, 1948, a five-day week of forty-four hours should be granted to the day workers in the electricity supply industry and that the method of operating the hours should be decided by the individual supply undertakings.

## The "F.B.I. Register"

The joint publishers of the "F.B.I. Register," Kelly's Directories, Ltd., and Iliffe & Sons, Ltd., inform us that no further orders can be accepted for copies for home use as the demand has already outstripped the available supply. Overseas orders can still be accepted and should be sent to Kelly's Directories, Ltd., 186, Strand, London, W.C.2, or to any of their agents overseas.

## Tin Metal Prices

The Ministry of Supply announces that from December 17th, the price of tin metal of 99 per cent up to under 99·75 per cent tin content will be increased from £437 to £510 per ton (f.o.b. U.K. port or delivered U.K. consumers' works). Other grades are varied as follows:—Refined tin 99·75 per cent minimum, from £438 10s. to £513 10s.; refined tin 99·9 per cent minimum, in 28 lb ingots, from £443 to £518; grain bar tin from £457 to £530; granulated tin from £462 to £535. The restrictions on the granting of licences to U.K. consumers are now withdrawn. Inquiries should be addressed to the Directorate of Non-Ferrous Metals, 20, Albert Street, Rugby. (Rugby 2131.)

## Overseas Trade in November

Though not reaching the high figures of July and September, electrical exports during November at £7,066,357 were £289,108 above those for October and £1,201,458 above those for November, 1946. Generators of over 200 kW and parts accounted for £600,203 of the total and there was a record shipment of telegraph, telephone and signalling equipment (£759,029). Electrical imports at £341,683 were very slightly up on the October figure (£335,802) and also on the pre-war monthly average (£328,117). Full details will be given in our next issue.

## Nickel in 1947

In a review of the nickel industry, Mr. R. C. Stanley, chairman and president of the International Nickel Co. of Canada, Ltd., says that Canadian nickel deliveries this year in all markets will approximate to those of the industry's greatest peacetime year of 1937, and shipments in the United States and Canada will show an increase of about 50 per cent over 1937. Operations of International Nickel at Copper Cliff, its mining and smelting centre, were substantially higher than in 1946, despite the continuing labour shortage. Throughout the world the general trend towards further use of pure nickel and cupro-nickel for coinage purposes has accounted for increased tonnage. The demands for most of the established applications of nickel electro-deposits have continued to increase, and the amount of nickel used for plating purposes is still at a steady high level.

## Service to Consumers

We regret that errors occurred in dates of the issues of the *Electrical Review* referred to in the letter under the above heading last week. The first reference should have been November 22nd, 1935 (not 1945) and the second June 16th (not 6th), 1939.

## Manufacturers and Export

A deputation from the National Union of Manufacturers last week met the President of the Board of Trade, Mr. Harold Wilson, to place before him the members' views on export handicaps. It was pointed out primarily that most of the difficulties arose from circumstances beyond the manufacturers' control.

Import restrictions imposed by foreign and Empire countries were said to be the most serious problem and the export targets appeared to have been fixed without proper recognition of this fact. The Government should regard the conclusion of trade agreements with foreign countries as its most urgent task.

Reference was made to the loss of export business through the higher prices for raw

materials which the British manufacturer had to pay in comparison with his overseas competitors. It was recommended that an inquiry should be made into the operation of the bulk-buying system.

A long list was presented of goods which could not be completed for lack of component parts or packaging. This included electrical goods which were held up by shortages of brass tube, iron castings, and steel sheet and strip. The Union called for improvements in the system of allocating materials, particularly steel.

Other matters brought to the Minister's attention were the necessity on the part of labour to work harder and for longer hours and the importance of Government assistance to exporters by the provision of services adequate to the demands of industry at headquarters, in the Regions and overseas.

## European Power Production

In a report on European activities in connection with the Marshall Plan since the Paris Conference ended Mr. Ernest Bevin, the Foreign Secretary, has stated that the electric power plan sponsored by the Committee must await the provision of equipment. In the meantime, considerable progress had been made on a European basis with the selection of the most economic hydro-electric prospects in the Alpine-Danubian area and with a survey in areas of eastern and western Europe of low-grade fuel possibilities for thermal power stations. At the same time an examination was being made of the type of power station most suitable for operating on the fuel available.

## Electric Tool Refresher Course

S. Wolf & Co., Ltd., have instituted a series of three-day courses for salesmen engaged in the tool and equipment trades. The course is proving of particular interest to those salesmen recently demobilized, since it is helping them to regain touch with the portable electric tool industry and to catch up with developments in design and production. The first day is given over to consideration of the basic principles of salesmanship applied to portable electric tools and visits to the works; the second day to uses for electric tools followed by demonstrations; and the third day to after-sales service, packing and presentation.

## Farmers and Load Shedding

As the outcome of representations made by the National Farmers' Union the Electricity Commissioners have asked electricity supply authorities to give special consideration in drawing up load-shedding schemes to the position of large chicken hatcheries and dairy establishments in which electrical methods are employed.

Where undertakings are satisfied that it is impracticable for owners of chicken hatcheries to make stand-by arrangements they are asked to give sympathetic consideration to the maintenance of supplies to establishments at which hatching or brooding is continuous.

In the case of dairy farms special attention should be given to the period of load shedding if this is necessary. Undertakings might consider how far it is practicable to arrange that feeders giving predominantly agricultural supplies shall be left to the later cuts. Dairy farmers should not be deprived of power for their milking machines early in the morning if it can be avoided.

## Siemens' Hartlepool Factory

Work has been completed on the erection of a factory for Siemens Brothers & Co., Ltd., which will be used for making parts for automatic telephones for the export trade. The factory covers 100,000 sq ft and is to be extended eventually to 250,000 sq ft. Work will be found for 2,000 women and a training school for employees has been started.

## E.A.W. Annual Conference

The twenty-third annual conference of the Electrical Association for Women will take place at Southport on April 14th, 15th and 16th. The speaker at the opening session will be Lord Citrine, chairman of the British Electricity Authority, who will be accompanied by Lady Citrine.

## Radio Data Charts

The fourth edition of this series of "Abacs" compiled by R. T. Beatty, M.A., D.Sc., and revised by J. McG. Sowerby facilitates calculation in upwards of forty routine radio receiver design problems, ranging from radio-frequency coils and transformers to loud-speaker dividing networks. Each chart is accompanied by an explanatory introduction and worked example, being valuable adjuncts to ordinary text books. The book is published at 7s. 6d. (postage 5d.) for the *Wireless World* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1.

## Projector Lamp Tax Abolished

H.M. Customs and Excise announces that Class A.1 and Class G. projector lamps have been freed from purchase tax, even where of 250 W and below.

## Accident at Power Station

A Coventry Corporation employee, Charles E. Price (50) was fatally injured when he was crushed between a conveyor belt and a drum at Longford power station on December 12th.

## Exports from Bristol

The potentialities of Bristol as a supplier of goods for export to the United States were stressed by Mr. Paul H. Pearson, the American Consul at the recent inaugural dinner of the Bristol and District Branch of the Institute of

Export at the Grand Hotel, Bristol. The Branch's achievements in promoting trade would, he believed, be furthered by his own and other governments' desires to encourage expansion of world trade by the relaxation of tariffs and other trade barriers. Mr. S. Harper Bill (General Accessories Co.) the chairman, said that the formation of the new branch should have taken place long ago in view of Bristol's importance in the export drive.

## Building Control

The Minister of Works has made the Control of Building Operations (No. 10) Order, 1947 (S.R. & O. 1947 No. 2698) prescribing for a further six months financial limits similar to those in force for the period ending January 31st, 1948. During the period February 1st to July 31st, therefore, the amount which may be spent on building work to any property without licence is limited to £10. In addition, not more than £2 may be spent on any property in any calendar month (on a non-cumulative basis) during the period.

## A.S.E.E. Conference

The Association of Supervising Electrical Engineers is to hold its next annual conference at Brighton on May 22nd.

## Trade Publications

**G. T. Weston, Ltd.**, 130, Vaughan Road, Harrow, Middlesex.—Leaflet illustrating light beater-mixer, table cooker and toaster.

**Meritus (Barnet), Ltd.**, Wood Street, Barnet, Herts.—Leaflet describing an automatic spot welder.

**J. J. Eastick & Sons, Ltd.**, 12, Errol Street, London, E.C.1.—Priced catalogue of radio components and valves, including equivalents of American types.

**Victor H. Iddon, Ltd.**, Harper Road, Wythenshawe, Manchester.—Priced catalogue of moulded "Nettle" wiring accessories, lampholders, plugs and sockets, switches, bell transformers, buzzers and inspection hand lamps.

**Zinc Alloy Die Casters' Association**, Lincoln House, Turl Street, Oxford.—Pamphlet illustrating commercial applications of zinc alloy gears, including a gear box for washing machines.

**Dawe Instruments, Ltd.**, Harlequin Avenue, Great West Road, Brentford, Middlesex.—Leaflets (307.B) on transformer turns radio bridge and (403.A) on oscillator-detector for bridge balance determinations.

**A. C. Withnell, Ltd.**, Friars Lane, Richmond, Surrey.—Leaflets descriptive of small vat electro-plating outfit (M.500) and general purpose battery charger (B.501).

**Lowestoft Electrical Co.**, Westwood House, Southtown Road, Great Yarmouth.—Priced list of household appliances.

**William Frost Products, Ltd.**, Fernhead Road, London, W.9.—Brochure on electrically heated vulcanizers for vehicle tyre tubes and heavy conveyor belting.

**Chloride Electrical Storage Co., Ltd.**, 6, Whitfield Street, Tottenham Court Road, London, W.1.—Folder (M.5006, trade edition) containing details of batteries for cars and light commercial vehicles, with separate price list.

**A. C. Wickman, Ltd.**, Banner Lane, Coventry.—Technical brochure on Cornelius electronic comparators for inspection and quality control.

**Pye, Ltd.**, Radio Works, Cambridge.—Folder describing 3- and 6-kW industrial radio-frequency heaters.

**Runbaken Electrical Products** 71, Oxford Road, Manchester, 1.—Leaflet on "Echo" armature and coil tester.

**Walker Brothers, Ltd.**, Quality House, 25, Temple Row, Birmingham, 2.—Priced catalogue illustrating household appliances, radio sets, lighting fittings and sunray therapy lamps.

**Vaughan Crane Co., Ltd.**, Openshaw, Manchester, 11.—Bound catalogue of travelling cranes, telphers, hoist blocks and runways.

**Metway, Ltd.**, King Street, Brighton.—Price list (OF.17) of armoured flexible "Pe-Ve-Cee" conduit tubing.

## Calendars and Diaries

A picture of All Saints Pavement, York, from the painting of Noel H. Leaver, A.R.C.A., adorns the tasteful calendar received from Milne & Longbottom, Ltd.

The Cressall Manufacturing Co., Ltd., has sent us a neat pocket diary bound in navy blue calf leather.

The diary received from A. Reyrolle & Co., Ltd., is bound in navy blue calf leather and, in addition to the usual diary information, has a number of sectional maps of the British Isles and a map of the London Underground Railways.

A serviceable desk diary with a fortnight to an opening has been received from Laurence, Scott & Electromotors, Ltd.

A neat calendar has been received from the Flare Co., Ltd., with two months on each sheet surmounted by views of English beauty spots.

The Electroplant Co. have sent us a wall calendar with monthly slips.

The calendar of Rich & Pattison (Birmingham), Ltd., has large monthly sheets with bold figures.

## Trade Announcements

From January 1st next the Home Power Cable Sales Department of the Telegraph Construction & Maintenance Co., Ltd., will operate from the company's Telcon Works, Christchurch Way, Greenwich, London, S.E.10 (telephone: Greenwich 1040). The Export Power Cable Sales Department will continue to operate from 22, Old Broad Street, E.C.2.

The address of the **Pyrotenax** representative for Scotland and Northern Ireland, Mr. D. Maclachlan, is now 13, Kingsburgh Drive, Paisley, Scotland (telephone: Paisley 2221).

# Pottery Drying

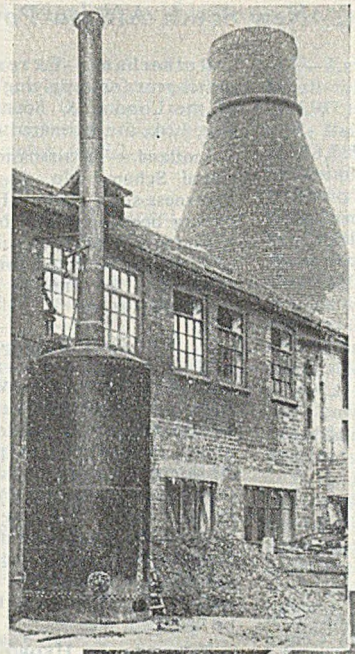
## New Electrical Methods Have Many Advantages

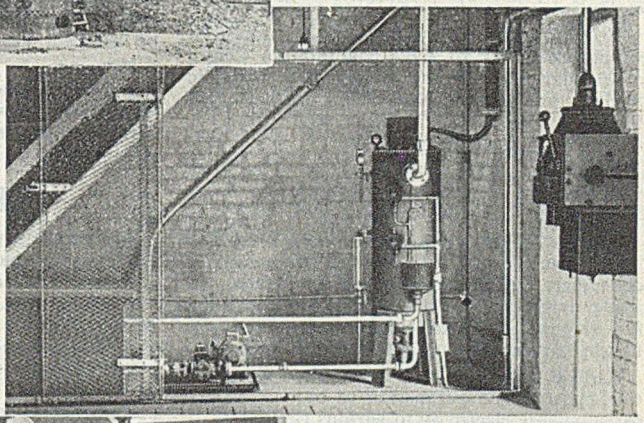
IN the article on "Pottery Making" in our issue of January 17th last we indicated that there was a considerable field open for the use of electricity in the drying of green ware prior to firing and referred both to the suggested use of infra-red drying apparatus and also to hot water and steam heated plant incorporating fans. Two electrically heated designs of the latter equipment are now being employed with conspicuous success at the Leighton Pottery, Burslem.

In one of these a 10-kW electric heater is substituted for the steam coil. In the others the heating coils are retained but, instead of the steam being provided from a solid-fuel fired boiler, a 150-kW, 415-V, type 320, Bastian & Allen electrode boiler is employed.

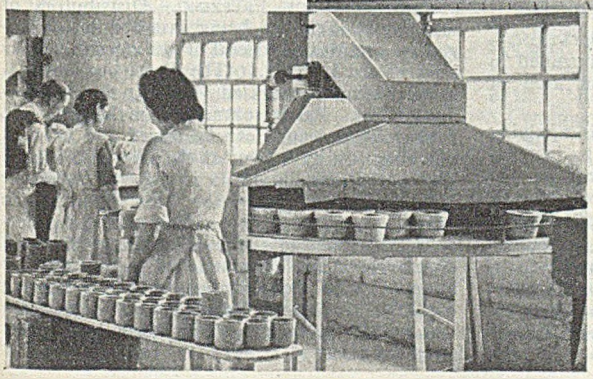
Installed in an odd corner under stairs this equipment is of sufficient capacity to handle without difficulty the output of nine jiggers (wheels on which cups, saucers, plates, etc., are made). It is entirely automatic and requires no attention, thereby eliminating the human element and incidentally saving a boilerman's wages.

Another particularly important point in favour of the electrode boiler is its absolute cleanliness, the risk of dust and dirt getting on the ware being a constant source of anxiety to the potter. Boilers of this type may be installed quite close to the drying plants so eliminating the heat losses associated with long pipe runs from a central solid fuel-fired boiler plant. The increased cost of coal also makes the electrode boiler an attractive proposition for this type of duty





**Installed in an odd corner under stairs the electrode boiler replaces the solid-fuel fired boiler seen on the left**



**One of the nine drying plant (below) served by the 150-kW electrode boiler (right) at the Leighton Pottery**

Our thanks are due to the Leighton Pottery for giving us permission to inspect the plant and also to Mr. Thomas Lockett, general manager of the Stoke-on-Trent Electricity Department, Mr. L. Goodall, his distribution engineer, Mr. H. McCartney, his technical assistant, and Mr. J. C. Edwards, sales manager, Bastian & Allen, Ltd., for their assistance in preparing this article.

# ELECTRICITY SUPPLY

## Purchase Tax Payment. New South African Power Station.

**Ayrshire.** — BOARD'S ACCOUNTS. — The accounts of the Ayrshire Electricity Board (engineer and general manager, Mr. W. C. Bexon) for the year ended May 15th last show a gross revenue of £770,956 (against £737,656 in 1945-46). Working expenses amounted to £752,759 (£690,521), leaving a gross profit of £18,217 (£47,135). After meeting loan charges but before taxation there was a net deficiency of £86,627 (£53,240). Various transfers are made from suspense taxation and tariff stabilization accounts and taxation reserve, leaving a balance to be carried forward of £538. A total of 228·8 million kWh was generated (against 244·6 million) and on the distribution side sales which had fallen from 217·9 million kWh in 1944-45 to 189·8 million in the following year, recovered to 213·5 million kWh. An additional 3,861 consumers were connected, making 66,427 altogether.

**Bath.**—REPAIRS TO TURBINE.—The city electrical engineer (Mr. E. A. Newburn) reported to the Electricity Committee recently that the blading of No. 5 turbine (7,000 kW) damaged earlier in the year had now been replaced.

**Bedford.**—SUPPLY TO CLAPHAM PARK.—To supply electricity to the Rehabilitation Centre at Clapham Park for the Industrial Orthopædic Society, an 11-kV cable is to be provided, together with a h.v. switch and 100-kVA transformer, at a cost of £1,704.

**Brighouse.**—NEW CABLES.—The Electricity Committee proposes to lay cables from River Street to Huddersfield Road (£5,419).

**Burnley.**—HIRE PURCHASE AND PURCHASE TAX.—The Electricity Committee proposes that consumers acquiring electrical appliances on hire-purchase terms shall be required to pay the full amount of purchase-tax, together with the first instalment, on the signing of the agreement.

**Carlisle.**—RURAL SUPPLIES.—The Corporation has received permission to borrow £4,311 for supplying electricity to various rural areas.

**Hastings.**—RAILWAY ARCH SUBSTATION.—Equipment costing £3,650 is to be installed in a substation made by enclosing an arch of Landgate railway bridge, Rye.

**Hoylake.**—LOANS.—The Council is applying for sanction to borrow £43,370 for the installation of 500-MVA, 11-kV switchgear at the electricity works, and £4,670 for providing an electricity supply to a housing estate at Greasby.

**Newcastle (Staffs.).**—STREET LIGHTING.—The borough surveyor has been authorized to obtain tenders for street lighting installations at Bradwell, May Bank, Clayton Road, Beasley, Church Lane, Knutton and Chester Crescent (estimated cost £600).

**Rotherham.**—EXTENSIONS.—Cables and switchgear for supplying electricity to the works of the London & Scandinavian Metallurgical Co., Ltd., are estimated to cost £2,500.

**Scotland.**—TRANSMISSION LINES.—Constructional Scheme No. 14 (transmission lines in Inverness-shire from Fasnakyle to Beauly), having been approved by the Electricity Commissioners, it has been submitted to the Secretary of State for Scotland for confirmation. Objections may be entered within 40 days from December 16th.

### Overseas

**South Africa.**—NEW PRETORIA POWER STATION.—Work has begun on Pretoria's new £7,000,000 power station which, when completed, will, with the present station, supply electricity to a municipal and rural area bigger than that supplied by any other local authority in the Union. The new station, which is being built on the south side of the existing station in Pretoria West, will have an ultimate capacity of 180,000 kW, double the capacity of the existing station. Six 30,000-kW turbo-alternators are to be installed.

**Tasmania.** — HYDRO-ELECTRIC SCHEME. — Authority to proceed with a power development scheme on the Nive River costing £7,047,000 is sought in a Bill introduced in the House of Assembly.

# TRANSPORT

**London.**—EXTENSION OF TIME.—The Minister of Transport has made the London Passenger Transport Board (Extension of Time) Order, 1947 (S.R. & O. 1947, No. 2395) extending the period for the completion of various works, including the operation of trolley-buses along a route (4B) in the boroughs of Leyton and Walthamstow.

PREVENTION OF FREEZING.—Distributors of anti-freeze liquid are being installed on above-ground sections of several of the electric railway lines of the L.P.T.B. The device consists of a metal bath incorporated in a gap in the conductor rail. Partly submerged in the bath is a rubber roller, which can be raised and lowered out of action by a lever at the side of the bath. The anti-freeze liquid is transferred from the bath to the surface of the "live" rail by the passage over the rubber roller of the current-collecting shoes of the trains. Some 200 such distributors have been installed, which number is soon to be doubled; about 850 are being made. The distance between them varies from 600 to 900 yards depending upon local track circumstances.

