

2.58/114

AERO-ENGINE TESTING

ELECTRICAL REVIEW

FOUNDED
1872

Vol. CXXXV. No. 3498

DECEMBER 8, 1944

9d. WEEKLY

COMPACT



CORRECT



I-V-I.

INVERTED VERTICAL ISOLATION

E.H.T. METALCLAD SWITCHGEAR



TYPICAL "I-V-I" 4 METALCLAD SWITCHBOARD
FOR 3.3 K.W. 100 M.V.A. SERVICE
ARRANGED FOR
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SHORT CIRCUIT TESTED
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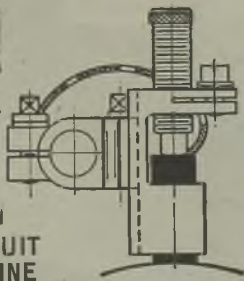
GRAMS: HEATRAE, NORWICH

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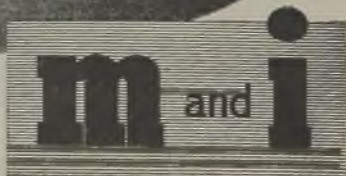
M.C.L. and REPETITION LTD.
Pool Lane, Langley, Birmingham.

All this talk about the power of electricity cuts no ice with Messrs. Volt and Amp and Mr. and Mrs. Watt. What they'd like is a little bit of freedom, but they haven't a chance when they come up against a piece of Mica or Micanite or Paxolin or Panilax or Empire Tape, all of which are made by the Micanite and Insulators people for manufacturers and others, who must keep electricity in its proper place.



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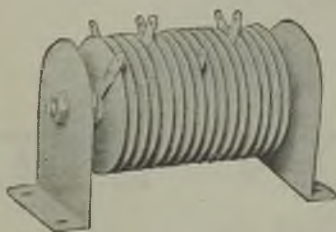
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Makers of MICANITE (Built-up Mica Insulation), Fabricated and Processed MICA, PAXOLIN (Synthetic-resin laminated sheets, rods, tubes and cylinders), High Voltage Bushings and Terminals, for indoor and outdoor use, Empire Varnished Insulating Cloths and Tapes and all other forms of Electrical Insulation. Suppliers of Vulcanised Fibre, Leatheroid, Presspahn, etc., Distributors of Micoflex-Duratube Sleeveings and Kenutuf Mouldings (P.V.C.).



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For us, this means many things: bringing the boon of Rediffusion service to thousands of homes; contributing Radio Heating to industrial progress; building Radio Transmitters for world-wide links —and always, the freshness of vision which commands leadership.

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**Designers and manufacturers
of Radio Communication and
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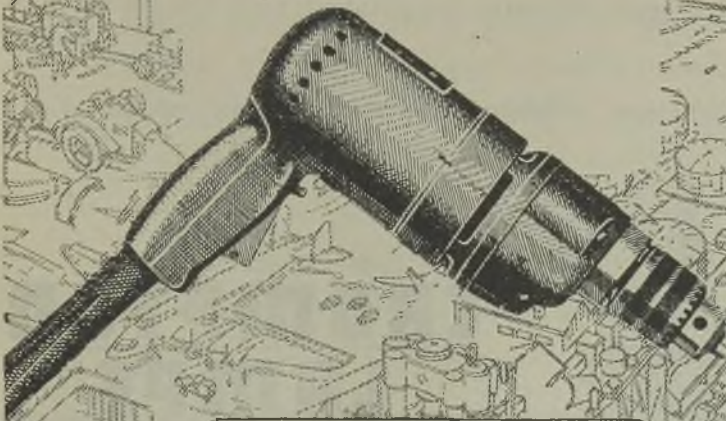


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Continuous production conditions call for sturdy machines that can be relied upon to get through a lot of hard work without fear of constant breakdown. Hicycle tools possess these essential characteristics for such conditions, i.e.:

- No armatures to burn out.
- Maximum possible power per lb. weight of tool.
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MORE LIGHT ON THINGS TO COME . . .

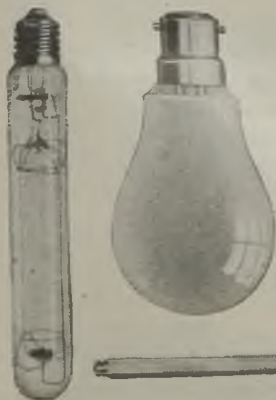


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Lamps will bring you the many important advances that the needs of

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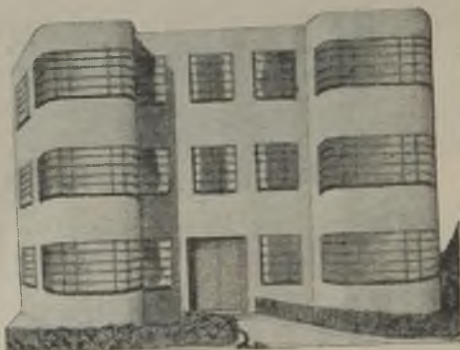
Our reference W114/U will gladly supply full particulars.

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PREMIER ELECTRIC HEATERS LIMITED · BIRMINGHAM, 9



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"Do not rob the worker of his ride" "Leave rush hour travel for war workers please" When these and other war slogans become museum pieces, and queues and crushes go back to Cup Ties and Test Matches, then indeed the Passenger Transport Industry can look ahead.