# NEW PATENTS

## Electrical Specifications Recently Published

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification* (1*s. each*) *may be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

### 1941

THE Metropolitan-Vickers Electrical Co., Ltd., H. Constant, D. M. Smith and F. E. Baumann.—" Bearings of internal-combustion gas turbines, turbine type gas compressors, and like high-speed machinery." 5952. May 7th, 1941. (595346.)

Metropolitan-Vickers Electrical Co., Ltd., and K. Baumann.—" Internal-combustion turbine plant." 5953 and 12274. May 7th, 1941, and September 22nd, 1941. (595347 and 595348.)

British Thomson-Houston Co., Ltd., and A. Bowen.—" Means for effecting the displacement of an aerial in a circular path." 14109. November 1st, 1941. (595349.)

### 1942

E. C. Cork and M. Bowman-Manifold.—" Electric wave guides." 12349/50. September 1st, 1942. (595352/3.)

### 1943

English Electric Co., Ltd., and R. J. Welsh.—" Power plant incorporating internal-combustion engine driven compressors supplying motive fluid to a prime mover." 8651. June 30th, 1943. (595297.)

British Thomson-Houston Co., Ltd.—" Light projectors." 8696. May 30th, 1942. (595397.)

A. H. Stevens (Lear Avia, Inc.).—" Electric motor drive units." 13602. August 20th, 1943. (595446.)

### 1944

Power Jets (Research & Development), Ltd., and E. Brame.—" Power plants." 6590. April 8th, 1944. (595357.)

Marconi's Wireless Telegraph Co., Ltd.—" Method of manufacturing electrode foundation structures for cathode-ray tubes." 11328. April 29th, 1943. (595301.)

British Thomson-Houston Co., Ltd.—" Electric capacitors." 12785. July 8th, 1943. (595402.) " Frequency modulation receivers." 13957. July 23rd, 1943. (595497.) " Apparatus employed for computing illumination." 15795. August 18th, 1943. (595405.)

English Electric Co., Ltd., and R. J. Welsh.—" Power plant incorporating internal-combustion engine driven compressors supplying motive fluid to a prime mover." 13211. July 11th, 1944. (Addition to 595297.) (595302.)

A. von Rotz.—" Wash-drying machines." 15812. January 4th, 1944. (595305.)

G. S. P. Scantlebury.—" Thermionic relaxation oscillators." 17930. September 20th, 1944. (595307.)

R. K. Sas.—" Ultra-high-frequency rotating field generator." 18191. September 23rd, 1944. (595308.)

Western Electric Co., Inc.—" Electric pulse generators." 20671, 21783 and 22631. September 14th, 1943, November 17th, 1943, and November 30th, 1943. (Additions to 585359.) (595312, 595317 and 595319.)

C. Arnold (Standard Oil Development Co.).—" Method and apparatus for the recording of electrical impulses." 20781. October 25th, 1944. (595313.)

### 1945

S. S. Cramer.—" Radio tuning structure." 183. May 23rd, 1944. (595324.)

T. A. B. Carver.—" Electro-mechanical control mechanism for lathes and like machine tools." 902. January 11th, 1945. (595416.)

Standard Telephones & Cables Ltd.—" Torque measuring devices." 1578. January 26th, 1944. (595325.) " Electrical contact brushes." 13546. July 29th, 1944. (595438.)

Westinghouse Electric International Co.—" Power plants, and more particularly gas turbine power plants." 1638. January 31st, 1944. (595326.) " Systems for continuously measuring the power output of a rotating shaft." 2132. November 19th, 1942. (595418.)

A. von Rotz.—" Wash-drying machines." 1707. August 18th, 1944. (Addition to 595305.) (595327.)

English Electric Co., Ltd., R. J. Welsh and A. B. Fitzherbert.—" Free-piston internal-combustion operated compressors or gas generators." 1981. January 25th, 1945. (Cognate application 2841/45. (595460.)

Western Electric Co., Inc.—" Retractile electrical conductor cords." 2446. February 9th, 1944. (595329.)

Marconi's Wireless Telegraph Co., Ltd.—" Television transmitting apparatus." 2496. October 23rd, 1942. (595330.) " Frequency shift keying in carrier signalling systems." 3355. February 11th, 1944. (595421.) " Centimetre wave apparatus." 10732. October 29th, 1943. (595376.)

C. Watwills.—" Tubular heaters and coolers for fluids." 4654. February 23rd, 1945. (595424.)

A. E. Willis.—" Electric heaters of water and other liquids." 5750. March 8th, 1945. (Cognate applications 31925/45 and 9711/46. (595426.)

Farnsworth Television & Radio Corporation.—" Impulse generator using a gas discharge tube." 6743. October 18th, 1943. (595336.)

Plessey Co., Ltd.—" Self-interrupting electromagnetic vibrator." 10254. May 26th, 1944. (595471.)

British Vacuum Cleaner & Engineering Co., Ltd., and H. J. Whiteside.—" Electric time switches." 10859. April 30th, 1945. (595433.)

Telefonaktiebolaget L. M. Ericsson.—" Cable sheaths composed of lead alloys." 11909. May 13th, 1944. (595339.)

Electric & Musical Industries, Ltd., E. L. C. White and D. Walker. (Legal representatives of A. D. Blumlein.)—" Electric oscillation generators." 11985. May 12th, 1945. (Addition to 535778.) (595509.)

Standard Telephones & Cables, Ltd., and S. E. Buckley.— " Manufacture of finely divided magnetic material." 12064. May 14th, 1945. (595510.)

Murex Welding Processes, Ltd., E. J. Clarke and E. C. Rollason.—" Manufacture of flux-coated non-ferrous welding rods or electrodes." 13422. May 29th, 1945. (595437.)

General Electric Co., Ltd., and R. J. Franklin. —" Means for measuring the electrical conductivity of liquids." 13567. May 30th, 1945. (595475.)

Standard Telephones & Cables, Ltd., and W. A. Billings.—" Sealing a conductor through a metal envelope." 15249. June 15th, 1945. (595387.)

T. Birchall.—" Electric flat-irons." 17012. July 4th, 1945. (595441.)

R. C. Graseby.—" Electrical apparatus for producing oscillatory movements of controllable frequency." 17057. July 4th, 1945. (595479.)

J. G. Story and J. S. Clark.—" Electrical ducts or conduits for use in building construction." 17093. July 4th, 1945. (595513.)

R. H. Colborne.—" Electric condensers." 17117. July 5th, 1945. (595480.)

Cornercroft, Ltd., and N. Rycroft.—" Electric heating system for buildings." 17128. July 5th, 1945. (595483.)

Best & Lloyd, Ltd., and F. H. Cashmore.— " Lighting fittings." 17216. July 5th, 1945. (595524.)

Westinghouse Brake & Signal Co., Ltd., and L. E. Thompson.—" Alternating electric current rectifiers of the dry surface contact type." 17266. July 6th, 1945. (595536.)

A. Garrard.—" Lighting reflectors." 21130. August 18th, 1945. (595542.)

**1947**

G. S. P. Scantlebury.—" Thermionic relaxation oscillators." 1970. September 20th, 1944. (Divided out of 595307.) (595345.)

# New Immersion Heater Factory

WE recently had an opportunity of inspecting the new factory into which C. H. Blackburn & Co., Ltd., have moved in Shelburne Road, Calne, Wilts. In the considerably greater accommodation now at its disposal the company will be able, besides increasing its production of " Stellex " immersion heaters and kettle elements, to proceed with plans for developing a range of electromedical appliances. Throughout the war the company produced a very considerable number of instrument sterilizers, bowl sterilizers and high-pressure sterilizers. Now the first prototype has been made of an apparatus called a balanced pulse generator, which employs a new technique for the " re-education " of paralysed muscles. A 1½-gal. thermal storage heater of attractive design is also being developed.

**Assembling immersion heaters at C. H. Blackburn & Co.'s Stellex Works, Calne**

Apart from presswork and ceramic components the factory is practically self-contained and has a well-equipped test department. Until lately the company has been largely engaged on making immersion heaters for temporary houses but now, while continuing to supply a limited amount of apparatus for the home market, it is concentrating largely on export.

## Lift Makers' Dinner

The first annual dinner of the National Association of Lift Makers was held recently at Kettners Restaurant, with Mr. L. F. Hammond, chairman of the Council of the Association, presiding. Mr. L. J. Gooch proposed the toast of the industry, and Mr. V. A. Patterson proposed the toast of the guests. The dinner was followed by a musical entertainment.

# FINANCIAL SECTION

## Company News. Stock Exchange Activities.

### Reports and Dividends

**Crompton Parkinson, Ltd.,** report a profit for he year ended September 30th last of £450,895, as compared with £440,363 for the preceding year. It is proposed to pay a final dividend on the ordinary and "A" ordinary stock of 7½ per cent actual, making 15 per cent actual for the year, and to pay a special cash bonus on the ordinary and "A" ordinary of 7½ per cent, making the total distribution for the year 22½ per cent. The balance to be carried forward, before deducting the final dividend and cash bonus on 83,584 "A" ordinary stock units which were issued subsequent to September 30th, 1947, is £916,297 (against £797,902 brought in). The dividend and cash bonus on the ordinary and "A" ordinary stock are the same as for the previous year.

**Thorn Electrical Industries, Ltd.**—An extraordinary general meeting will be held on January 5th at which resolutions will be submitted for increasing the capital of the company to £606,250 by the creation of 400,000 5 per cent second cumulative preference shares of £1 each. In a circular to shareholders the company states that since March 31st last the group has spent on extensions to its productive capacity sums additional to the money raised by the issue of ordinary shares made in August, 1946. It is now proposed to add further machinery and equipment by purchase or manufacture within the group. The further capital expenditure already incurred and in contemplation amounts to approximately £320,000. Subject to Treasury consent being obtained it is proposed that there shall be a public issue of the shares with preferential consideration to existing shareholders.

**The General Cable Manufacturing Co., Ltd.,** reports profits for the year ended September 30th last, before tax, of £150,671, as compared with £103,616 for the preceding year. It is proposed to pay a final ordinary dividend of 30 per cent (against 17 per cent), making 50 per cent for the year (against 25 per cent).

**The Para Electric Railways & Lighting Co., Ltd.,** reports a working loss for the year to November 30th, 1946, of £17,481 (£24,226). Having taken into account proceeds of the sale of assets of a subsidiary in liquidation, reserve no longer required, and surplus over written down value on sale of sundry assets, there is a net loss of £13,074 (£27,451), and the debit balance carried forward is increased to £153,635.

Last April, in order to increase the supply of electricity to factories, etc., the local authorities enforced the closing down of the tramways. Although they accepted full responsibility for indemnities to dismissed employees, the company was later forced to take over this liability under threat of the immediate cancellation of its concession. On September 24th a Decree of Caducidade was signed by the President annulling the company's concession and transferring its assets to the municipality of Belem. The company has been advised that "caducidade" of a contract implies annulment without compensation, and has placed the facts before the Foreign Office asking for official representations to be made to the Government of Brazil.

**The Anglo-Argentine Tramways Co., Ltd.**—At an extraordinary meeting held on December 16th the shareholders sanctioned the scheme of arrangement passed by the three classes of debenture stockholders on July 31st and previously approved by the City of Buenos Aires Tramways Co. (1904), Ltd., under which the company was granted further moratoria in respect of interest, redemption and annuity obligations.

At the ordinary general meeting which followed, Sir Bernard Docker (chairman), in referring to the various reports that have been current relating to the purchase of the company's interest in the Transport Corporation by the Argentine Government, said that preliminary discussions which started some months ago had not yet led to the conclusion of any definite agreement.

**The Perak River Hydro-Electric Power Co., Ltd.,** in its accounts for the year to July 31st last, shows a gross surplus (with interest, etc.) of £241,434, against £15,927 for 1945-46. After deducting expenses, directors' fees, debenture interest, etc., and providing £95,000 (nil) for taxation and £19,094 (nil) for staff fund, there is a net profit of £9,244 against a loss of £20,545. The debit balance carried forward is thus reduced to £82,236. The report states that while good progress has been made in restoring the system, considerable expenditure must still be incurred.

**The Delhi Electric Supply & Traction Co., Ltd.,** whose undertaking is being purchased by the Delhi Provincial Government, announces that the final valuation has now been received. The total valuation amounts to Rs.82,11,580 (about £615,868). Approximately £53,300 has, therefore, to be added to the deposit referred to in the report, dated October 28th, 1947. The directors state that they still have to receive further accounts from India, dealing with plant and materials ordered, but not delivered at March 2nd, 1947, and receipts and payments on the company's account since that date. The company's liability for Indian taxation has also to be determined.

## New Companies

**T. R. P. (Exmouth), Ltd.**—Registered November 24th. Capital, £2,500. To acquire the business of radio set manufacturers, carried on by Television & Radio Products Co. at the Docks, Exmouth, Devon. Directors: L. E. Adams and L. C. Williams. Regd. office: The Docks, Exmouth, Devon.

**S.B.S. (Luton), Ltd.**—Registered November 27th. Capital, £1,000. Manufacturers and repairers of, and dealers in, electrical accumulators, batteries, acids and containers, electrical plant and apparatus, wireless, etc. Directors: E. A. Burgess and L. R. Levy. Regd. office: 17, Dunstable Road, Luton.

**F. Lomax (Salford), Ltd.**—Registered November 15th. Capital, £1,500. To acquire the business of electrical and radio engineer formerly carried on by the late Fred Lomax at Salford as "F. Lomax." Directors: Mrs. S. A. Lomax and E. Davies. Regd. office: 164, Cross Lane, Salford.

**Radio Trades Manufacturing Co. (Ealing), Ltd.**—Registered November 12th. Capital, £3,000. Wireless and electrical engineers, etc. Directors: A. G. Browne and D. M. Tod. Regd. office: 141, Little Ealing Lane, Ealing, W.5.

**Herne Bay Refrigeration Service, Ltd.**—Registered November 14th. Capital, £2,000. Directors: C. D. Innocent. N. A. K. Spreeth and S. H. Price. Regd. office: 17, Kings Road, Herne Bay.

**De Beer Radio & Electric, Ltd.**—Private company. Registered November 14th. Capital, £1,000. Directors: Baron Christian de Beer, 28, Dersingham Road, Cricklewood, N.W.2, and Catherine M. de Beer.

**Speed-Electric, Ltd.**—Registered November 26th. Capital, £100. Electrical, mechanical, automobile and civil engineers, etc. F. Ingram is the first director. Regd. office: 15, Little Park Street, Coventry.

**Caistor Electrics, Ltd.**—Registered November 29th. Capital, £1,000. Directors: H. M. Croft, J. S. Johnson and E. A. Elvin. Regd. office: High Street, Caistor, Lincs.

## Increases of Capital

**Philips Electrical, Ltd.**—Capital increased by £400,000, in £1 "A" shares, beyond the registered capital of £200,100. On November 1st, 1947, 400,000 "A" ordinary shares were allotted to Midland Bank Executor & Trustee Co., Ltd. On January 24th, 1947, the above company held 200,094 shares out of 200,100 issued.

**Philips Blackburn Works, Ltd.**—Capital increased by £450,000, in £1 ordinary shares, beyond the registered capital of £150,000.

**Mitcham Works, Ltd.**—Increased by £200,000, in £1 ordinary shares, beyond the registered capital of £250,000. On January 14th, 1947 the Mullard Radio Valve Co, Ltd., held 249,998 shares. A further 200,000 shares were allotted to the same company on November 24th, 1947.

**Philips Hamilton Works, Ltd.**—Increased by £100,000, in £1 ordinary shares, beyond the registered capital of £100,000. On January 14th, 1947, Philips Lamps, Ltd., held 49,999 shares. 150,000 ordinary shares were allotted to Philips Electrical, Ltd., November 27th.

**Philips Southport Works, Ltd.**—Increased by £74,000, in £1 ordinary shares, beyond the registered capital of £1,000. On December 2nd, 74,000 ordinary shares were allotted to Philips Electrical, Ltd.

**General Accessories Co., Ltd.**—Increased by £235,000, in 5s. ordinary shares, beyond the registered capital of £15,000. All shares have now been subdivided into shares of 5s. each. At August 26th, 1947, practically the whole of the issued shares were held by British Mechanical Productions, Ltd.

**Haines & Sheppard, Ltd.**—Increased by £100, in 1s. ordinary shares, beyond the registered capital of £2,000. The existing 2,000 ordinary shares have been converted into 2,000 10 per cent cumulative preference shares of £1.

**Oldham & Son, Ltd.**—Capital increased by £250,000, in £1 5 per cent cumulative preference shares, beyond the registered capital of £120,000.

**Welding Controls, Ltd.**—Increased by £900 beyond the registered capital of £100.

**Sutton Wholesale Electrical Co., Ltd.**—Increased by £1,000 beyond the registered capital of £1,000.

**Newage (Manchester), Ltd.**—Increased by £39,900 beyond the registered capital of £100.

**Electromech Appliance, Ltd.**—Increased by £3,000 beyond the registered capital of £2,000.

## Stockholders' Representatives

The following further appointments of stockholders' representatives under the Electricity Act, 1947, are announced:—

MR. J. C. BURGESS, 7, Norfolk Street, Manchester.—Yorkshire Electric Power Co.

MR. W. F. PEARCE, Atlas Chambers, King Street, Leeds.—Electrical Distribution of Yorkshire, Ltd.

MR. F. W. ENGLISH, 8, Frederick's Place, Old Jewry, London, E.C.2.—North Wales Power Co., Ltd.

MR. G. L. WATES, c/o Johnson & Phillips, Ltd., Victoria Works, Charlton, S.E.7.—Dunoon & District, Ringmer & District, and Westmorland & District Electricity Supply Companies.

## Liquidations

**Tolworth Electricity Co., Ltd.**—Meeting of members on January 15th at 58, Victoria Street, London, S.W.1, to receive an account of the winding-up by the liquidator, Mr. G. S. Hall. (Members' voluntary winding-up.)

# STOCKS AND SHARES

STOCK Exchange business has been activated, to use a popular word, by a considerable volume of business arising out of the nationalization of Home Railways. Stockholders in the latter have been selling and reinvesting the money into the popular domestic industrials. The prices of Home Railway stocks are maintained by support accorded through institutional buyers—trust, insurance and other similar investment bodies—having taken very substantial amounts of stock on the assumption that they are obtaining a Government security at a discount price. The effect, generally speaking, is to strengthen quotations for industrials.

### Electricity Supply Shares

A seller of electricity supply ordinary shares at to-day's quotations receives a net price which is about 5 to 6 per cent below the figures estimated as the basis for compensation under nationalization. From the point of view of a buyer who has to pay the 2 per cent transfer stamp as well as commission charges, the net cost of the shares is seldom much less than the take-over price. Edmundsons £1 ordinary, for instance, have a market dealing price of 30s. to 30s. 6d., which compares with the compensation figure of 31s. 6d. After commission and, in the buyer's case, transfer charges, the seller receives 29s. 9d. and the net cost to the purchaser is within twopence of the Government's figure. The seller's discount works out at 5½ per cent.

### Dividend Considerations

On the face of it, the position of electricity supply shares outlined above does not appear to offer investment much inducement to deal either one way or the other. It probably explains the inactive condition of this particular market. Dividend considerations, however, provide relief to an otherwise uninteresting state of affairs. Under the Electricity Act, the companies would be allowed to distribute ordinary dividends up to the rates paid for the financial year ended last January. Repetition this year of the previous final distributions is regarded as a reasonably safe assumption: it accounts for discrepancies in the basis on which some shares are quoted. Edmundsons cannot pay a final of more than 3 per cent; but Midland Counties, for instance, can distribute up to a further 6½ per cent without exceeding the rate for 1946. Consequently the net cost of the latter shares, quoted at 50s., is very slightly above the take-over price of 51s. 5d.

### Price Changes

Price changes on the week are mostly in favour of shareholders. In addition to a number of other improvements in the list of electricity supply shares, there figure Bournemouth & Poole, 63s., West Gloucestershire, 31s., West Devon, 25s. 6d., and Scottish Power, 44s. In the industrial group, J. & F. Stone are better at a guinea, and Westinghouse Brake at 71s. 3d. Business in this particular class continues fairly active, and electrical equipment shares are in steady demand. British Insulated Callenders have hardened to 39s., Ericssons to 45s., Ever Ready to 36s. 6d., and Hopkinsons to 5 $\frac{5}{16}$.

### Miscellaneous Matters

Brush Electrical Engineering shares have picked up to 6s. 9d., after being 6s. 3d., since the annual report and news of the negotiations for a transfer to the company of two Associated British Engineering subsidiaries, in exchange for Brush preference and ordinary shares. The market was impressed by the figure of £7½ millions given in the report as the value of the present order book, representing eighteen months' work. Earlier, Mr. Good had replied to comment on the writing-up of the balance-sheet assets. Scophony 5s. shares have fallen 1s. to 4s. on the appearance of the full accounts, which confirm the debit of £32,000 carried forward in profit and loss account. Policy and prospects were left to be dealt with at the meeting on the 22nd of this month.

### Thorn Electric Capital

Thorn Electrical Industries, the makers of "Atlas" lamps and dealers in electrical and radio goods, are seeking Treasury consent to a further increase of capital. Last year, the company acquired the Ferguson Radio business, and the ordinary capital was raised to £156,250 by the issue of 225,000 5s. shares at 27s. 6d. On this occasion, the intention is to make a public offer of 400,000 5 per cent 2nd preference shares, with preferential consideration to applications from present shareholders. With the £50,000 in 6 per cent preference shares already in issue, total capital would be £606,250. Dividends of 20 per cent were paid annually from 1936 until last year, when the rate was raised by 5 per cent. At 24s. the shares return a fraction over 5 per cent on the money. The 6 per cent preference shares of the company changed hands at 23s. 6d. a month ago.

### General Cable Dividend

The final dividend of 30 per cent declared by General Cable Manufacturing fulfilled the expectations entertained by the market since the raising of the interim from 8 to 20 per cent. The total 50 per cent distribution is double last year's, and from the preliminary figures it appears that the extra payment has been well covered by the expansion of £47,000 profits, although tax provisions have not been disclosed. The profit of £150,000 is twice the nominal amount of issued ordinary capital. At 47s. 6d. the price of the 5s. shares has held the past month's 10s. advance, and makes the yield about 5½ per cent. There is a restricted market in the shares.

D

# NEW BOOKS

## Atomic Theory for the Layman.

**The Atom and Its Energy.** By E. N. da C. Andrade, D.Sc., Ph.D., F.R.S. Pp. 196; 17 figs., 12 plates. G. Bell & Sons, Ltd., 6, Portugal Street, W.C.2. Price 10s.

This is a popular book but in no derogatory sense. Intended for a public not trained in the physical sciences, it can also be commended to those, including many electrical engineers, with only a smattering of these. Its topical interest naturally relates to nuclear fission on the big scale associated with present developments, but it differs from most books of the moment in treating these as the logical outcome of a long train of investigations (the main features of which are given at each stage) into the nature of the atom as fundamental to the very existence of matter.

No encouragement is given to an expectation of early application of atomic energy to the generation of electricity, although the light weight of nuclear fuel would be of decisive advantage in certain instances. An estimate is quoted that if atomic energy, free of cost, replaced all coal and oil used in stationary power plants, the nation's working week would be reduced by only 45 minutes. More promise is held out for its use in research, particularly for the production of radio-active elements for use as "tracers" in aiding the solution of diverse physical problems. The theories accounting for the behaviour of the atom and its components are illustrated by happily appropriate analogies drawn from more familiar phenomena. Science, the author states, is a detective story, and his handling of his material gives it all the exciting interest of one in which the clues are impeccably scientific.—C.O.B.

## Electro-Technology Fundamentals.

**Electro-Technology and Calculations.** By M. G. Say, Ph.D., M.Sc., M.I.E.E. Pp. 159; figs. and index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 6s.

This book is really the first of a series. The later ones will deal with the technical and constructional side of electrical engineering; this one deals with the fundamental theory. As such, it does so pretty completely and the approach is definitely mathematical and cannot be followed by any person not having the necessary mathematical equipment.

There is much that pleases us about this approach. It begins with the atom and describes the electron theory of the electric current and the fundamentals of atomic structure. From this we are conducted to the conception of electromagnetic waves and the essential field, physics of the magnetic field and the electrostatic field. This implies the two laws concerning the line integral of a unit pole carried round a current (Ampère's Law) and the line integral of a unit charge in a changing magnetic field (Faraday's Law).

Having reached this we are introduced to what might be called practical electrical theory. The author explains that, as it happens, the electrical engineer is chiefly concerned with currents and that only in certain cases, as ultra-high frequency, is it necessary to return to the field physics.

Such laws as Ohm's follow from the fundamental Maxwellian principles as approximations in special cases; such cases, as the author remarks, are "physically unreliable." It has been several times pointed out by Professor Kapp and others that under no conceivable circumstances can Ohm's Law be rigidly obeyed.

We also like the careful classification and definitions of the units. The author decides to follow the metre-kilogram-second system rather than the c.g.s. system as he says the adoption of this is "long overdue in Britain." This may be so, but we think it will be foreign to most theoretical engineers and physicists in this country and will thus introduce a complication.

With regard to the format of the book, we quite understand the difficulties of paper shortage, but the condensation that has been necessary has resulted in rather small type being used that will be hard on the eyesight of many students, particularly in the case of some of the indices. Still it is something nowadays to find any advanced technical book at so low a price.—W.C.A.

**Planning : The Architect's Handbook.** By "E. & O. E." Pp. 436 with over 600 diagrams. Gilbert Wood & Co., Ltd. (for the *Architect & Building News*); distributed by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 21s.

A tremendous amount of information on all classes of building design and construction is contained in the fifth edition of this useful "handbook." From our readers' point of view the chief interest lies in the section on factory buildings in which various factors to be taken into account are well set out, with appropriate suggestions. Shops and stores and office buildings are treated separately in the same detailed manner and there are also sections on buildings for technical education and many classes of other public buildings.

While in general the positions of, and space allowances for, equipment are indicated, services are not dealt with in detail. We would suggest that in future editions Fig. 11B (page 17), showing the space requirements for meters, should bear the inscription "Electricity," rather than "Electric Light," which seems to be an old-fashioned limitation.—J.H.C.

# Shops and Warehouses

## Tenants' Position When Leases Expire

MANY electrical contractors are at the present time faced with the termination of their leases of shops and warehouses, particularly those which were extended for periods of from three to five years during the war.

Values have now gone up and landlords endeavour to increase the rentals where they have the power. If the contractor lives over the premises he is protected by the Rent Restriction Act. If he has a showroom combined with a warehouse, to a certain extent he is entitled to a new lease under the Landlord and Tenant Act, 1927, if he can show, *inter alia*, that he has been in occupation of the premises for a minimum period of five years, and that as a consequence of business carried on there a certain goodwill has become attached to the premises, thus making the premises more valuable to the landlord.

**By F. E. Sugden,**
*A.C.I.S., Barrister-at-Law*

Looking at the matter from another angle, it may be that the contractor has leased a shop and showroom and because of expansion of trade he has, in addition, taken over a new workshop and warehouse on a separate lease but from the same landlord. Obviously he desires to remain in possession of the warehouse where he executes all his repairs and stores his goods and which is situated close to his shop. At the termination of the lease he will probably be asked by the landlord for an increased rent. Normally he will be quite willing to pay this increased rent if it is a reasonable one. But most landlords are asking as much as three or four times the old rent and if a reasonable rent is offered it is turned down. The question then is, can the tenant demand a new lease? In answer to that question I should like to quote a case which recently occupied the attention of the Court.

### A Recent Ruling

Briefly the facts were these. The tenants carried on business in two adjoining buildings held from different landlords under different leases. One building was used solely as a warehouse, and the other as a shop and workshop. The lease of the warehouse was determined and the tenants served on the landlord a notice under the Landlord and Tenant Act, 1927, requiring the landlord to grant them a new lease. Goodwill attached to the business premises as a whole, but the County Court Judge found that no goodwill attached to the warehouse as such. The tenants appealed against the decision and the Court of Appeal held that there was nothing in the Landlord and Tenant Act to warrant the assertion that where a business was carried on in two separate buildings and goodwill attached to the business there must in law be an apportionment of the goodwill between the two, and, therefore as no goodwill attached to the warehouse as such, the landlord could not be compelled to grant a new lease of the warehouse. The goodwill must be specific to a special part of those premises where the goodwill is earned, namely the shop premises itself and not the warehouse.

This ruling is a very important one from the electrical contractor's point of view because obviously he must have plant and machinery and storage accommodation in order to carry on his work, but in spite of this fact, he cannot claim a new lease for a warehouse because the Court held that no goodwill could possibly become attached to the warehouse itself.

### Length of Lease

Naturally the contractor will ask how he can get over this difficulty. There is only one course open to him and that is to have a very long lease, I should say a minimum period of twenty years, if not longer because the Landlord and Tenant Act, 1927, lays down that if for any reason whatsoever the tenant desires to dispose of his warehouse he can always sub-let it to another tenant after having obtained the sanction of the landlord, which must not be unreasonably withheld.

What I should be inclined to do would be to ask for permission by registered post and if the permission is not forthcoming and having proof that the landlord received the letter, then I should take the matter into my own hands, because I am sure that in such circumstances the Court would deem that the landlord's sanction had been unreasonably withheld.

# MUNICIPAL REPORTS

## Steam Conditions at Portobello. Leyton's "All-Electric" Houses.

**Bedford.**—A deficiency of £25,038 on the year's operations is reported by the chief engineer and general manager of the Electricity Department (Mr. P. G. Campling). Of this, however, £19,651 was brought about by a special discount given to consumers in the March quarter in view of the inconvenience caused by load shedding, etc. In October last year a resolution was passed for a 5 per cent increase in charges, but this was only approved by the Minister of Fuel and Power in February. Total income increased by £28,130 to £457,365 and working expenses by £67,920 to £422,540. The average price per kWh sold decreased from 1·118d. to 1·064d. Sales of electricity, at 94·5 million kWh, show an advance of 16 per cent. During the floods in March the generating station had to be closed down temporarily.

**Edinburgh.**—Referring to the extensions at Portobello in his annual report the engineer and manager (Mr. J. F. Field) says that the 540,000 lb per hr boiler will be the largest pulverized fuel unit in Europe. The steam conditions of 1,350 lb per sq in. (95 kg/cm²), 950 deg F (500 deg C) total temperature and feed heating up to 450 deg F (232 deg C) should ensure a thermal efficiency of just over 30 per cent and with the best Lothians coal fuel consumption should be just about 1 lb (0·45 kg) per kWh generated. This plant is scheduled for completion next year; a duplicate set is now excluded from the revised programme of the C.B.E. On the distribution side the Department is well away on the first step in reconstructing the network to take anything up to four or five times the present capacity by stepping up the transmission voltage.

During the year ended May 28th last 561·8 million kWh was generated against 450·7 million in 1945-46. Sales, excluding bulk supply, totalled 332·0 million kWh (278·2 million), an increase of 19 per cent.

Gross income amounted to £1,461,610 (£1,313,172) and working costs were £1,233,516 (£1,080,312). The net result of the year's working was a profit of £80,212 (£1,452) before contributing £17,001 (£7,638) to reserve.

**Leyton.**—In spite of the acute shortages of materials 1,180 additional consumers were connected during 1946-47. This makes the total number 30,317, and the extent of development is shown by the fact that the aggregate number of hereditaments in the area is about 29,577. The 200 emergency hutments and 106 temporary bungalows so far connected (to March 31st) last are "all-electrically" equipped and Mr. A. E. Morgan, the borough electrical engineer, says he hopes to report the same with regard to the Council houses and blocks of flats in course of erection. Altogether 50·8 million kWh was sold, an increase of 8·2 million (19 per cent) on the previous year. The average price received per kWh sold was 1·570d. (against 1·577d.). Gross revenue amounted to £348,646 (£292,415) and working expenditure to £274,453 (£226,161), the net profit remaining practically unchanged at £19,624.

**Wallasey.**—During the past year a start was made on a change-over and network reinforcement scheme which is expected to take five years to complete. Part of the single-phase distribution system dates back to the inauguration of the supply fifty years ago. The need for reinforcement is indicated by the fact that in spite of restrictions and incessant propaganda consumption rose by 25 per cent to 46·7 million kWh; under the domestic tariff the increase was no less than 58 per cent. Total income advanced by £55,214 to £389,549 and working expenditure by £56,995 to £359,747, there being a net profit on the year of £1,136 (against £4,086). Revenue per kWh sold decreased from 1·373d. to 1·242d. The borough electrical engineer (Mr. W. J. Forster) says that a review of the domestic tariff is necessary.

**Wimbledon.**—The residential nature of the area is indicated by the fact that, of the 109 million kWh sold in 1946-47, power supplies accounted for only 17·6 per cent. Excluding both power and street lighting, the average consumption per head of the population was 636 kWh. Altogether, sales increased by 18 per cent over 1945-46. Daily load curves for a Sunday and weekday in the chargeable period reproduced in the report of the chief engineer and manager (Mr. H. C. Spence) show the maximum chargeable demand occurring on Sunday. Other curves are included for the fuel crisis period last February. Total revenue of the undertaking increased last year by £90,686 to £618,277 and working expenditure by £101,951 to £538,649, there being a net profit of £2,561 (£2,236). Average revenue per kWh sold decreased from 1·281d. to 1·269d.

**Oswestry.**—The borough electrical engineer and general manager (Mr. H. Breckell) reports that during 1946-47 275 new consumers were connected, making a total of 4,359. Sales rose by 23 per cent to 9 million kWh. During the year 50 "all-electric" prefabricated houses were occupied, and it is stated that the tenants have expressed satisfaction with the exceptional cleanliness and economical working of the kitchens. Total income of the undertaking amounted to £68,255 and there was a net profit of £5,984, before providing for capital works met out of revenue. The average price received per kWh sold was 1·66d. Reductions in charges were introduced in the March quarter.

# CONTRACT INFORMATION

## Accepted Tenders and Prospective Electrical Work

## Contracts Open

*Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.*

**Barking.**—January 9th. Electricity Department. Stoneware conduits, troughs and covers, and interlocking cable covers. (See this issue.)

**Bethesda.**—December 31st. Urban District Council. Substation switchgear, l.v. cable and overhead line. (December 19th.)

**Blackpool.**—January 12th. Town Council. Electrically driven automatic centrifugal pump, with accessories. Borough surveyor, Municipal Buildings.

**Camberwell.**—January 12th Borough Council. Electric lamps for twelve months from April 1st. Borough engineer, Town Hall.

**Dagenham.**—January 10th. Town Council. Lamps and other electrical supplies for the year commencing April 1st, 1948. Borough engineer, Civic Centre.

**Keighley.**—January 12th. Corporation. Fire extinguishing equipment. (December 12th.)

**Kettering.**—January 30th. Electricity Department. Two 11-kV, 3-phase, 250,000-kVA, duplicate busbar, metalclad switch units. (See this issue.)

**Stockport.**—February 9th. Electricity Department. Supply and erection of storage battery at Millgate generating station. (December 19th.)

## Orders Placed

**Middlesbrough.**—Town Council. Accepted. Cable (£5,811).—Hackbridge Cable Co.

**Stockton-on-Tees.**—Town Council. Accepted. H.v. switchgear.—A. Reyrolle & Co. L.v. switchgear.—W. Lucy & Co. Transformers.—C. A. Parsons & Co., Cables.—Edison Swan Cables.

## Contracts in Prospect

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

*It must be borne in mind that many of the projects mentioned may be postponed as a result of the Government's suspension of building activities for the time being.*

**Altrincham.**—Extensions to Broadheath Bridge Works, for Lancashire Motor Traders, Ltd.; Donald Macdonald, Ltd., builders, Trafford Bar, Manchester, 16.

**Ashburton.**—Secondary school (£93,000); county architect, Heavitree Road, Exeter.

**Atherton.**—Flats (56), Hag Fold estate, for U.D.C. (£50,442); Geo. Moss & Sons, Ltd., builders, Back St. Helens Road, Leigh, Lancs.

**Birkenhead.**—Police headquarters, Chester Street; borough surveyor, Town Hall.

**Bishop Auckland.**—"Orlit" houses (100) for U.D.C.; Tarslag, Ltd., builders, Stockton-on-Tees.

**Bolton.**—Completion of technical college, Manchester Road (£43,542); borough surveyor.

**Broughton.**—Extensions, rainwear clothing factory, Gordon Street, for M. Stone, Ltd.; L. D. Clegg, architect, 5, Queen Street, Oldham.

**Bury.**—Secondary school, Hardman's-in-the-Fields, for Catholic Authorities; R. Byrom, architect, 9, Victoria Buildings, Silver Street.

**Chigwell.**—Cinema, Roding Valley estate; Provincial Cinematograph Theatres, Ltd., 123, Regent Street, W.1.

**Cradley Heath.**—Extensions to Eagle Chain Works, Corngreaves Road, for S. Woodhouse & Sons, Ltd.; Robinson & Kay, architects, High Street, Stourbridge.

**Dorking.**—Factory extensions, South Street; Long Eaton Cable Co., Ltd.

**Durham.**—Houses (70) for the City Council; W. J. Greene, city engineer.

**Easington (Co. Durham).**—Aluminium houses (258); C. W. Clarke, surveyor, R.D.C. offices.

**Easingwold.**—Factory; G. Mallinson & Sons, Ltd., woollen mfrs., Spring Grove Mills, Linthwaite.

**Elstree.**—Fire station, offices, etc., at M.G.M. Studios, Elstree Way; Guy Morgan & Partners, architects, 36, Upper Mall, London, W.6.

**Glasgow.**—Extensive additions to factory; Fibreglass, Ltd., Possilpark.

**Handbridge.**—R. C. secondary school, Old Wrexham Road; F. X. Velarde, architect, 3, Abercrombie Square, Liverpool.

**Huddersfield.**—New factory for Gledhill Bros. & Co., Ltd., Lockwood Road.

**Kilmarnock (Ayrshire).**—Farm machinery factory for Canadian firm of Massey Harris, Ltd.; manager, Scottish Industrial Estates, Ltd., Glasgow.

**Kirkby-in-Ashfield.**—Rebuilding Market Hall; U.D.C. surveyor, Urban Road, East Kirkby, Notts.

**Liverpool.**—Transit sheds, and other works for the Mersey Docks and Harbour Board; R. J. Hodges, general manager.

**Ludlow.**—Housing scheme on 11-acre site, Sandpits Road; S. N. Shrimpton & Son, 18, Bridge Street, Knighton, Radnorshire.

**Maidenhead.**—Factory, Cox Green; Vandervell Products, Ltd., Western Avenue, W.3.

**Middlesbrough.**—New works for H. Pooles & Sons, Ltd., Stockton Street; Thos. A. Crawford, architect, 80, Borough Road.

**Newark.**—Secondary School, Hawtonville; Greenwoods, Ltd., builders, 2, Wood Street, Mansfield.

**Newcastle-on-Tyne.**—Offices for the National Coal Board in Ellison Place; Stephen Easten, Ltd., Westgate Grange.

**Newtownards.**—Houses (66), on four sites, for R.D.C.; Roe, Stevenson & Sons, 71, Great Victoria Street, Belfast.

**Northfield.**—School (£18,000) for St. Laurence's Church; Rev. J. Crowle Ellis, The Rectory.

**Nottingham.**—Houses (96), Wollaton; Bodill & Sons, Ltd., builders, Portland Street, Hucknall.

**Paisley.**—New maternity hospital; burgh medical officer of health.

**Pembroke.**—School, Simpson Cross; county architect, Council Offices, Haverfordwest.

**Rayleigh (Essex).**—Houses (33) for land workers; U.D.C. surveyor, 28, High Street.

**Scarborough.**—Ice cream factory for G. Paccitto & Sons, Ltd.; F. Baker, architect, York Place.

**South Shields.**—Temporary Baptist Church; M. Swales, Ltd., builders, Imeary Street.

**Sunderland.**—Secondary school at Hill View; Martin & Felton, quantity surveyors, Lloyds Bank Chambers.

Hill View primary infants' school; Allen & Hill, quantity surveyors, Frederick Street.

**Surbiton.**—Houses (46), Gosbury Hill, Chessington, and flats (72), Mansfield estate, Hook; borough engineer.

**Tynemouth.**—Oil refinery, Northumberland Dock; borough engineer, 19, Howard Street, North Shields.

**Wallsend.**—Offices at Swans Bank for Swan, Hunter & Wigham Richardson, Ltd.; Holland, Hannen & Cubitts, Ltd., builders, Queen Anne's Gate, London, S.W.1.

Additions in Neptune Road for the Thermal Syndicate Co., Ltd.; L. J. Couves & Partners, architects, Carliol House, Newcastle-on-Tyne.

Houses (36) for the T.C.; R. A. Gofton & Sons, builders, Monkseaton. Houses (40) for the T.C.; J. H. James, builder, Archer Street.

**West Hartlepool.**—Workshop block at the Technical College; borough architect.

**York.**—New maternity hospital (£75,000); C. J. Minter, city engineer, Guildhall.

## Memorial Tower Clock

THE Church of the Good Shepherd, Collier Row, Romford, Essex, has installed as its war memorial an auto-wound tower-clock with three 4-ft (1·3m) dials.

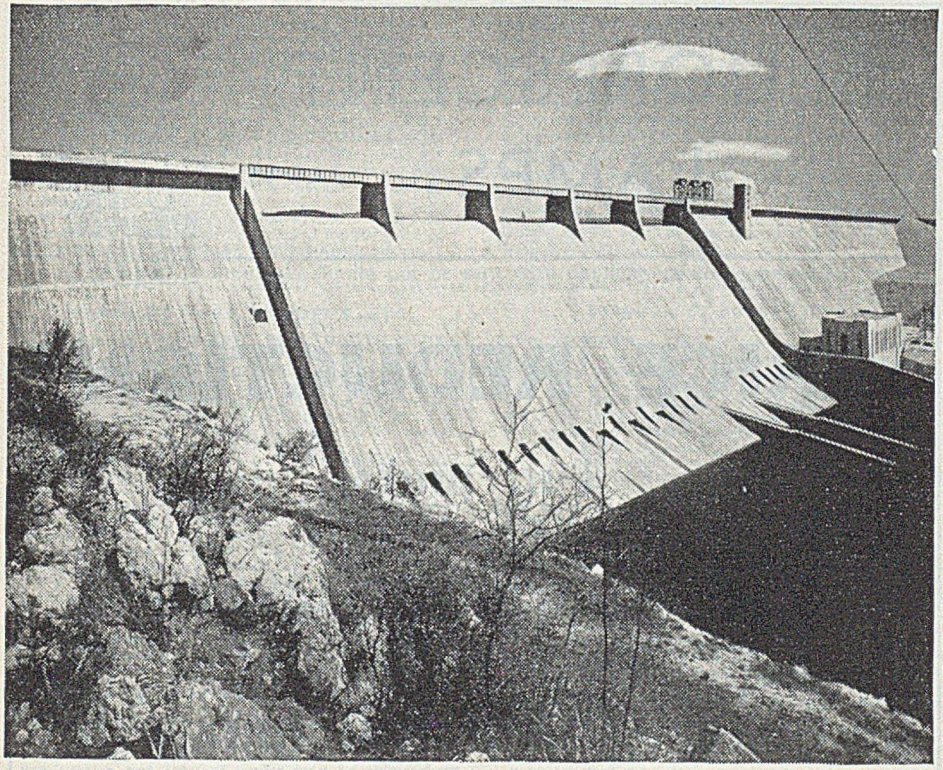
The mechanism is of the flat-bed type and the timekeeping train is driven by a weight which hangs from an endless length of roller chain which passes round sprockets on the main arbor of the clock. The descent of the weight is used to actuate the switchgear controlling the re-winding operation in the usual way, but the location of both the switchgear and the re-winding motor is unusual. A mercury-tube switch is fitted on one of the upright members of the underframe supporting the clock mechanism, close to the weight itself, so enabling the latter to actuate the switch directly by depressing and raising two link levers. The re-winding motor is not on the main clock frame, but is mounted on a small platform spanning two of the upright members of the underframe. The B.T.H. motor is directly coupled to an Oppermann worm-reduction gear of the totally enclosed type; the spindle carries the drive pinion of a single-stage spur reduction gear which rotates the winding sprocket.

The striking mechanism is particularly simple in design. Its motor is of similar type to that used for re-winding and a pair of heavy cams raise the hour hammer lever. The striking mercury-tube switch is mounted on a rocker, which is tripped by a lever whose movement is in turn controlled by the let-off cam on the hour spindle of the clock.

The striking of the correct number of blows at each hour is controlled by a circular "locking-plate," or count-wheel, the ratio of its pinion and gear wheel being such that the locking-disc makes one complete rotation for the striking of the 78 blows that are sounded during twelve hours. The circumference of the plate is notched at intervals to provide for the progressive striking of the hours from one to twelve and a blade, attached to a lever pivoted on the clock frame, rests on the edge of the locking plate every time a blow is struck. So long as the blade lever is unable to descend far enough to affect the switchgear, the circuit remains closed, but when the blade falls into a notch, the additional distance it is able to fall is sufficient to cause it to engage with the switch rocker and trip the striking motor circuit, until it is re-started at the next hour by the let-off cam on the hour spindle of the timekeeping part of the clock.

The automatic winding mechanism requires current only during the relatively short time that the weight is being raised; a certain amount of additional weight-fall beyond the normal travel is provided for, so that the clock will continue to go for some time should the supply fail. It can be wound by hand.

The clock was designed and constructed by Mr. T. M. Hartley, of Silchester, Hants, to the specification of Mr. A. B. Webber, a Romford horologist.



*FAMOUS HYDRO-ELECTRIC STATIONS:*

*The Marshall Ford Dam, on the Colorado River, Texas, U.S.A., is of the straight gravity type. Completed in 1942, with a height of 270 ft. and crest length of 2,423 ft., the dam was built for flood control, irrigation and hydro-electric power. The volume of 3,579,000 cubic yards provides an electrical power capacity of 50,000 h.p.*

# CLASSIFIED ADVERTISEMENTS

**ADVERTISEMENTS** for insertion in the following Friday's issue are accepted up to **First Post on Monday**, subject to space being available, and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.
**THE CHARGE** for advertisements in this section is 3/- per line (approx. 7 words) per insertion; ***ONLY OFFICIAL AND GOVERNMENT ANNOUNCEMENTS CAN NOW BE DISPLAYED***:—42/- per inch. Where the advertisement includes a Box Number this counts as two words and there is an additional charge of 1/-.
**SITUATIONS WANTED.**—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

**REPLIES TO** advertisements published under a Box Number if not to be delivered to any particular firm or individual should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Letters of applicants in such cases cannot be returned to them. The name of an advertiser using a Box Number will not be disclosed. All replies to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1. Cheques and Postal Orders should be made payable to ELECTRICAL REVIEW LTD. and crossed.

**Original testimonials should not be sent with applications for employment.**

## *OFFICIAL NOTICES, TENDERS, ETC.*

### BOROUGH OF KETTERING ELECTRICITY DEPT.

TENDERS are invited from British manufacturers for the supply and delivery of two 11,000-volt, 3-phase, 50-cycle, 250,000-kVA, duplicate busbar (off load method of selection), hand-operated, metalclad Switch Units. To extend existing type 11/E.25 switchboard by Messrs. Switchgear & Cowans Limited, Manchester.

Specifications and forms of tender, in duplicate, may be obtained from the Borough Electrical Engineer, Rockingham Road, Kettering, upon receipt of one guinea, which will be refunded upon receipt of a bona fide tender and the return of the specification. Further copies of the specification may be purchased at a cost of 5s. each.

Tenders must be submitted in a plain sealed envelope supplied by the Corporation, endorsed "Tender for Specification No. 109," and must be received by me not later than Friday, the 30th January, 1948. The Corporation do not bind themselves to accept the lowest or any tender.

JOHN CHASTON,
Town Clerk's Office, Town Clerk.
High Street, Kettering.
16th December, 1947. 656

### BOROUGH OF BARKING ELECTRICITY DEPT.

TENDERS are invited for the supply and delivery of the following materials: Stoneware Conduits, Troughs and Covers, and Interlocking Cable Covers.

Specification and form of tender may be obtained on application to the Borough Electrical Engineer and Manager, Electricity House, Ripple Road, Barking.

Tenders, sealed and endorsed "Cable Covers," to be addressed to the Worshipful the Mayor of Barking, Town Hall, Barking, must be delivered not later than 9 a.m. on Friday, 9th January, 1948. The Council do not bind themselves to accept the lowest or any tender.

E. R. FARR, Town Clerk.
Town Hall, Barking. 686

## *SITUATIONS VACANT*

***Vacancies advertised are restricted to persons or employments excepted from the provisions of the Control of Engagement Order, 1947.***

### BRITISH ELECTRICITY AUTHORITY

#### Deputy Chief Accountants

THE British Electricity Authority desire to appoint Deputy Chief Accountants. The salary scale is £2,500 per annum rising by annual increments of £100 to £3,000 per annum, subject to deductions for superannuation, and successful candidates will be placed at points in the scale appropriate to their qualifications and experience. The Authority are prepared to consider an additional allowance in the case of a suitable candidate already receiving remuneration above the specified maximum.

Candidates should have extensive experience in accountancy in the electricity industry, and should have held responsible posts in electricity undertakings. Preference will be given to candidates at present engaged within the industry.

Applications, giving age, qualifications, experience, present salary and personal references, which will be acknowledged and treated as confidential, should be sent within 14 days to the Director of Establishments, British Electricity Authority, Portland Court, Great Portland Street, London, W.1. 663

### BOROUGH OF SCUNTHORPE

APPLICATIONS are invited for the following appointments in the Corporation Electricity Department:—
(A) CONSUMERS' ENGINEER, at a salary in accordance with Class G, Grade 8, of the N.J.B. Schedule, viz., £467 rising to £476 per annum.
(B) JUNIOR TECHNICIAN (Mains Department), at a salary in accordance with Class G, Grade 10, of the N.J.B. Schedule, viz., £312 rising to £323 p.a.

The minimum qualification required for appointment (A) is Graduate Membership of the I.E.E. or its equivalent. Applicants should have had a recognised training in electrical engineering, and considerable experience in the drafting of schemes and specifications for all classes of installations, and the supervision thereof. Experience in public lighting and remote control systems would be an advantage. Candidates for appointment (B) should have had sound technical training up to Higher Nat.onal Certificate standard or equivalent, and experience of the construction, operation and maintenance of substations and mains on L.T., H.T. and E.H.T. systems.

The positions will be subject to the conditions of employment of the aforesaid National Joint Board, to the provisions of the Local Government Superannuation Act, 1937, and to one month's notice on either side. The successful candidates will be required to pass a medical examination.

Applications, giving full details of age, qualifications, training and experience, accompanied by copies of two recent testimonials, endorsed "Consumers' Engineer" or "Junior Technician" as the case may be, should be sent to the undersigned not later than 9th January, 1948. Canvassing, either directly or indirectly, will disqualify.

W. P. ERRINGTON,
Municipal Offices, Town Clerk.
34, High St., Scunthorpe, Lincs.
12th December, 1947. 632

### BOROUGH OF CHESTERFIELD ELECTRICITY DEPT

#### Appointment of Mains Superintendent

APPLICATIONS are invited from qualified engineers for the position of Mains Superintendent in the Borough of Chesterfield Electricity Department. The salary scale for the position will be that of Grade 3, Class G, as prescribed by the National Joint Board for the Electricity Supply Industry and will commence at £681 p.a.

Candidates must have had a sound technical training, be Corporate Members of the Institution of Electrical Engineers, and possess extensive practical experience of high voltage and medium voltage networks, transforming stations and their equipment, and be conversant with the change-over of direct current networks to alternating current operation. The person appointed will be required to take full charge of the high voltage and medium voltage systems, substations, mercury arc rectifiers and rotary convertors.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Forms of application may be obtained from the Electrical Engineer and Manager, W. W. Grimes, Esq., 172, Chatsworth Road, Chesterfield, and should be returned to the undersigned not later than 10 a.m., Thursday, 8th January, 1948. Canvassing in any form, either directly or indirectly, will be a disqualification, and candidates must declare whether they are related to any member of the Council or to the holder of any senior office under the Council.

RICHARD CLEGG, Town Clerk.
507

## BOROUGH OF SWINDON

(This advertisement is published with the permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947.)

APPLICATIONS are invited for the appointment of Two Junior Shift Engineers in the Electricity Department of the Corporation from persons having a sound practical experience in a modern generating station. The salary in respect of each appointment will be in accordance with Class G, Grade 8b, of the scale laid down by the National Joint Board of Employers and Members of Staff, namely at a commencing salary of £408 per annum, and is also subject to the conditions of service laid down by the National Joint Board so far as they are applicable and have been adopted by the Council, and to such other conditions as may be laid down from time to time by the Council.

The appointments, which may be terminable by one month's notice on either side, are subject to the provisions of the Local Government Superannuation Act, 1937, and the successful applicants may be required to pass a medical examination.

Applications, stating age, training, qualifications, experience and present appointment, accompanied by copies of three testimonials and endorsed "Junior Shift Engineer," must reach the undersigned not later than the 10th January, 1948.

Canvassing in any form will be deemed a disqualification, and applicants must state whether to their knowledge they are related to any member of the Council or to any senior officer of the Corporation.

D. MURRAY JOHN,
Civic Offices, Town Clerk.
Swindon, Wilts. 662

## BOROUGH OF DOUGLAS ELECTRICITY UNDERTAKING

### Appointment of Power Station Superintendent

APPLICATIONS are invited for the above appointment from candidates having a sound technical education and practical experience in the operation and maintenance of a modern steam generating station. Preference will be given to Corporate Members of the Institution of Mechanical Engineers, not more than 40 years of age, who have had actual experience in the supervision of power station staff.

The salary will be in accordance with National Joint Board Schedule, Class E, Grade 3, commencing at £619 per annum.

The appointment will be an established post under the Superannuation Scheme of the Corporation, and the successful candidate will be required to contribute to the Council's Superannuation Fund. The Council's Superannuation Act does not provide for the receipt or payment of any transfer value on entering or leaving the Council's service. The successful candidate will be required to pass a medical examination.

Applications, endorsed "Power Station Superintendent," giving particulars of age, qualifications and experience, together with not more than three copies of recent testimonials, should be addressed to the Borough Electrical Engineer and Manager, Electricity Offices, Ridgeway St., Douglas, Isle of Man, not later than 5th January, 1948.

PERCY M. SHIMMIN,
Town Hall, Douglas, Town Clerk.
Isle of Man.
12th December, 1947. 577

## SURREY COUNTY COUNCIL

### Kingston County Hospital, Wolverton Avenue, Kingston-on-Thames—Appointment of Assistant Engineer

APPLICATIONS are invited from suitably qualified and experienced Engineers for the above appointment. Candidates should be experienced in the control and maintenance of boiler plant, large heating and domestic hot water systems, electricity services, and the general engineering equipment of hospitals, and preferably have had experience on the staff of a hospital.

A flat for which rent will be charged will be available if required. Commencing salary will be according to qualifications and experience on the grade £390 × £15 — £435 p.a., plus London allowance £20 p.a. and bonus £1 3s. per week. The appointment is subject to a satisfactory medical examination and to the Local Government Superannuation Act, 1937.

Applications by letter, stating age, qualifications, experience and present appointment, with a copy of not more than three recent testimonials, should be sent to the County Medical Officer, County Hall, Kingston-on-Thames, by 10th January, 1948. 648

## WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

### Appointment of Assistant Statistical Officer

APPLICATIONS are invited from qualified engineers for the position of Assistant Statistical Officer in the Chief Engineer's Department of the above-mentioned Authority. Applicants should possess the Higher National Certificates in electrical and/or mechanical engineering, and Corporate Membership of the Institution of Electrical and/or the Institution of Mechanical Engineers will be an added advantage. Candidates should have had experience in the collection, collation and interpretation of technical statistics related to the generation and distribution of electricity and in the application of the principles of statistics to various types of problems.

The salary offered will be £510 per annum.

The appointment will be subject to the Authority's Superannuation Scheme under the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination.

Applications, stating age, education, present occupation and engineering training, also full particulars of experience in the operation of generating stations, distribution of electricity, and in statistical work, accompanied by copies of three recent testimonials, should reach me not later than the 31st December, 1947. Canvassing, either directly or indirectly, will disqualify.

H. F. CARPENTER,
Phœnix Buildings, Clerk and Manager.
Dudley Rd., Wolverhampton.
8th December, 1947. 547

## WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

### Appointment of Assistant Constructional Engineer

THE above-named Authority invite applications for the position of Assistant Constructional Engineer on the permanent staff of the Authority at a salary of £925 per annum. Applicants must have been trained in a manufacturing works and have had a wide experience in the design and construction of electricity generating stations. They should, preferably, possess a degree in mechanical or electrical engineering and be Corporate Members of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers.

The appointment will be subject to the Authority's Superannuation Scheme under the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination.

Applications, stating age, education, qualifications and full details of practical training and experience, accompanied by copies of three recent testimonials, should reach me not later than the 31st December, 1947. Canvassing, either directly or indirectly, will disqualify.

H. F. CARPENTER,
Phœnix Buildings, Clerk and Manager.
Dudley Rd., Wolverhampton.
8th December, 1947. 546

## BOROUGH OF CONWAY ELECTRICITY DEPT.

### Appointment of Jointer (Class 1)

APPLICATIONS are invited for the above position, by permission of the Ministry of Labour and National Service under the Control of Engagement Order, for any person other than those normally employed in agriculture or coal mining. Applicants must be fully experienced in the jointing of all classes of 11-kV and L.T. cables.

The rate of pay will be in accordance with the Schedule of the National Joint Industrial Council, at present 31.25d. per hour for a 44-hour week. The appointment will be subject to the provisions of the Local Government Superannuation Acts, and the successful applicant will be required to pass a medical examination.

Applications, endorsed "Jointer," stating age, present position, particulars of experience, and accompanied by copies of two testimonials, should be forwarded to reach the undersigned not later than Friday, 16th Jan., 1948.

ARTHUR L. RALPHES,
Town Clerk's Office, Conway, Town Clerk.
17th December, 1947. 668

## METROPOLITAN ELECTRIC SUPPLY CO. LTD.

OPERATING Control Engineer, Class L, Grade 9, 1st year (as a minimum), N.J.E. conditions, required for shift duties in the company's control centres in Southall-Uxbridge areas. Candidates must have a good technical knowledge and have had previous experience of similar work on large systems operating up to 66 kV.

Applications, stating age, education, technical qualifications, training and subsequent experience, to be addressed to the Secretary, Metropolitan Electric Supply Co. Ltd., 16, Stratford Place, London, W.1. 646

## METROPOLITAN BOROUGH OF FULHAM ELECTRICITY DEPARTMENT

### Appointment of Installation Engineer

(By permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947.)

APPLICATIONS are invited for the position of Installation Engineer from candidates not over 40 years of age. The duties involve: (a) Preparation of schemes and designs for heating, lighting and power installations, industrial and domestic; the design, testing and installation of all types of electrical apparatus associated with the application of electricity to industry; (b) Preparation of specifications, diagrams and estimates; (c) Executive control of the installation staff, including approximately 70 wiremen; (d) The fundamental knowledge of electronics will be an advantage.

Candidates must have the Higher National Certificate in electrical engineering as a minimum, and have experience in the preparation of specifications for installation work in domestic and factory premises.

Salary in accordance with Grade 6, Class J, of the National Joint Board Schedule, commencing at £646 16s. per annum.

Forms of application and conditions of appointment may be obtained on sending stamped addressed foolscap envelope to the undersigned, to whom completed applications must be returned not later than noon on Thursday, 22nd January, 1948.

CYRIL F. THATCHER,
Town Hall, Fulham, S.W.6. Town Clerk.
December, 1947. 665

## BOROUGH OF CHESTERFIELD ELECTRICITY DEPT

### Appointment of Shift Charge Engineer

APPLICATIONS are invited from qualified engineers for the position of Shift Charge Engineer at the Corporation Temporary Arrangement Generating Station. The salary scale for the position will be that of Grade 8, Class G, as prescribed by the National Joint Board for the Electricity Supply Industry and will commence at £467 per annum.

Candidates must have had a sound technical training and should have considerable experience in the operation of water tube boilers, turbo-generators and auxiliary plant, rotary convertors and high and medium voltage switchgear. The person appointed will be responsible for the operation of the generating station and will take full charge of his shift.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Forms of application may be obtained from the Electrical Engineer and Manager, W. W. Grimes, Esq., 172, Chatsworth Road, Chesterfield, and should be returned to the undersigned not later than 10 a.m., Thursday, 8th January, 1948. Canvassing in any form, either directly or indirectly, will be a disqualification, and candidates must declare whether they are related to any member of the Council or to the holder of any senior office under the Council.

RICHARD CLEGG, Town Clerk.
568

## CORPORATION OF PAISLEY ELECTRICITY AND PUBLIC LIGHTING DEPARTMENT

### Deputy Electrical Engineer and Manager

APPLICATIONS are invited for the above appointment from experienced Engineers having a thorough practical and technical training in all departments of an electricity supply undertaking, together with a thorough knowledge of the commercial and administrative sides. Extensive experience on large distribution networks is essential, with a sound knowledge of change-over work. Preference will be given to applicants under 40 years of age who are Chartered Electrical Engineers. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1922, and the successful candidate must pass a medical examination.

The salary will be £600, rising to £750, per annum, plus bonus at present £90 per annum.

Applications, stating age and full particulars of experience and appointments, together with copies of three recent testimonials, to reach the undersigned not later than 6th January, 1948, endorsed "Deputy Engineer and Manager."

JOHN P. MORRISON,
Municipal Buildings, Paisley. Town Clerk.
13th December, 1947. 631

## WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

### Charge Engineer, Wolverhampton Generating Station

THE above-named Authority invite applications for the position of Charge Engineer at Wolverhampton generating station, at a salary of £481 per annum, Class H, Grade 8, of the National Joint Board Schedule. An additional emolument of £50 per annum will be payable for extra duties in connection with load control.

Candidates must have had a thorough practical engineering training and be experienced in the operation of large steam turbo-alternators, switchgear, high-pressure boilers and auxiliary plant in a modern generating station. Corporate Membership of the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers will be an advantage.

The appointment will be subject to the Authority's Superannuation Scheme under the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination.

Applications, stating age, training and experience, accompanied by copies of three recent testimonials, should reach the undersigned not later than the 31st December, 1947. Canvassing, directly or indirectly, will disqualify.

H. F. CARPENTER,
Phœnix Buildings, Clerk and Manager.
Dudley Rd., Wolverhampton.
8th December, 1947. 548

## METROPOLITAN WATER BOARD

### Appointment of Electrical Draughtsman

APPLICATIONS are invited from experienced Electrical Draughtsmen for appointment to the Board's permanent staff as Draughtsman at a commencing salary between £280 per annum and £460 per annum, plus £80 per annum cost-of-living bonus, according to the selected candidate's qualifications and experience. Candidates must have passed Matriculation, General School or other accepted preliminary examination. Age not to exceed 40 years.

The duties will include the preparation of specifications and wiring diagrams for electric motors, transformers, motor starters, control gear and switchboards for alternating and direct current and electric lighting installations. Applicants should have had a sound technical training and practical experience.

Particulars of these appointments and a form of application may be obtained from the undersigned on receipt of a stamped addressed foolscap envelope, quoting reference (ER).

This advertisement is published by permission of the Ministry of Labour and National Service under the Control of Engagement Order.

C. W. STOKER,
Offices of the Board, Clerk of the Board.
New River Head, Rosebery Ave.,
London, E.C.1. 615

## KENT EDUCATION COMMITTEE

### Medway Technical College

LECTURER in Electrical Engineering is required to take up his duties in September, 1948, to teach full-time and part-time students up to the standard of the Final B.Sc. Degree of London University and the Higher National Certificate in Electrical Engineering. Candidates must be graduates of a British university or hold equivalent qualifications. Duties will include the teaching of telecommunications and electrical measurements to Final Degree standard. Sound industrial experience is essential.

Salary, Burnham Scale for Teachers in Technical Colleges, including increments for industrial experience and war service.

Forms of application can be obtained from the Principal, Medway Technical College, Gardiner Street, Gillingham, Kent, and should be returned to him within three weeks of the appearance of this advertisement. 622

## FIRST GARDEN CITY LIMITED

(A) SHIFT CHARGE ENGINEER for generating station, N.J.B. conditions, Grade 8, Class F, commencing salary £442 per annum (prospect of Class G in 1948).

(B) RELIEF SHIFT CHARGE ENGINEER, as above, Grade 8a, Class F, commencing salary £413 p.a.

Applications in writing to the undersigned not later than 10th January, 1948.

W. A. BROWN,
Works Road, Letchworth, Electrical Engineer
Hertfordshire. and Manager. 661

## COUNTY BOROUGH OF SWANSEA ELECTRICITY DEPARTMENT

### Appointment of Instrument and Efficiency Engineer

APPLICATIONS are invited from men not over the age of 45 years, unless at present in the employ of a Local Authority, for the position of Instrument Engineer at Tir John Power Station at a salary corresponding to Grade J8b of the N.J.B. Schedule, at present £456-£477 per annum.

Candidates should be technically qualified for Associate Membership of either the Institution of Electrical or Mechanical Engineers, and should have a wide experience of the installation and upkeep of all classes of power station metering equipment. Experience in the preparation of heat balance sheets and the running of efficiency tests would also be an advantage.

The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the candidate will be required to pass a medical examination.

Applications, stating age, qualifications, training and experience, together with copies of not more than two recent testimonials, must reach the undersigned not later than Wednesday, 31st December, 1947. Canvassing, either directly or indirectly, will be a disqualification.

T. B. BOWEN,
Town Clerk.

Guildhall, Swansea.
11th December, 1947. 551

## BOROUGH OF ACCRINGTON ELECTRICITY DEPT.

APPLICATIONS are invited for the following positions at Hyndburn Road Generating Station: Two Switchboard Attendants, Class F, Grade 9a, of the National Joint Board Schedule, at present £327 per annum. Candidates must have had sound technical training and practical experience in the control of H.T. and L.T. switchboards. Preference will be given to candidates possessing the National Certificate.

The successful candidates will, if satisfactory, have the opportunity of being transferred to the new Accrington Huncoat Generating Station when the same is ready for commissioning.

Both appointments will be subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidates will be required to pass a medical examination.

Applications, stating age, full particulars of training and experience, accompanied by copies of three recent testimonials, should reach me not later than Tuesday, the 6th January. Canvassing, either directly or indirectly, will disqualify.

P. D. WADSWORTH, Town Clerk.

Town Hall, Accrington. 580

## DERBYSHIRE EDUCATION COMMITTEE

### Chesterfield Technical College

(Principal: N. Harwood, B.Sc.(Hons.), A.M.I.Mech.E.)

APPLICATIONS are invited for appointment as Lecturer in Electrical Engineering, with Physics as subsidiary subject. It is desirable that candidates should hold a university degree or equivalent qualification, and have had experience in the electrical engineering industry.

Salary in accordance with the Burnham Technical Scale. The Authority pays additional increments for approved industrial experience.

Application forms and further particulars may be obtained from the undersigned (stamped addressed foolscap envelope required), to whom completed forms should be returned as soon as possible.

NORMAN F. C. THORN,
Clerk to the Governors.

Technical College,
Chesterfield. 669

## BRISTOL CORPORATION ELECTRICITY DEPT.

PROMOTIONS and expansion have caused vacancies for Engineers with qualifications admitting to A.M.I.E.E. or A.M.I.Mech.E. Start as Shift Engineers in substations with view promotion power stations and distribution departments. Ex-Servicemen working for these qualifications considered. Appointments commencing £365 per annum.

Vacancy for Engineer to supervise Wiring and Installation Section. Capable advising large consumers on motors, lighting, etc.; prepare specifications, estimates for electrical equipment of factories, schools, etc. Ex-Servicemen working for these qualifications considered. Salary £458/£477 per annum.

Application forms for these appointments from undersigned, submitted 5th January.

Dorset House, GENERAL MANAGER.
Clifton Down, Bristol, 8. 647

## THE CLYDE VALLEY ELECTRICAL POWER CO.

### Assistant Area Engineers

APPLICATIONS are invited for the posts of Assistant Area Engineers for operation, maintenance and construction of the company's distribution system, at a salary in accordance with the N.J.B. Salary Schedule.

(a) Grade 7, Class H, commencing salary £538 p.a.
(b) Grade 8, Class H, commencing salary £481 p.a.
(c) Grade 8a, Class H, commencing salary £455 p.a.

Applicants must have sound technical and practical training and experience of E.H.T. and L.T. distribution and transformer stations. Applicants should submit full details of practical experience and technical qualifications which should be not less than the standard for admission to the I.E.E. For positions (a) and (b) Corporate Membership of the I.E.E. will be an advantage. Successful candidates are eligible to become members of the company's superannuation scheme and must pass a satisfactory medical examination. They will require to reside within the section of the company's area to which they will be posted.

Applications, stating age, particulars of education, technical qualifications and experience, to be addressed to the company at 206, St. Vincent Street, Glasgow, C.2. Envelope to be marked "Assistant Area Engineer." 655

## COUNTY BOROUGH OF CROYDON ELECTRICITY DEPARTMENT

### Engineering Assistant

AN Engineering Assistant is required to assist the Chief Engineering Assistant during the construction of a new power station, at a salary on N.J.B. Schedule, Class H, Grade 8(2), £518 per annum.

Applicants must have a wide experience in the design, construction and layout of large modern power stations, and be capable of dealing with technical correspondence and directing the work of contractors on site; preferably they should be Corporate Members of either the Institution of Electrical Engineers or Institution of Mechanical Engineers.

The appointment will be subject to the Local Government Superannuation Act, 1937, to one month's notice, and to medical examination.

Applications, stating age, training and experience, and accompanied by copies of recent testimonials, should be received by the Chief Engineer and General Manager, Electricity Department, Electric House, Croydon, endorsed "Engineering Assistant," not later than noon on 1st January, 1948.

E. TABERNER, Town Clerk.

December, 1947. 623

## LONG EATON U.D.C. ELECTRICITY DEPARTMENT

APPLICATIONS are invited for the position of Substation Attendant in the main station of the above undertaking. Candidates must have a thorough experience with remote controlled high tension switchgear, also D.C. boards, together with rectifying and rotary converting plant, transformers with on-load tap changers and batteries.

Rate of pay in accordance with the National Joint Industrial Council, being £6 10s. 2d. for a 44-hour week.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, stating age, married or single, training and experience, must be sent to the undersigned not later than Wednesday, 7th January, 1948. Applicants are required to disclose whether they are related to any member of the Council or their chief officials. Canvassing will be deemed to be a disqualification.

J. B. FELTHAM, M.Inst.E.E.,
Engineer and Manager.

Electra House,
Market Place, Long Eaton, Notts.
17th December, 1947. 670

## HERIOT-WATT COLLEGE, EDINBURGH

### Electrical Engineering Department

APPLICATIONS are invited from British subjects under 40 years of age for appointment as Lecturer in Electrical Engineering. Technical qualifications, including an Honours Degree, and recent practical experience, preferably in heavy electrical engineering, are essential. Salary scale £450-£15-£685, with placing according to qualifications and experience. Further particulars and application form, which must be submitted on or before 31st January, 1948, may be obtained from the College.

J. C. SMAIL, Principal.

621

## BOROUGH OF RADCLIFFE ELECTRICITY DEPT.

### Appointment of Meter Repairer

APPLICATIONS are invited for the position of Meter Repairer. Applicants should be skilled in the repair of all types of direct current and alternating current consumers' meters. Wages and conditions will be in accordance with the agreement of the National Joint Industrial Council for the Electricity Supply Industry, No. 3 Area, at present 2s. 8d. per hour, 44-hour week.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination. Canvassing will disqualify, and candidates must disclose in their applications any relationship to any member or officer of the Council.

Applications, stating age, qualifications and experience, together with copies of not more than three recent testimonials, must reach the undersigned, endorsed "Meter Repairer," not later than Wednesday, 31st December, 1947. This advertisement is published by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947.

H. A. FOX,
Town Hall, Radcliffe, Lancs. Town Clerk.
13th December, 1947. 578

## ROYAL BOROUGH OF KINGSTON-UPON-THAMES ELECTRICITY DEPARTMENT

APPLICATIONS are invited for the following appointment in the Class F Electricity Undertaking of the Corporation: Shift Charge Engineer (Temporary), N.J.B., Grade 8. Commencing salary £464 2s. p.a.

It is requested particularly that only suitably qualified persons with adequate experience should apply. The A.M.I.E.E. examination or recognised exempting qualification will be a recommendation. Conditions of service will be those of the National Joint Board of Employers and Members of Staff for the Electricity Supply Industry (London Area).

Appointment will be subject to the Local Government Superannuation Act, 1937, and selected candidate will be required to pass a medical examination.

Application forms may be obtained from the Borough Electrical Engineer, 17, High Street, Kingston-upon-Thames, and should be returned, together with copies of three recent testimonials, to reach the Borough Electrical Engineer not later than Saturday, 10th January, 1948. Canvassing will disqualify.

A. W. FORSDIKE,
Guildhall, Town Clerk.
Kingston-upon-Thames. 649

## GOVERNMENT OF BIHAR, INDIA

APPLICATIONS are invited for the appointment of Chief Electrical Engineer, Government of Bihar. Candidates should be graduates in electrical engineering or members of the Institution of Electrical Engineers, have 25 years' experience of electric works, including construction, operation and maintenance (particularly large-scale H.T. transmission), be familiar with British or Indian Electricity Acts, and possess administrative ability.

Contract for five years. Pay Rs. 2,500, rising annually by Rs. 125 to Rs. 3,000 a month (£2,250—£2,700 p.a. approx.), plus overseas pay up to £30 a month. Higher initial pay might be considered. Free passage to and from India for appointee and wife. Provident fund.

Further particulars and forms of application on request by postcard, quoting No. 376, from the High Commissioner for India, General Dept., India House, Aldwych, London, W.C.2. Last date for receipt of completed applications, 17th January, 1948. 620

## SURREY COUNTY COUNCIL

### Netherne Hospital, Coulsdon, Surrey

ENGINEER required to maintain mechanical and electrical plant and supervise engineering staff at the above hospital. Age not over 45 years. Preference will be given to candidates with hospital experience. Applicants should possess a degree in engineering of a British university or the Graduateship, Associateship or Associate Membership of the Institution of Civil, Electrical or Mechanical Engineers. Salary on the Council's Grade VII, scale £575 × £25 — £650 per annum, plus bonus £59 16s. per annum. A house on the estate is provided at a rent of 8s. 9d. per week. The appointment is subject to the provisions of the Asylum Officers' Superannuation Act, 1909, and to a satisfactory medical examination. Form of application can be obtained from the Clerk and Steward, and must be completed and returned by the 17th January, 1948. 651

AN interesting position is offered by a North-West firm of precision engineers for their Electrical Research Department. The person required must have experience in electronic recording equipment; must be capable of dealing with the application to mechanical problems, involving use of strain gauges and capacity and inductive pick-ups. Experience of D.C. amplifiers an advantage.—Box 672.

ARMATURE Winder, suitable for first-class repair shop, A.C. and D.C. State age and experience. Apply—Wm. Broady & Son Ltd., English Street, Hull. By permission of M.O.L. and National Service under the Control of Engagement Order, 1947. 421

ARMATURE Winders. Steady job, good conditions.—Service Electric Co. Ltd., Water Road, Alperton, Wembley, Middx. Perivale 7251. 157

ASSISTANT Electrical Engineer for installation of light alloy strip mill. Age 26-35; must have rolling mill experience. Apply to General Engineering Department, Northern Aluminium Co. Ltd., Rogerstone, Nr. Newport, Mon., marking your envelope "Confidential." State age, qualifications and experience. 543

ASSISTANT Manager works Birmingham district, manufacturing special type electric motors, 1 h.p. to 100 h.p. Should be between 35 and 45 and have held responsible post of similar nature, preferably with one of the large electrical manufacturing concerns. A good salary will be paid to a keen man well versed in modern production methods. State fully training and experience to —Box 674.

ASSOCIATION Secretary. The Electrical Contractors' Association of Scotland invites applications for the position of whole-time General Secretary of the Association. The Association's offices are located in Edinburgh and the successful applicant will be required to undertake the management of the entire affairs of the Association. Applicants should have administrative and commercial ability, and experience of the work of an employers' association, while not essential, will be considered an advantage. The salary offered will be on the scale of £750 to £1,250, and the successful applicant will receive a placing on the scale in accordance with his qualifications and experience. Applications, accompanied by the names of three persons to whom reference may be made, and clearly marked "Application for Secretary," should be addressed to the President, the Electrical Contractors' Association for Scotland, 55, Frederick St., Edinburgh, 2, to reach him within seven days of the appearance of this advertisement. 657

BUYER for switchgear manufacturing company in the North-West. Excellent opportunity for youthful applicant having previous experience of the purchase of electrical equipment. Reply, stating age, experience and salary required, to—Box 659.

DESIGNER of A.C. motors required by established manufacturers. Must be capable of undertaking electrical designs of single-phase, 1 to 24 h.p.; 3-phase, 1 to 200 h.p., and alternators up to 75 kVA. Knowledge of D.C. design advantageous. State age, qualifications, experience and salary expected.—Box 558

DRAUGHTSMAN (young), by consulting engineers (London West End) for cable diagrams, switchgear work, etc. Previous electrical experience useful but not essential. Permanency, pensionable. Reply, with full particulars, to—Box D.305, c/o Streets, 110, Old Broad Street, E.C.2. 505

ELECTRICAL Engineer Salesman, by firm in West Bromwich, to act as assistant to technical director. Applicants should be in the region of 24/34 years of age, and should be familiar with all heavy industrial electrical installations and equipment, and have had a sound technical training and possess a motor car driving licence. Salary £350/£400 per annum according to age and experience.—Box 556.

ELECTRICAL wholesalers require Assistant with good knowledge of all equipment, for stores and clerical work.—London Electrical Co. Limited, 92, Blackfriars Road, London, S.E.1. 41

ESTIMATOR Draughtsman with some experience in switchboard work. (London district). Reply, with full particulars of experience, age, salary required, etc.—Box 483.

EXECUTIVE Engineer required as Chief of Production Development Department by large manufacturing concern engaged in the light electrical engineering field. Suitable applicants must have comprehensive knowledge of production methods and must have experience covering tooling, estimating, time study and mass production layout. State full details, including salary required, to—Box 671.

FOREMAN Armature Winder for C. Horne & Co. Ltd., Dock Street, Middlesbrough. Must be experienced in all classes of A.C. and D.C. rewinds. Permanent progressive position. Applications, stating age, experience and salary required, to be forwarded to—The Manager, Ministry of Labour and National Service, Employment Exchange, 36, Grange Road, Middlesbrough. 7034

EXPERIENCED Transformer Draughtsmen required for all sizes of transformers and associated equipment for employment in office in Central London of large heavy electrical plant manufacturing company. Security and prospects for suitable men.—Box 445.

FOREMAN for East London factory, to take charge assembly and testing fluorescent fittings. Able to train and control male and female staff. Good remuneration and prospects for right man.—Box 569.

FOREMAN Electrician required, commencing New Year for Newcastle-on-Tyne area. Experienced large power and lighting installations, must be good disciplinarian. Excellent prospects and terms to suitable man. Write in first instance to—Box 7077.

MALAYA. Applications are invited for the following positions with an electricity supply company in Malaya: Assistant Engineers (Generation); applicants should have sound technical training and experience in operation of medium-pressure boiler and turbine plant. Assistant Engineers (Distribution); applicants should have sound technical training and preferably some experience of high-voltage transmission and distribution. Remuneration for both positions according to qualifications. Free passage, quarters and medical attention provided.—Box 658.

MAN for position of Progress Clerk in factory in London area producing small wires and cables. Must have some technical knowledge and be capable of dealing tactfully with works and customers. Write details, experience and age and salary required.—Box 7079.

MAN required to take charge of Sales Office. Must have experience of sales correspondence and internal sales organisation, also knowledge of radio. State experience, salary received and salary now required, married or single, and when free. N. London area.—Box 636.

MATTHEW Hall & Co. Ltd. require young man with some knowledge of electrical materials as Assistant to Chief Buyer. Excellent prospects for an ambitious young man. Write in full detail to—General Manager, 26, Dorset Square, N.W.1. 651

PLUMBER-Jointer (High Tension). Applications are invited for situation of High Tension Plumber-Jointer from persons who are fully experienced in all classes of 11-kV and L.T. cable jointing. Attic flat available to rent in Perth. Wages and conditions in accordance with J.I.C. Schedule, No. 13 District, Zone B, Scotland. Present rate 31.25d. per hour. Applications should be submitted not later than 28th December, 1947, to—The Area Manager, The Grampian Electricity Supply Co., Blackfriars, Perth. 634

PUBLICITY department of large electrical engineering firm requires Assistant to take charge of publication of sales promotion literature. Work comprises subediting of material and direction of presentation and printing. Essential qualifications: Good education and personality, B.Sc. (Electrical Engineering), age 27 to 45; leadership and administrative ability; originality and good artistic appreciation; knowledge of type and of reproduction processes; previous experience of similar duties. Write, giving full particulars of experience, and state salary required, to—Box N.5380, A.K. Advg., 212a, Shaftesbury Avenue, W.C.2. 650

REPRESENTATIVE required, well educated, tall, good approach, experienced contact with principals, 30 to 45, London area, own car, salary expenses commission basis, electrical equipment, interview London.—Box 599.

REPRESENTATIVES. Old-established electrical wholesalers (London) require Representatives for following areas: S.E. London and Kent; East London and Essex; Herts. and Bucks. Large stocks carried; good commission paid. Car owners essential. State previous experience in confidence to—Box 624.

SENIOR Draughtsman with experience in motor control gear required by manufacturing firm in N.W. area. Final settlement of this situation must be made through the Ministry of Labour and National Service Officer. Apply, stating education, experience and salary required, to—Box 536.

SEVERAL Electricians required for country work in agricultural buildings. Must be experienced in all classes of wiring installations for lighting and power. Rates as agreed between the N.F.E.A. and E.T.U., Grade B area. Apply—Drake & Gorham Ltd., 9, Merchant's Place, Reading, Berks. (By permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947.) 637

SWITCHGEAR Contract Draughtsmen for layout and detailing of indoor and outdoor E.H.T. switchgear, Manchester district. Reply with full details of experience and training.—Box 687.

THE Homeshade Co. Ltd., 99, Baker St., W.1. requires Six Representatives in the U.K. to sell lampshades, floor standards and lighting fittings, etc., to stores, shops and electricity undertakings. Only those with proved selling ability and live connections in this field need apply. 682

TECHNICAL Sales Engineer for well-known engineering firm with offices at Bombay and Calcutta. To prepare estimates of electrification schemes of all types of industrial power drives, generators, motors and ancillary gear. The appointment carries the responsibility of the entire contract work, including supervision, starting up of the scheme and acting in an advisory capacity to clients. Applicants should be between 25 and 32 and hold a B.Sc. (Eng.) or equivalent, followed by workshop training or apprenticeship, with at least two years' subsequent experience in a responsible post. Similar position of responsibility in Forces (R.E.M.E.) would be considered equivalent provided the experience is the type required. The successful candidate will be paid £400 per annum during short period of training in England. In India the salary will be £840 per annum to commence, with annual increments. Write, quoting D.287/47-0A, to Ministry of Labour and National Service, Technical and Scientific Register, Room 669, York House, Kingsway, London, W.C.2, for application form, which must be returned completed by 31st January, 1948. 683

TELEPHONE Cable Plumber-Jointer for Hong Kong. Experienced, single man, under 30 years preferred. For full particulars of engagement and form of application apply to the Secretary, 11, Money Hill Parade, Uxbridge Road, Rickmansworth, Herts. (By permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947.) 626

THE Renold and Coventry Chain Co. Ltd. require at Renold Works, Didsbury, Manchester: (1) Engineer to deal with problems of mechanical power transmission. Candidates, who should be about 35 years of age, must have good general education, with university degree (or equivalent) in engineering; practical experience in the mechanical or electro-mechanical field essential; salary £695-£750, depending on qualifications. (2) Senior Engineer to supervise the activities of technical personnel, and to deal independently with theoretical and practical problems concerning mechanical power transmission; candidates, who should be about 35 to 40 years of age, must have good general education, with university degree (or equivalent) in engineering; wide practical experience in mechanical engineering essential; experience in mechanical power transmission an advantage; salary £740-£825, depending on qualifications. Both posts include participation in company's pension and profit-sharing schemes, and the company is prepared to discuss the housing problem with selected candidates. Applications, which must be in writing, stating date of birth and full details of qualifications and experience, should be addressed to the Employment Manager, Renold Works, Didsbury, Manchester, and should state for which vacancy the application is to be considered. 633

THIS advertisement is published by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947. The English Electric Company's heavy electrical plant commitments urgently need the services of additional Senior and Junior Draughtsmen for design and detail work. Knowledge of appropriate class of equipment advantageous, but a good electrical or mechanical drawing office experience is the essential requirement. Vacancies exist in the following departments: Heavy Electrical Machine D.O., for sections covering water wheel, steam and diesel-driven alternators, rectifiers, rolling mill motors (Order Nos. 722 and 723); Transformer D.O., all sizes of transformers and associated equipment (Order No. 721) (also vacancies in London, Order No. Kings Cross 6740); Switchgear D.O., sections covering control boards, outdoor gear, cubicle and truck gear, wiring diagrams, circuit breaker development, instrument transformers (Order No. 720); Plant D.O., covering plant layout, electrical power, distribution, steam generation, factory water, gas and air services (Order No. 727). Good prospects and security for suitable men. Staff pensions scheme. Applications to—The Manager, Employment Exchange, 132, Newport Rd., Stafford. 444

THREE Machinists with high machining experience of milling, turning, grinding and fitting (only experienced men need apply). Also one Paint Sprayer, experienced in crackle finish process. Please state salary required to work in West Country.—Box 635.

TIME and Motion Study Engineer for works manufacturing small accurate instruments on mass production. State age, experience and salary required.—Box 673.

WANTED for engineering office dealing with contracts for automatic exchange equipment. Engineers with experience in similar work or in construction and/or maintenance of auto exchanges. Applicants should give full particulars of education and technical training, citing certificates obtained, with chronological outline of experience, and should state what salary they regard as commensurate therewith.—Ref. 231, Siemens Brothers & Co. Ltd., Woolwich, S.E.18. (Advertisement published by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947.) 625

WANTED for London office, young Engineer with some experience in design or construction of, and scheduling of materials for, overhead transmission lines, all voltages and types of construction. Write—Box 239, c/o Judds, 47, Gresham Street, E.C.2. 595

YOUNG Man for internal routine work in lighting fittings (industrial and commercial) department. Apply in writing, stating experience, age and salary required, to—F. A. Crosse, Veritys Ltd., Maxlume Department, Brettenham House, Lancaster Place, London, W.C.2. 503

### *APPOINTMENTS FILLED*

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

### *SITUATIONS WANTED*

B.Sc. (Eng.) Hons. Works Manager (35), 17 years' in industry, available for progressive post. Full administration, ability to secure max. output, mathematician. Would consider post at technical college. London or Surrey.—Box 7042.

CHIEF Draughtsman (36), general engineering, seeks change as such, or comparable position. Systems and works organisation thoroughly understood. Specialist in elec. & mech. instruments. Preferably Central London district.—Box 7086.

ELECTRICAL Engineer (Honours Graduate), with industrial and research experience, seeks position with firm in Yorkshire. Design or development work of any kind preferred.—Box 7020.

ELECTRICAL Engineer (39) requires change; 18 years' motor winding, repair and some production experience. Conscientious and good practical man.—Box 7017.

GRAD. I.E.E. (23), a good draughtsman, requires progressive position, preferably in London. Good technical education (H.N.C.); 7 yrs. in power station D.O. Prepared to accept a period of training at reduced salary in any situation in order to progress.—Box 7033.

### *AUCTION NOTICES*

G. R.

**BY ORDER OF THE MINISTER OF SUPPLY**

M.O.S. DEPOT No. 120, TEST HOUSES, GILLBROW, BARNOLDSWICK

DAVID WATERHOUSE & NEPHEWS have been instructed to sell by auction without reserve on Wednesday, Thursday and Friday, 14th, 15th and 16th January, 1948, at 10.30 a.m. prompt each day, the valuable

**INDUSTRIAL AND ELECTRICAL EQUIPMENT AND STORES**

including 11 Sciaky Spot Welding Units; Electric Motors, Generators, Starters, Transformers and Switches; Motor Alternator Sets; Electric, Pneumatic and other Travelling Hoists; Electric Grinders; Steam-heated Degreasing Plant; Electro-magnetic Steel Testing Equipment; Avery Weighing Machine; Heat Treatment Plant with Furnace, Tempering Bath, Set of Dipping Gear and Brook 3-h.p. Motor; Gas-heated Furnace; 140 12-volt D.C. Electric Fans; Voltage Control Boards; Pressure Gauges; Reels of Cotton- and Silk-covered Copper Wire; Rubber-covered Cable (300 coils); Screwdrivers, Spanners (all types), Pipe Cutters, Shears, Hammers, Mallets, Pliers, Oilstones, Brazing Lamps and numerous other small tools for all trades; 2 Industrial Vacuum Cleaners; Tufnol and other Insulating Materials; Wood and Steel Stools; 176 Fuel Filters; Patent Non-Slip Flooring, and a large quantity of Surplus General Stores.

On view Tuesday, Wednesday and Thursday, 6th, 7th and 8th January, 1948, from 10 a.m. to 4 p.m.

Catalogues (price 6d.) admit two persons to view and one only on sale days. Auctioneers' Offices: Britannia House, Bradford. Tel. Bradford 22622/3). 619

G. R.

**BY ORDER OF THE MINISTER OF SUPPLY**

Unreserved Auction Sale at
No. 14 MAINTENANCE UNIT, R.A.F., CARLISLE, on Wednesday, 7th January, 1948, at 10.30 a.m.

Useful Assortment of
**ELECTRICAL AND WIRELESS GOODS, TOOLS, CHEMICALS AND SUNDRIES**

including over One Million Electric Lamps, Half a Million Sheets of Emery Cloths, Cable, Ebonite, Asbestos, Steel Boxes, 2-ton Lifting Jacks, etc., as per catalogue.

Viewing Monday and Tuesday, 5th and 6th January, from 9 a.m. Catalogue, 6d., from the Joint Auctioneers: HARRISON & HETHERINGTON LTD. (Phones 1792/3; Telegrams, "Sales, Carlisle"); H. E. WINTER & SON (Phone 237), Carlisle. 616

G. R.

**BY ORDER OF THE MINISTER OF SUPPLY**

J. H. NORRIS & SON, F.A.I., are instructed to sell by auction without reserve on Tuesday, Wednesday, Thursday and Friday, 6th, 7th, 8th and 9th January, 1948, commencing at 10.30 a.m. promptly each day, at the NEW ISLINGTON PUBLIC HALL, UNION STREET, ANCOATS, MANCHESTER.

**MISCELLANEOUS PLANT, INDUSTRIAL AND ELECTRICAL EQUIPMENT, SURPLUS STORES**

and other effects, comprising briefly

2 20-therm Gas-producing Plants; Spare Parts for Bauch, Asquith, Gisholt and Maxicut Machines; Milling Cutters; Electric Motors (various h.p. and voltages); Cropping Machines; various Testing Rigs; Salt Bath Equipment; Rectifiers, Contactors and Control Panels, etc.; large quantity of various Transformers, Starters, etc.

Frity Werner Comparators, Refrigerator Boxes and Equipment, Degreasing Plant, Air Compressors, Motor-driven Oil and Water Pumps, miscellaneous Electric Plugs and Sockets; Paints, Dopes and various Jointing Compounds, Glues, etc.; Emery Powder, Glass Paper, etc.; Platform Ladders, Asbestos, Paxoline, Ebonite, Tufnol and Rubber Sheeting, Fibre Strip, Liquid Heat, Nos. 300 and 800.

2-ton and ½-ton Winches; Streamline Filters; large quantity of Metal-banded Tent Poles; approx. 550 Observer Type Parachutes with Harness; large quantity of various Linen and Silk Thread, Rubber Hosing, and miscellaneous rubber items; Lamp Fittings, various Budenberg Pressure Gauges, Fitters' Steel Benches, Aeroplane Wheels (various sizes) and Tyres; 400-gall. Storage Tanks, Collapsible Stretcher Trolleys.

Mopump Water Pumps, complete with Brook Motors; 7-ton Coles Crane and 1-ton Smith's Mobile Crane; Transformers, 150 kVA; 3-throw Ram Pumps with McLaren-Ricardo Diesel Engines; single-stage Centrifugal Water Pumps, complete with 28-h.p. Chrysler Industrial Petrol Engines and with large quantity of spares; Thresh Steam Disinfectors; Emergency Lighting Sets; Sirocco Ventilating Fans; Ingersoll Portable Air Compressor Spares; Axia Ships' Fans with 8½-h.p. Motors; large quantity of Hemp, Manilla and Sizal Rope up to 6".

Canteen Equipment, including Pans, Brushes, Ladles, Cutlery, Basins, Plates, Potato Mashers, Buckets, etc.; Blankets and Travelling Rugs; Bath Mats; large quantity of various Electric Cable covered in Rubber, Varnished and Braid; large quantity of various Hand Tools and Toolholders, Cutters, Chucks, etc.

The lots are situate at the following Depots:

M.O.S. Depot (No. 142), Byley, Nr. Middlewich.
M.O.S. Depot (No. 76), Old Siding, Scottfield Road, Ashton Road, Oldham.
M.O.S. Depot (No. 45), 36, Cannel Street, Ancoats, Manchester.
M.O.S. Depot (No. 898), Lowerhouse, Padiham, Nr. Burnley.
Messrs. A. V. Roe & Co. Ltd., Chadderton Factory, Greengate, Middleton.

View Days: 30th and 31st December, 1947; 1st, 2nd and 5th January, 1948, from 10-4 o'clock each day, on production of catalogue, price 6d. each.

Catalogues in preparation. Apply Auctioneers' Offices, 9, Albert Square, Manchester, 2 (Tel. BLA. 8373/8374). Note: One catalogue will admit two persons to view and and one person on sale days. 618

G. R.

**BY ORDER OF THE MINISTER OF SUPPLY**

M.O.S. STORAGE DEPOT, THORP ARCH, Nr. WETHERBY, YORKS, W.R.

Auction Sale without reserve of Government Surplus
**ELECTRICAL STORES AND EQUIPMENT**

including 105-h.p. Watford Starter, Electric Grinders, Drills and Screwdrivers, Panel Controls, Electric Light Bulbs, Accumulators, Wireless Equipment (including Amplifiers, Loudspeakers), Condensers, Transformers, Bulkhead Fittings, Switches, Portable Furnaces, Electric Shades (factory type), Miners' Lamps, Automobile Lubricating Equipment, Linoleum Dressing, Hoghair, Artists', etc., Brushes, and various miscellaneous items.

The above items can be viewed in bulk from Monday to Friday, 12th to 16th January inclusive, from 10 a.m. to 4 p.m., to catalogue holders.

Sale to be held Tuesday and Wednesday, 20th and 21st January, at 10.30 a.m. each day.

Catalogues of the sale (to admit two on view days and one only on sale days) may be had, price 6d., at the main entrance gate to the factory or from the Auctioneers' Offices, BARTLE & SON, Garforth, Leeds. 617

**G. R.**

265 M.U., R.A.F., GROVE, Nr. WANTAGE, BERKS.

Unreserved Sale of
**GOVERNMENT SURPLUS STORES**
comprising Radio & Electrical Components, Charging and Switchboards, Panel Controls, Rectifiers, Transformers, Voltage Regs., Filament Lamps, Torches and Batteries, an assortment of Lamps, Accumulators, Power Units, Pulsometer Fuel Pumps, Canvas Bags, Camera Tripods, Tubing, Cable, Fuse Wire, Receivers and Loudspeakers, Generators and Electric Motors by Brooks, Higgs, etc., Fractional and Starting Motors, Switches, Motor Generating Sets, Engine-driven Generators and Alternators, Nuts, Plugs, Coupling and Screws, etc., and about 2,000 Secondhand Cycles.

ADKIN BELCHER & BOWEN and HOBBS & CHAMBERS (acting in conjunction) will sell the above by auction on Wednesday, Thursday and Friday, 7th, 8th and 9th January, 1948, at 11.30 each day.

View days, 5th and 6th January, from 10 to 4.30. Catalogues, 6d. each, from the joint auctioneers at Wantage (and Abingdon) and Faringdon (and Cirencester, Glos). 654

***FOR SALE***

*Traders buying and selling hereunder must observe the Restriction of Resale Order, S. R. & O. 1942 No. 958.*

**CITY OF MANCHESTER**

THE Electricity Committee has the following secondhand material, lying at the Bennett Street Substation, for disposal:—

List A.—Direct Current Motors.

List B.—Miscellaneous Electrical Equipment, including D.C. Motor Generators, Rotary Converters, D.C. Starting Panels and Automatic Starters, Forge Blower Units, Electric Drills and Grinders, etc.

Particulars and form of tender may be obtained from Mr. R. A. S. Thwaites, Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2.

Tenders, addressed to the Chairman of the Electricity Committee, to be delivered not later than 10 a.m. on Wednesday, 7th January, 1948. The Committee does not bind itself to accept the highest or any tender.

PHILIP B. DINGLE,
Town Clerk.
Town Hall, Manchester, 2.
December, 1947. 615

A bargain: Brand new Coventry Climax/Crompton petrol-driven, complete self-contained Generating Plants, 3.5 kW, 230 v., 1-ph., 50 cycles, price £130. Also brand new similar Sets, with separate new switchboards and automatic voltage regulators, 9 kW, price £400. Full details —Max Electric Co. Ltd., 190, Thornton Road, Croydon. Phone, THO. 4276/8. 162

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A. Cooksley & Co. Ltd. offer large selection of used Electric Motors, D.C. Write—21/25, Tabernacle Street, London, E.C.2 (Monarch 3357/58). 46

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A large selection Bakelite Electrical Accessories available ex stock, attractive prices: Switches, Switch-fuses and other priority items. Non-priority items also available: Holders, Batten Holders, Plugs, Junction Boxes, etc. Export enquiries invited. Write—BCM/ELEC, London, W.C.1. 7092

A.C. Generating Sets, petrol, 3-phase, 50 periods, 400 volts and 230 volts; 50 periods, single-phase, 5 to 15 kVA; 40 sets available.—Midland Counties Elec. Eng. Co. Ltd., Grice Street, West Bromwich. 43

A.C. and D.C. House Service Meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one year. Repairs and recalibrations.—The Victa Electrical Co., 47, Battersea High Street, S.W.11. Tel. Battersea 0780. 138

A.C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22. Forest Hill 2278-9. 102

A.C. and D.C. Motors, Generators, from stock.—Service Electric Co. Ltd., Water Road, Alperton, Middx. Perivale 7251/2/3. 91

A.C. and D.C. Motors, over 300 in stock, ¼ h.p. to 20 h.p., at keen prices; 100/200-amp. double-pole Switch Fuses; 30-amp. double-pole Isolators; two and three-pole Distribution Boards.—Weldaneon Signs Ltd., 125, Water Lane, Leeds, 11. Tel. 21210. 7090

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D.C. to A.C. Motor Alternators, 110 v. D.C. input, 220 v., 50 cycles, single-phase A.C. output, 250 watts, ball bearings, £12 10s.; 1,000 watts, £20.—Johnson Engineering, 319, Kennington Rd., S.E.11. Reliance 1412/3. 99

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GENERATING Sets, 75 kVA, 400 volts, 3-phase, 50 cycles; G.M.C. Diesel Engines direct-coupled to English Electric Alternators. Complete control panel, electric start and all accessories. Guaranteed one year. £2,150, ex works.—Lesco, 10, Lovat Lane, London, E.C.3. MAN. 3838. 610

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ONE 93-h.p., 990-r.p.m., 400/3/50-cycles, "No-Lag," slipring Motors by B.T.H. with oil switchgear: three 40-h.p., 960-r.p.m., 400/3/50-cycles, ball bearing, slipring Motors only by L. D. & C.; two 50-h.p., 720-r.p.m. ditto Motors by English Electric.—Newman Industries Limited, Yate, Bristol. 590

OVER 100 Plating and Anodising Generators from 200 to 1,600 amps. D.C. or A.C. motors can be supplied for most sizes.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. Tel. B.S. 1000/1. 153

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PLATING Generator, ball bearings, enclosed ventilated, 10 volt, 1,600 amp., 1,000 r.p.m., with or without 220-v. D.C. driving motor and C.I. bedplate.—Max Electric, 190, Thornton Rd., Croydon. THO. 4276/7/8. 103

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ROTARY Converters in stock, all sizes; enquiries invited.—Universal Electrical, 221, City Road, London, E.C.1. 16

ROTARY Transformers, brand new, unused, ex-R.A.F., 24 v. in; 1,230 v. at 200 mA out. Easily converted to fractional h.p. mains motors. Weight approx. 18 lb., size 11½" long, 5½" diam. Hoovers type T.29, on feet. Offers (near scrap) invited. Several thousand in stock. Also various other elec. surplus.—Auto Collections Ltd., 15, Lawrence Street, Northampton. 429

SCREWS, cut thread at rolled thread prices: Brass, self colour, csk. head, 500 gross 6 B.A. × ¾"; 3,000 gross 6 B.A. × 5/16"; Brass, nickel plated, 250 gross 8 B.A. × ½", csk. head; 1,100 gross 8 B.A. × ¾", cheese; 200 gross 6 B.A. × ¾", csk.; 2,900 gross 6 B.A. × 5/16", csk.; 450 gross 6 B.A. × 21/32", csk.—D. C. Woodberry, Engineering Supplies, Treforest Trading Estate, Glam. 7032

SECONDHAND Time Switches, in perfect condition, fully guaranteed. Installed if required. Inquiries invited.—J. W. & R. E. Hughes (Clockwork Engineers), 58, Victoria St., London, S.W.1. Tel. VIC. 0134. 128

S.H.E.F.I. Moving Coil Pick-up is now available for both Home Trade and Export. It combines for the first time high fidelity with high output voltage, enabling it to directly replace normal moving iron pick-ups without any extra amplification. It has an exceptionally clean response with no undesirable resonances, thereby reducing needle scratch. In walnut and black plastic finish, 40s. each retail, including Transformer, plus 10s. 4d. purchase tax; in ivory finish, 43s. 8d., plus 11s. 7d. purchase tax. Wholesale and retail inquiries invited. Illustration sent on request.—Brooks & Bohm Ltd., 90, Victoria Street, London, S.W.1. 105

SLIDERAILS for electric motors, all sizes. Trade supplied.—W. H. Sugden & Co. Ltd., Glenny Road, Barking. 4903

SECTIONAL Buildings. Ex-Government Huts, all having been completely reconditioned, 18 feet wide and from 30 to 90 feet long, pitched roofs. Plans available for conversion to bungalows if required.—William R. Selwood, Chandler's Ford, Hants. Tel. 2275. 640

SMALL Gas Engine Plant, approx. 8-10 b.h.p., entirely self-contained with external flywheels and shafting, suitable for direct generation.—317, Regent's Park Road, N.3. Finchley 5143. 130

SPIRAL Elements, Firebars, Boiling Ring Elements, Pencil Elements for manufacturers and wholesalers. Enquiries to—S. I. Engel, 485/7, Harrow Road, London, W.10. 355

SPIRAL Elements for electric fires, boiling rings and other appliances, supplied to order.—Electrothermal Engineering Ltd., 270, Neville Road, London, E.7. 54

STAFF Time Checking and Job Costing Time Recorders (all makes) for quick cash sale. Exceptional condition. Write—Box 528, Smiths, 100, Fleet Street, London, E.C.4. 31

STANDARD Fuses, 15 amps., vit. porcelain body, arranged for front wiring and back busbar connection, or fuse assemblies as required for incorporation into fuse boards. Also Distribution Boards, 15 amps., 3, 4, 5 and 6-way, double-pole clad type, in aluminium die-cast housing, with knock-out entries either side for ¾ conduit. Supplies from stock, or good deliveries for larger quantities. For full details apply—Renas Engineering Co. Ltd., 107, Albert Road, S.E.25. Addiscombe 6055/6/7. 148

SUMMER or winter it's Winter for all types of Fluorescent Fittings. We carry a complete range of 3', 4' and 5' fittings and spares in stock. Your enquiries are invited. —Winter Trading Co. Ltd., 6, Harrow Road, Paddington, London, W.2. Tel. Paddington 3271. 107

SUPERIOR Type Builders' Ladders now in production; also Steps, Trestles and Extension Ladders. Phone—Shaftesbury Ladders Ltd., 453, Katherine Road, E.7. Grangewood 3363/4. 15

SUPPLEMENTARY to requirements: One 100-kW, 500-volt, compound wound Mawdsley D.C. Generator; also one 100-kW, 250-volt, compound wound Mawdsley D.C. Generator. Each offered subject to remaining unsold.—Holden Automotive & Marine Co. Ltd. (Naval Architects, Marine & Electrical Engineers), 317, Regent's Park Road, N.3. Finchley 5143/1087. 90

SWITCHPLUGS, Bakelite, 15 amp., 3-pin. We are now accepting orders for delivery December/January; large quantities available. Price on application. All other types of accessories held in stock. Write for our 1948 price list.—Direct Electric Lamp Co. Ltd., 81, City Road, London, E.C.1. CLE. 5546/7. 164

THREE 35-kVA, 750-r.p.m., 400/230-volts, 3-phase, 50-cycles, 4-wire Alternators, with exciters, for despatch in 4 weeks.—Newman Industries Limited, Yate, Bristol. 589

TO shippers, wholesalers, manufacturers and contractors. Large quantities of ex-Government Wireless, Electrical and other goods, comprising Block and Tubular Condensers, various capacities; Potentiometers; Headphones; Test Voltmeters; Receivers, etc.; Insulating Sheeting, and various other types of ex-Government equipment and material. Sold in quantities only, at prices to suit purchasers. Goods can be inspected at 4, Conduit Court, Long Acre, W.C.2.—West Central Merchandise Mart. Phone, Temple Bar 0233/4; Grams, "Loudsigs, Rand, London." 539

TRANSFORMERS: Two pairs Scott connected, 80-kVA, 2 to 3-phase, 200 to 400 volts.—Harold W. Worboys (Sales) Ltd., Eastern Works, By-Pass Road, Barking, Essex. Phone, Rippleway 1173. 7062

TUCKER C.G. and Batten S.C.B.C. Brass Lampholders; T.P. and D.P. 15-amp. I.C. Change-over Switches, G.E.C.; D.C. 3-h.p., 110 and 220-v. G.E.C. Starters; A.C. 3-h.p., push button, 3-phase, 400-v. G.E.C. Starters; 3 only, 3-h.p., 3-phase, 400-volt, 1,425-r.p.m. Motors; Glasgow Box 100-amp. D.P. I.C. Switch Fuses; Cantic D.P. H.R.C. 160-amp. Switch Fuses, No. W.B.A. All new London stock.—Ryness Electrical Co. Ltd., 178, Stamford Hill, London, N.16. STA. 7906. 7048

TWO Diesel Generating Plants, brand new, 30 kVA, 3-phase, top grade British make, electric start, radiator cooled, complete with switchboard and maker's guarantee. £1,790 each.—Alliance Electrical Co. Ltd., 2, Henrietta Street, W.C.2. 614

TWO 20-kVA Diesel Generating Sets, for delivery two weeks; two 100-kVA, 3-bearing type Alternators, Exciters and Switchboards, for delivery February, 1948. —The Horseshoe Supply Co. (Spalding) Ltd., Horseshoe Road, Spalding. Phone 2535. 48

UNUSED Ford Petrol-driven Generating Sets for plating and battery charging, 400/800 amps., 15/7½ volts.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 155

UNUSED Plating or Battery Charging Generators, 200/400 amps. at 15/7½ v., direct coupled to new A.C. 440/3/50 motors.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 154

UNUSED Portable Petrol-driven Welding Sets, by Meadows, with switchboards and resistances. Suitable for electrodes sizes 6 to 14.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. Tel. B.S. 1000/1. 151

UP to 1 ton D.C.C. Copper Wire, .3 × .3, "Lewcos."—Max Electric Co. Ltd., 190, Thornton Road, Croydon. 514

USED Double Flanged Wooden Bobbins, 1,500 gross, approx. measurements 3¾" overall, 3" traverse, 2¾" diameter flange, suitable wire winding. Will sell all or part.—Box 103.

VACUUM Cleaner Spares and Accessories, Belts, Brushes, Bearings, Fans, Dustbags, etc., etc. Largest stock of spares in country. Repairs, rewinds, etc.—Reliance Vac. Spares Ltd., 152-154, Broadway, Bexley Heath. 62

VARNISH Impregnator by the General Engineering Co., Radcliffe, capacity 2' diam. by 4' long, arranged for steam heating. Complete with compressor and varnish tank but without boiler or drive motor.—Box 684.

VARNISHED Silk Tape, 1.13/16" × 6 mil, 30s. per gr. yds.; ¾" Empire Tape, 8s. per gr. yds.; 40 lbs. 46 s.w.g. Double Silk Cov. Wire, 35s. per lb.; 5 cwts. Flexible Mica Sheet, 6s. per lb. the lot; 600 5-amp. Slydlok Fuses and Bases, 2s. each; 200 15-amp. ditto, 2s. 6d. each; Ironclad ¾" entry Stop Button Controls, 4s. 6d. each. Also large quantity of Ross Courtney Terminals.—Garston Manufacturing Co., 12, Victoria Road, Liverpool, 17. 7076

WEE Megger Testers, 500 v., in case, £13 16s. 3d.; Record 500-v. Test Set, £12 7s. 6d., C.O.D. (new). —Robins, 222 West End Lane, N.W.6. HAM. 0879. 82

WHY worry about power cuts? Four-cylinder, 2.75-kVA, 8-h.p. Coventry Climax Petrol Generating Sets, 3-phase, A.C., variable voltage control. Ideal for small factories, power plants and counter shaft driving. Price as new, ex works, £35. Immediate delivery. Prices adjusted for quantities.—Phone, Maryland 4610. 7088

WOODEN Handles for Irons, Kettles, 4½" × ¾" strap. Cheap, quick sale.—Box 642.

WROUGHT Iron Electrical Fittings. We are instructed to dispose of a large quantity of genuine Dutch fittings of all types. A keen price will be accepted for the lot. Enquiries to—Managing Director, Star Furnishing Co. Ltd., 165-175, Stoke Newington Road, London, N.16. 501

1 Motor Generator Set comprising 500-h.p., 550-v., 3-ph., 50-cycle synchronous motor, 750 r.p.m., fitted with exciter, 500-h.p., 220-v. compound D.C. generator, fitted on common bedplate and complete with Korndorfer starter and D.C. control gear; 1 Mobile Mercury Arc Rectifier Equipment, 500/550 v. D.C., input 6,600 v., 3-phase, 50 cycles; 1 500-h.p., 750-r.p.m. E.T.H. Co. Synchronous Motor, 550 v., 3-phase, 50 cycles.—Box 643.

6, 8 and 12-volt Plating Generators, complete with motors; also 230-volt Generator, Geisler Balance Machines, Edgwick Mechanical Handles, and Asquith Carbide Cutting-off Machine. View on site Glasgow.—Box 627.

9-kVA new Switchboards, 230 v., 1-phase, with instruments, switches and regulators; also Isenthal Automatic Voltage Regulators.—Midland Counties Electrical Eng. Co. Ltd., Grice Street, West Bromwich. 169

9-kVA, 230-v. single-phase Coventry Climax Petrol Generating Sets, self-contained, with complete panels and switchgear. Ideal for lighting factories, out-buildings. Also in these units are transformer and rectifier for charging batteries. Complete with racks and benches. Whole unit mounted on brand new Crossley lorries ready to drive away. £785.—Phone, Maryland 4040. 7087

12 Synchronous Geared Motor Units developing 5 lb. ins. torque at 30 r.p.m., 230 v., 50 c., single-phase. Complete with condensers.—Box 629.

15-amp., 3-pin Switched Sockets. Robustly constructed of cast aluminium, box measuring approx. 4¾" × 3¾" × 2½" with florentine bronze finish face plate, box finished cream with 4 knock-outs for ¾" conduits. Special terms to exporters.—Scemco Ltd., 6 & 7, Soho Street, London, W.1. GER. 1461-2-3. 106

15 × 13 Switchplugs; all sizes Switchplugs, Sockets, Plugtops, Multiplugs, Switches, Lampholders, Battenholders, Junction Boxes, Ceiling Roses, Adaptors, Connectors, Elements, etc. Immediate delivery.—Douglas Turner Ltd., 13a, Edge Street, London, W.8. 644

20-h.p., 720-r.p.m. Brook Slipring Motors, 200 or 400 v., 3-phase, 50 cycles, with control gear.—Box 7091.

22.5-kVA, 400/3/50, 4-wire Petrol Alternator Sets, complete with switchboard and all accessories, as new, on trailer, price £675 each net, ex our works; also large stocks of other Sets, Switchfuses, Change-over Switches, Instruments, etc.—Hampson Industries Ltd., Union Street, West Bromwich. 680

47-h.p., 400-v., 3-phase, 50-cycle, 725-r.p.m., slipring, ball-bearing L.D.C. Motor, with Allen West Ironclad control panel, guaranteed perfect.—Max Electric Co. Ltd., 190, Thornton Road, Croydon. 513

50-h.p. Harland S. Cage Motor, 400/3/50, b. brgs., 485 r.p.m., with auto transformer starter, £250.—Electric Machinery Co. Ltd., Union Works, Ancoats, Manchester. 452

75-kVA English Electric Alternators, 4-wire, 3-phase, 400/230 v., directly coupled to G.M.C. 6-cyl., 2-cycle diesel engine, radiator cooled, complete with electric starting gear, fuel tanks, instrument panel, mounted on common bedplate, at £2,150 each ex works; 12 available. Trade enquiries invited.—Houchin Ltd., Garford Street, E.14. Telephone, East 3708 & 3817. 030

230 to 110-volt Transformers, 10, 6 and 2.5 kVA; Rectifier Units, 230 volt input, 15 volt, 5 amps. output; M.E.M. 2-pole, 100 and 200-amp. Switch Fuses.—C. Leatherbarrow Ltd., Grand Bdgs., W.C.2. Whitehall 3948 or Liverpool, Central 7251. 593

250-kW Rotary Converters (2), with transformers and switchgear, input 6,600 volts, 3-phase, 50 cycles, output 420/210 volts; also A.C. and D.C. Motors, Switchgear, Generating Sets, Welders, etc.—Midland Counties Electrical Engineering Co. Ltd., Grice Street, Spon Lane, West Bromwich. 36

250-kW Steam Generating Set, 220 v. D.C.; 400-kW Steam Generating Set, 440 v. D.C.; 34-kW Steam Generating Set, 220 v. D.C.; 20,000 gallons C.I. and Steel Sectional Tanks; 2 2½-kW, 130-v. Petrol Generating Sets.—Harry H. Gardam & Co. Ltd., Staines. 60

1,800 12-v. Heater Elements in copper case, suitable for motor car de-mister, at 6d. each; and similar quantity of Thermostats, 12/24 v., designed to switch on at freezing point to 45 degrees F., also at 6d. each.—Wade, Smith & Co. Ltd., Star Street, Bradmore, Wolverhampton. 526

2,000 Unused Heavy Duty Panel Mounting Sliding Resistances, offered at less than ¼ today's price in three sizes only:— size 1, max. current 5 amps., max. ohms 70, max. dissipation 1.75 kW, price ex works £2; size 2, max. current 10 amps., max. ohms 12, max. dissipation 1.2 kW, price ex works £1 15s.; size 3, max. current 20 amps., max. ohms 5.4, max. dissipation 2.16 kW, price ex works £1 12s.—P. W. & Co. Ltd., Davenset Electrical Works, Leicester. 588

## ARTICLES WANTED

A.C. Motors, all h.p., urgently wanted. Burnt-out machines acceptable.—Max Electric Co. Ltd., 190, Thornton Road, Croydon. 12

ACCUMULATOR Plates (old) and lead Peroxide; as actual smelters we pay top price. Also old storage batteries, transformers and whole installations purchased.—Elton, Levy & Co. Ltd., 1/4, St. Ermin's (West Side), Caxton Street, S.W.1. Whitehall 9021/2/3. 39

BUSBARS, English Elec. Co., 3-phase and neutral, 9/16" copper rod, 12 ft. lengths, completely cased in. Any quantity, any condition; also Switchgear. Spot cash.—Box 146.

DRUM Controllers and Resistances for 7-h.p. and 15-h.p., 3-phase, 400-v. slipring motors.—Box 677.

ENAMELLED Copper Wire 37 and 38 s.w.g., wanted by manufacturer (not for resale).—The Solenoid Regulator Co., 268, Moseley Road, Birmingham, 12. 7081

ENAMELLED Copper Wire, 38, 39, 40, 41 and 42 s.w.g. Any quantity purchased. Particulars to—Signcrafts Ltd., Cobourg Wharf, Cobourg Road, S.E.5 (RODney 4433, Ext. 7). 133

ENAMELLED Copper Wires, all gauges. Offers to—Box 679.

HOFFMANN Roller Bearings, one MT.18 and one MT.15.—Box 667.

ONE Motor Generator, input 415 v., 3-phase, 50 cycles, output 90 kW, 250/500 v. D.C., 3-wire.—317, Regent's Park Road, N.3. Finchley 5143. 19

ONE secondhand 300/400-h.p. Motor, 440 v., 3-phase, 50 cycles, 450/500 r.p.m., complete with starting gear. Full details, condition and price (f.o.b.) to—Box 661.

ONE 45-h.p., 220-volt D.C., ball bearing Motor and Starter; 750 r.p.m. essential for direct coupling. Box 591.

TRANSFORMER Steel, Sheets, Offcuts and Laminations, any quantity purchased. Particulars to—Signcrafts Ltd., Cobourg Wharf, Cobourg Road, E.E.5 (Phone, Rodney 4433, Ext. 7). 134

TRANSFORMER, 150 kVA or over, 33,000/380/220 v.—Box 676.

VARIABLE Speed Motors, 400/50/3 (for own use only, not for resale).—Box 37.

WANTED, D.C. and A.C. ball-bearing Motors. Full details to—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 29

WANTED for export: Alternators, Generators, Electrical Motors, Lamps, Cables, Wires, Household Apparatus, Accessories and Components, etc., etc. Send illustrated literature, prices and quotations, f.o.b. U.K. port, to—World Atlas Trading Co., T/Address, 46, Hurst Road, East Molesey, Surrey. 4985

WANTED for export: 230-v., 50-cycle, ¼ to ½-h.p., split-phase Electric Motors, approximate speed 1,400 r.p.m.—James Begg, 266 Holloway Rd., London, N.7. 641

WANTED for prompt cash, Ferrous and Non-Ferrous Scrap; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady Street, Bethnal Green, E.1. 142

WANTED, Rotary Converters, any size.—Universal, 221, City Road, London, E.C.1. 22

2 new Fan Motors, 12½ h.p., 400/440 v. A.C., 3-phase, 50 cycles, approx. 3,000 r.p.m., squirrel cage, totally enclosed, heavy industrial type.—Howarth & Walter Ltd., Handel Street Foundry, Bradford, Yorks. 509

## WORK WANTED AND OFFERED

ARMATURE, Rotor and Stator Rewinds and Repairs, fractional to 100 h.p. Prompt deliveries.—T. A. Boxall & Co., Horley, Surrey. Phone 654. 652

ARMATURES. Vac., Gramo. and Dryer Armatures rewound and returned in seven days. Special terms for quantities.—Streatham Transformer Co. Ltd., 68, Streatham High Road, S.W.16. Streatham 7626. 118

BAKELITE Moulding Capacity available to clients supplying own powder and moulds. Immediate deliveries, new machines, compression only up to 50 tons. No injection mouldings as yet.—Box 500.

CAPACITY available for Light Assembly, London area. Some machining.—Box 79.

CAPACITY available for Shot Blasting, Metal Spraying and Paint Spraying. Prompt and efficient treatment. Let us have your enquiries.—Surfacings Dept., Staffa Works, Staffa Road, Leyton, E.10. 112

CAPACITY available for winding armatures and fields, under 1/10 h.p.—V. L. Martin, 34-36, High St., Southall, Middx. SOU. 1734. 7075

CAPSTAN capacity immediately available, 6B.A.-1¼", steel or brass. Large stocks of both materials. Also light milling and small assembly.—Sacron Ltd., 1a, Bamborough Gardens, London, W.12. 6700

CASTINGS. Fisher Foundries Ltd., Great, Birmingham, have capacity for Brass, Gunmetal and Soft Grey Iron Precision Castings in large quantities, suitable for plate and machine moulding. Weight 1-50 lb. Delivery by road. 181

CERAMIC Heating Elements, wired to standard wattage and voltage, or unwired. In all sizes, at reasonable prices. Special discount for wholesale traders.—Flare Co. Ltd., 13-21, Hoxton St., N.1. Clerkenwell 5442-8565. 422

CHORLEY Precision Engineering Ltd., Engineers and Electroplaters, have capacity available on Surface Grinding up to 5'. 16" deep (special terms for domestic iron soleplates), OxyAcetylene Welding, Electric Welding, Nickel Plating, Chromium Plating, Black Plating on Steel or Zinc.—Avenue Works, Longworth Street, Chorley, Lancs. Tel. Chorley 2617. 11

ELECTRIC Motor Repairs, Rewinds, Conversions, etc., 1/6th h.p. to 100 h.p.—Smith Bros., 87a, Meeting House Lane, Peckham, S.E.15. New Cross 2194. 318

ENGINEER starting high-class coil winding business desires to contact firms who could supply own wire. Only quality work undertaken. Coils up to 5" dia. × 7½" long, 25-50 s.w.g.—Box 7089.

ENGINEERS, Precision, South England, seek manufacture of electrical, mechanical or domestic assemblies or components. Press tools, gauges, small stampings, capstan turning, also Internal and External Grinding.—Box 74.

FLUORESCENT Lighting. Speciality Fittings designed to your own requirements and specifications. Estimates and sketches submitted free of charge of genuine enquiries. Apply—Scemco Ltd., 6 & 7, Soho St., London, W.1. Gerrard 1461 (3 lines). 121

PRECISION Engineering, capstan and centre lathe work, welding, spot welding, tube bending, finishing, assembly, experimental work, product improvement, complete production runs. All enquiries to—Herbert W. Baker (Engineering) Ltd., 2a, Kilburn Lane, W.10. LAD. 4006. 499

REPAIRS to Time Switches, Clocks, Electric Clocks, etc., and repair or assembly of all kinds of Electrical and Clockwork Mechanisms.—J. W. & R. E. Hughes (Clockwork Engineers), 58, Victoria St., London, S.W.1. Phone, VIC. 0134. 126

RUNBAKEN Electrical Repairs. Rewinding to trade. Fractional h.p. motors a speciality, A.C. and D.C. Prompt service. Guaranteed work.—45, Oxford Road, Manchester. Tel. Ard. 2507 (3 lines). 106

THE Engineering Design Co. (E. Chidlow, F. J. Thomas), Pride Hill Chambers, Shrewsbury (Tel. 2603). Drawings and Tracings for electrical engineers. Wiring Diagrams a speciality. 7084

WINDING and Rewinding A.F. Transformers, Chokes, Field Coils and Bobbins.—Southern Trade Services Ltd., 297/299, High Street, Croydon. Tel. 4870. 98

22/6, Cleaner Type Armatures rewound; 67/6, Split-phase Motors rewound. One to three-phase conversions. Three to one-phase conversions. Carriage paid one way over £5.—J. B. Electric Limited, Brosdheath, Altrincham, Cheshire. 183

### AGENCIES

A well-connected South African firm of merchants and distributors is anxious to market additional British lines in Electrical Equipment.—Electrofield (Pty.) Ltd., P.O. Box 402, Durban, S.A. 78

ACTIVE London company desires represent progressive electrical manufacturers, old or newly established.—Box 81.

ADDITIONAL Agencies required for South of England, including London: (a) Cables and Flexibles; (b) Small Switchgear; (c) Transformers, and any lines suitable for distributing through wholesalers.—Box 40.

AGENTS with established connection in London and South Coast require additional agencies for all types of Domestic Appliances for sale to corporations, wholesalers and retailers.—Box 4801.

A.M.I.E.E., specialist power plant, intends starting agency Midlands. Any reputable firm interested please communicate—Box 7022.

ARE you a small man? The small-scale manufacturer is now told that he must export. But how? E.M.S.A. supplies the answer—finds the markets—takes over every detail. The mere fact of joining E.M.S.A. proves that you are tackling export energetically. Write now for 16-page booklet to—The Export Manufacturers' Service Association, 63, Coleman Street, London, E.C.2. 188

MANUFACTURERS' Agents, covering the whole of Great Britain and Colonies, are desirous of contacting manufacturers with a view to sole selling rights (either commission or buying).—Box 23.

WELL-known old-established firm of manufacturers' agents, covering London, South of England, requires additional agencies: (1) Brass Accessories, Switchplugs, etc.; (2) Conduit and Fittings, etc. Advertisers have contacts with every wholesaler in territories mentioned. Immediate turnover can be guaranteed on either commission or buying basis.—Box 64.

### BUSINESS OPPORTUNITIES

LEADING manufacturers of Electrical Wiring Accessories requiring substantial increase in priority production desire to contact similar manufacturers with necessary plant and equipment willing to co-operate or needing further capital. Necessary basic raw materials are available.—Box 675.

RABONES of Birmingham have 200 years' experience of overseas markets and will help you in your export drive.—Rabone, Petersen & Co. Ltd., Exeter Street, Birmingham, 1. 172

SCEMCO Ltd., Fluorescent Lighting and Electrical Component Specialists, wish to contact manufacturers of 5-amp., 10-amp. and 15-amp. Switch Plugs and other Switchgear accessories. Full co-operation given for Sole Distribution Rights. Illustration and write-up will be inserted in "The Scemco Export" Bulletin which is sent out weekly to all leading export houses and large purchasing organisations all over the world. "Export through the Experts without Delay." "Watch your Order File Grow and your Product Pay." Replies, treated with strictest confidence, to—Managing Director, Scemco Ltd., Scemco House, 6 & 7, Soho Street, London, W.1. Gerrard 1461 (3 lines). 167

### EDUCATIONAL NOTICES

LATEST A.M.I.E.E. Results. In the examination held by the Institution of Electrical Engineers 646 candidates sat who had taken B.I.E.T. courses. Of these 620 were successful in passing the examinations. We believe this record of 620 successes out of 646 entrants has never before been approached by any oral or correspondence tutorial organisation, and indicates the very high efficiency of the modern system of technical training which we have laid down. The B.I.E.T. tutorial organisation is waiting to assist you either with a short specialist course or complete training for a recognised examination. We have available a large full-time staff of instructors, while the efficiency of our extensive organisation is a byword among engineers. We guarantee—"No pass—no fee." May we send a copy of "Engineering Opportunities"? Containing a great deal of useful advice and detailed information on over 200 home-study courses and examinations, this handbook is of very real value to the ambitious engineer. Our highly informative handbook will be sent free and without obligation on request.—British Institute of Engineering Technology (established 1927—over 200,000 students), 12, Shakespeare House, 17, 18 & 19, Stratford Place, Oxford Street, London, W.1. 33

ENGINEERING Careers and Qualifications. Both Government and industry have announced and emphasised that young men with technical knowledge and qualifications must receive every chance of rising to the highest posts within their capacity in post-war engineering and allied industry. Write to-day for "The Engineer's Guide to Success"—200 courses—free—which gives particulars of the first-class training supplied by The T.I.G.B. for the A.M.I.E.E., A.M.Inst.C.E., A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., B.Sc.(Eng.), C. & G., etc., examinations in which T.I.G.B. home-study students have gained over fifty first places. The Guide covers careers in all branches, Electrical, Mechanical, Radio, Aeronautical, etc.—The Technological Institute of Great Britain, 35, Temple Bar House, London, E.C.4. 77

### PARTNERSHIPS

A.M.I.E.E., resident Birmingham, car, wishes to contact small firm part time, view ultimate partnership.—Box 7021.

### COMPANY MEETINGS

## BRUSH ELECTRICAL ENGINEERING

### Orders Exceed Delivery Rate

THE Annual General Meeting of the Brush Electrical Engineering Co. Ltd. was held at Loughborough on 23rd December, 1947.

Sir Ronald W. Matthews, the Chairman, presided, and the following is an extract from his circulated statement: The unsatisfactory results for the year ended 31st December, 1946, arose in great part from declining turnover coupled with expanding overheads arising from the rebuilding of a peacetime staff, and the report also disclosed that a not unsatisfactory profit had been made on trading up to 30th September, 1947. He therefore proposed to confine his observations chiefly to a survey of the prospects.

Last year he had referred to the decisions made on re-design with consequent re-tooling and new shop layout, feeling that they would ensure the financial well-being of the company. Those remarks had proved correct, although the adverse effects during 1946 had been greater than anticipated and the benefits of reorganisation had not been felt to any marked degree until early 1947.

The total order book was in the neighbourhood of £7,500,000, which would provide some 18 months' work at the rate of output which they were now achieving. That order book was naturally not spread equally over the whole of the company's departments: in some they had two or three years' work ahead of them, and in others were able to give reasonably good deliveries. Nevertheless it was a gratifying fact that in spite of the substantial increase in output which had been achieved over the past 12 months orders were still coming in at a faster rate than that at which they were delivering.

It was the policy of the company to concentrate on improved production methods, and by so doing to try to offset the steadily increasing costs of labour and material with which the industry as a whole had been faced over the past two years.

Unless a determined stand was taken against the spiralling costs of manufactured goods there was no question that Britain would lose her export markets. Although the company could not control the cost of raw materials, which was steadily rising, by more economic production methods they could offset those increases in costs and thus maintain if not reduce existing prices. He was hopeful that so far as many of their engine products were concerned the production methods which they had introduced would enable them to make reductions in their sales prices whilst still leaving a satisfactory profit margin.

Much had been said about the failure or unwillingness of the British working man to do a fair day's work. In this company they had shown that with proper leadership willing support was forthcoming from the men on the shop floor. Although the company had had their problems and their differences of opinion with representatives of organised labour, and would continue to have them, they had been able to settle those difficulties as they had arisen in a business-like manner without the necessity of either side resorting to extreme action. He was hopeful that a continuation of the policy of industrial relations which the company had followed throughout the past year would produce similar results in the years to come.

*The report was adopted.* 666

### BUSINESS PREMISES

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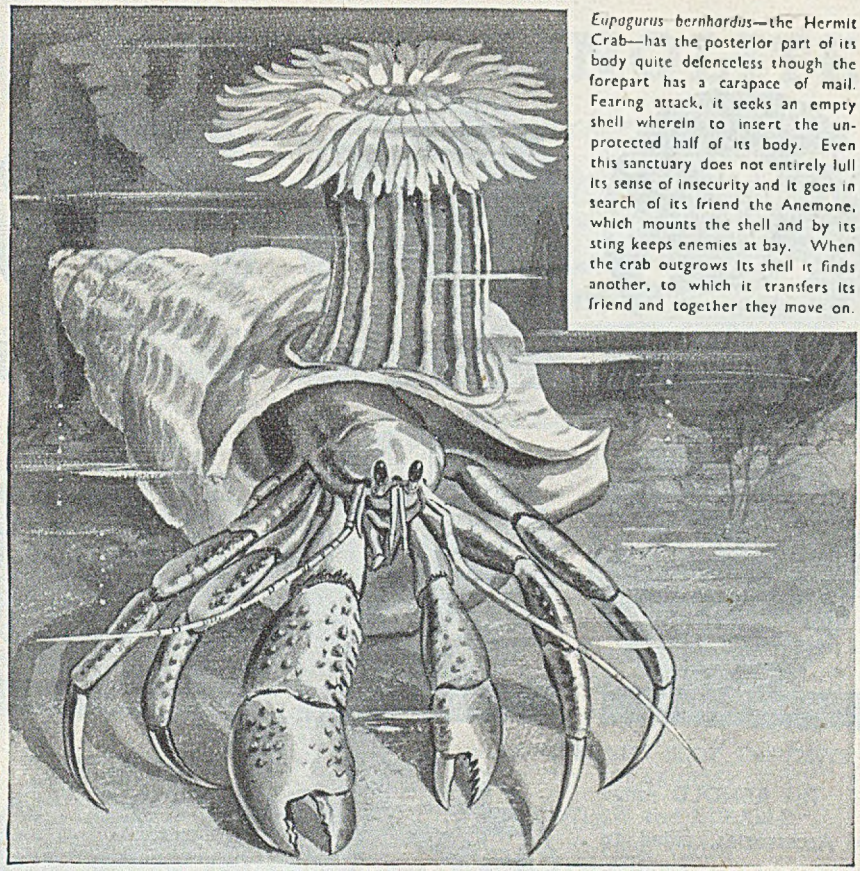

*Eupagurus bernhardus*—the Hermit Crab—has the posterior part of its body quite defenceless though the forepart has a carapace of mail. Fearing attack, it seeks an empty shell wherein to insert the unprotected half of its body. Even this sanctuary does not entirely lull its sense of insecurity and it goes in search of its friend the Anemone, which mounts the shell and by its sting keeps enemies at bay. When the crab outgrows its shell it finds another, to which it transfers its friend and together they move on.

# *Eupagurus bernhardus*

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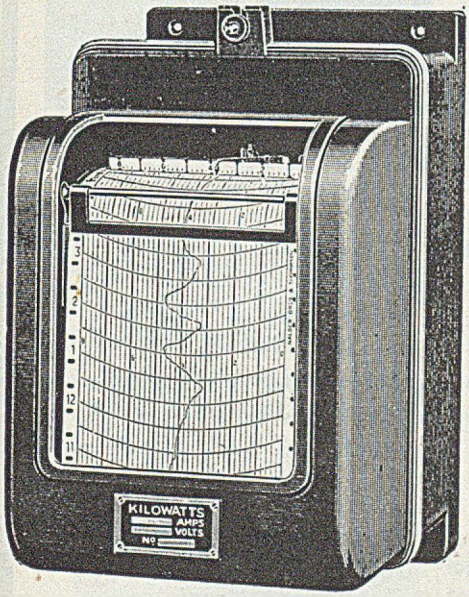


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## Index to Advertisers



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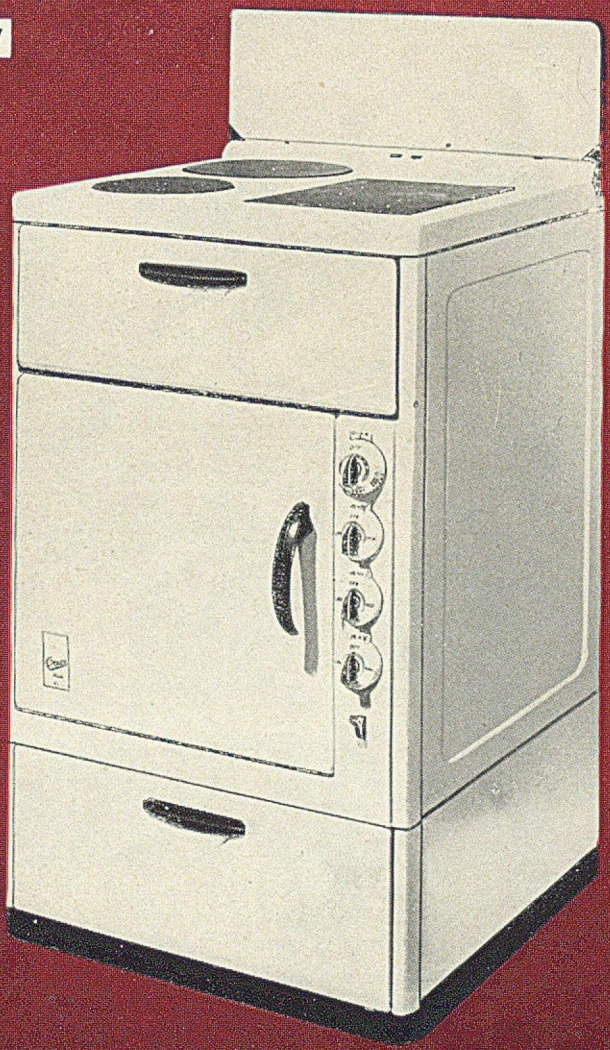
INDEX TO ADVERTISERS

## Index to Advertisers

(Continued from page 80)

# Creda scores again!



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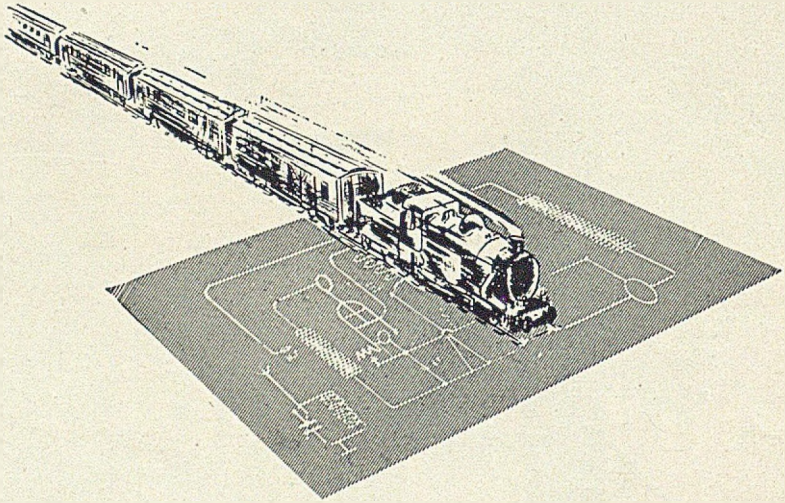

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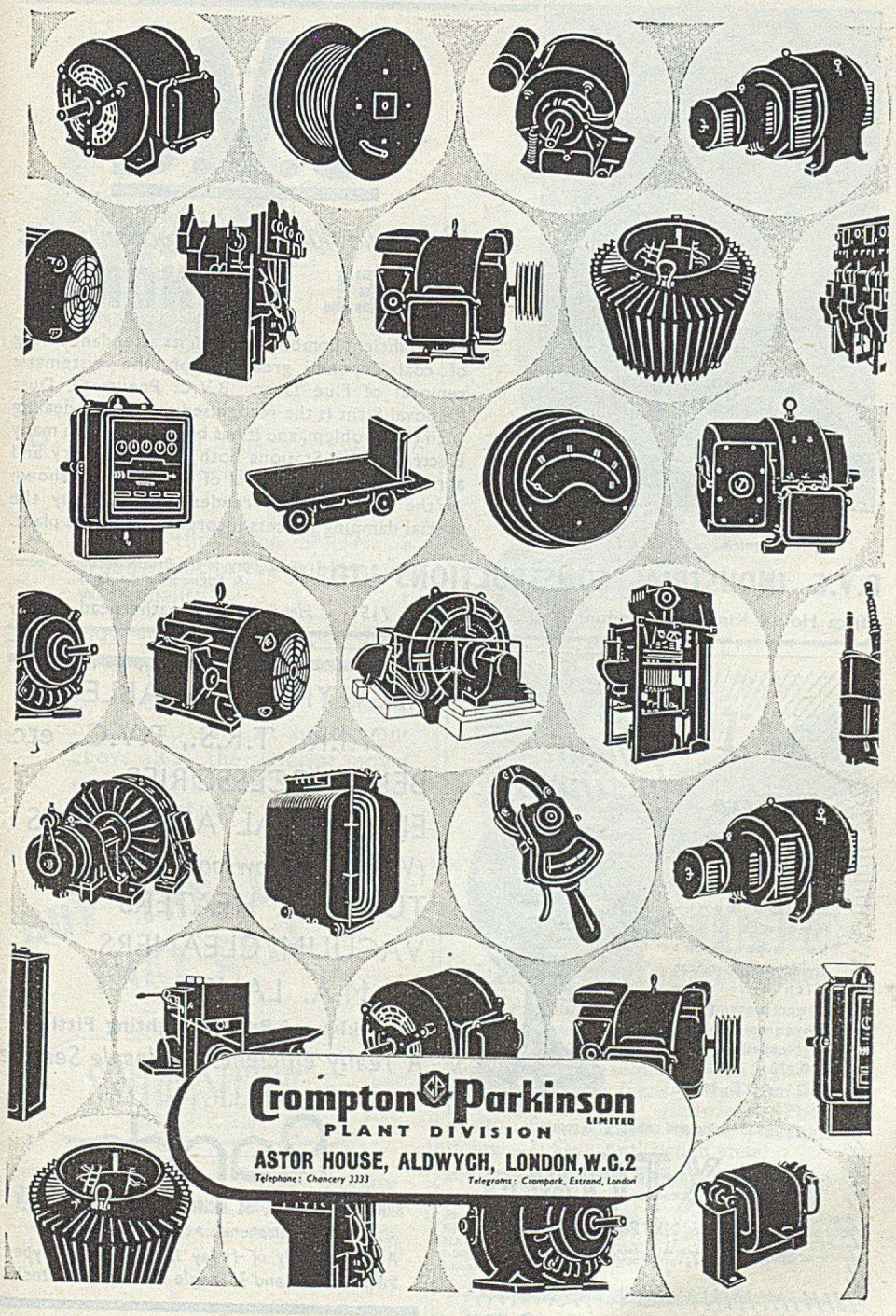
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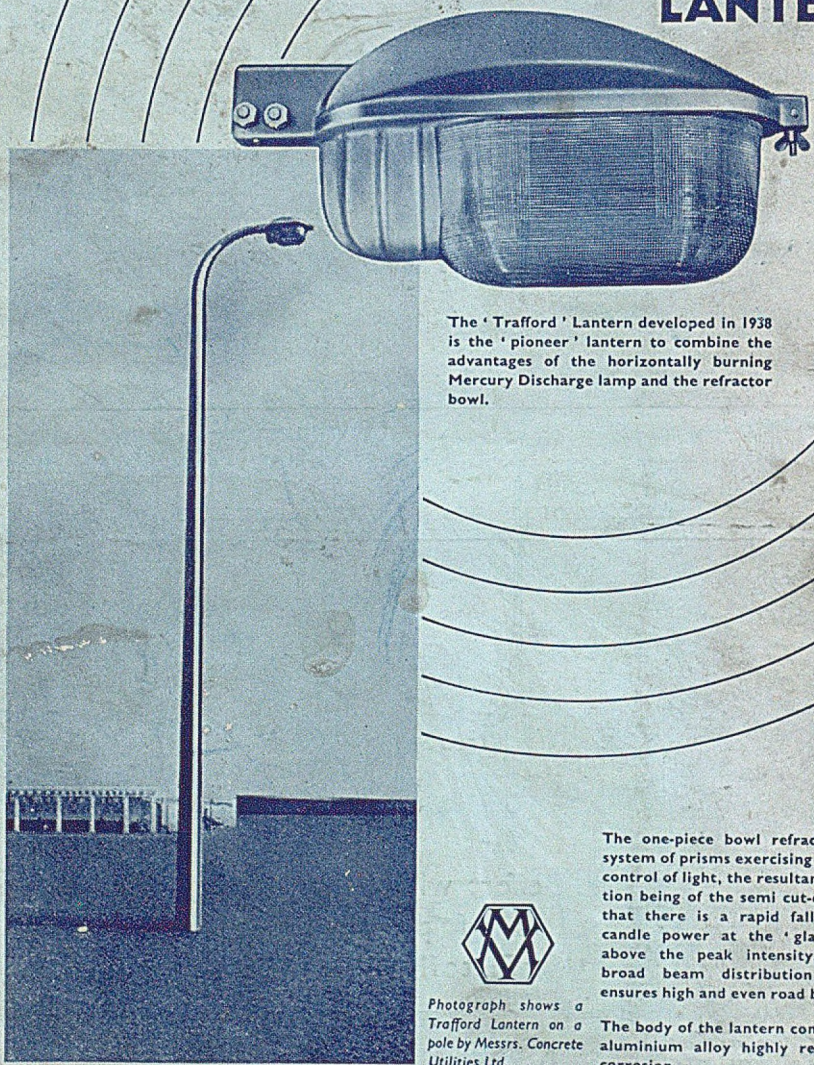
# METROVICK TRAFFORD LANTERN



The 'Trafford' Lantern developed in 1938 is the 'pioneer' lantern to combine the advantages of the horizontally burning Mercury Discharge lamp and the refractor bowl.

*Photograph shows a Trafford Lantern on a pole by Messrs. Concrete Utilities Ltd.*

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