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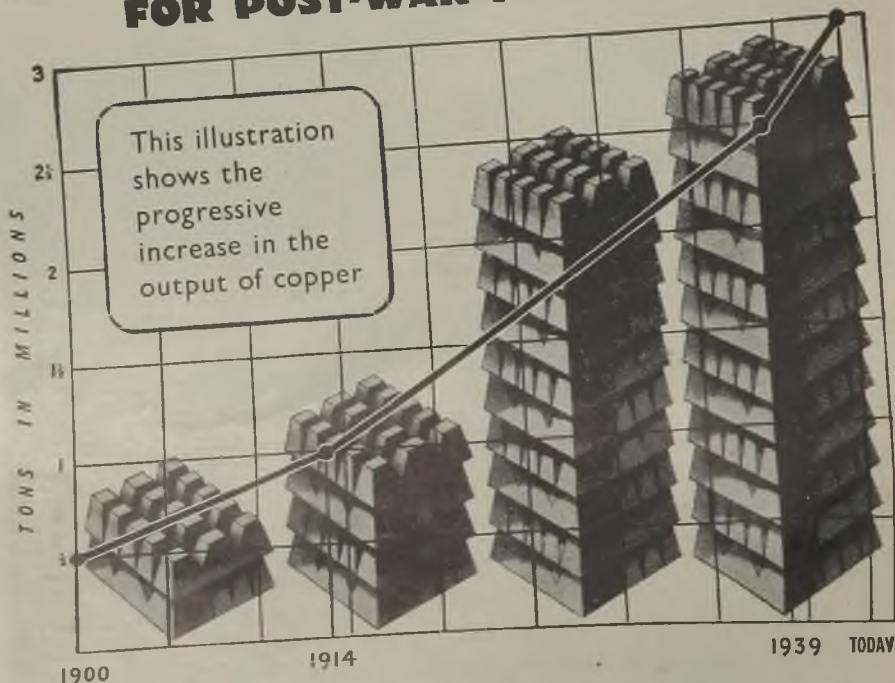
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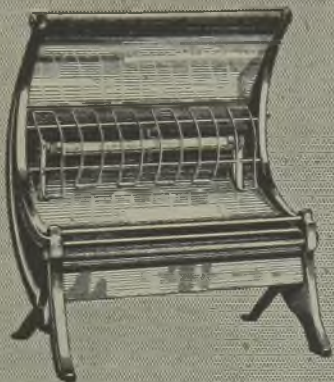
C22



A non-trading organization, maintained by the British Copper Industry, to supply information and advice, free, to all users of copper.

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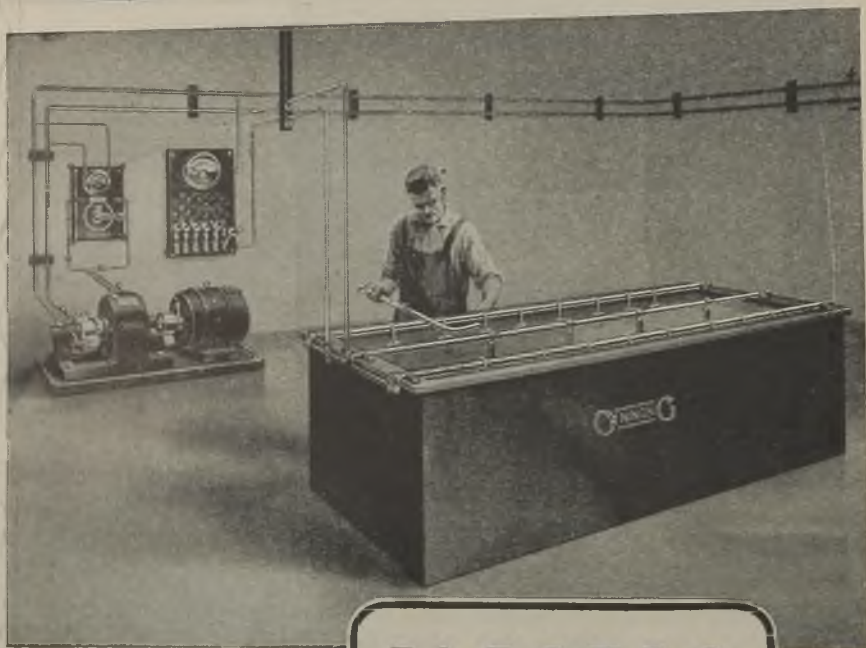
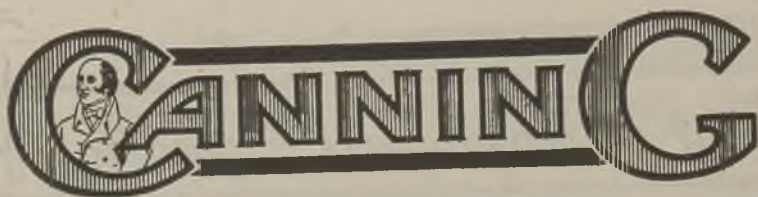


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FF295

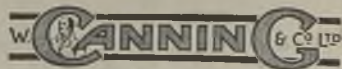


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A7/43



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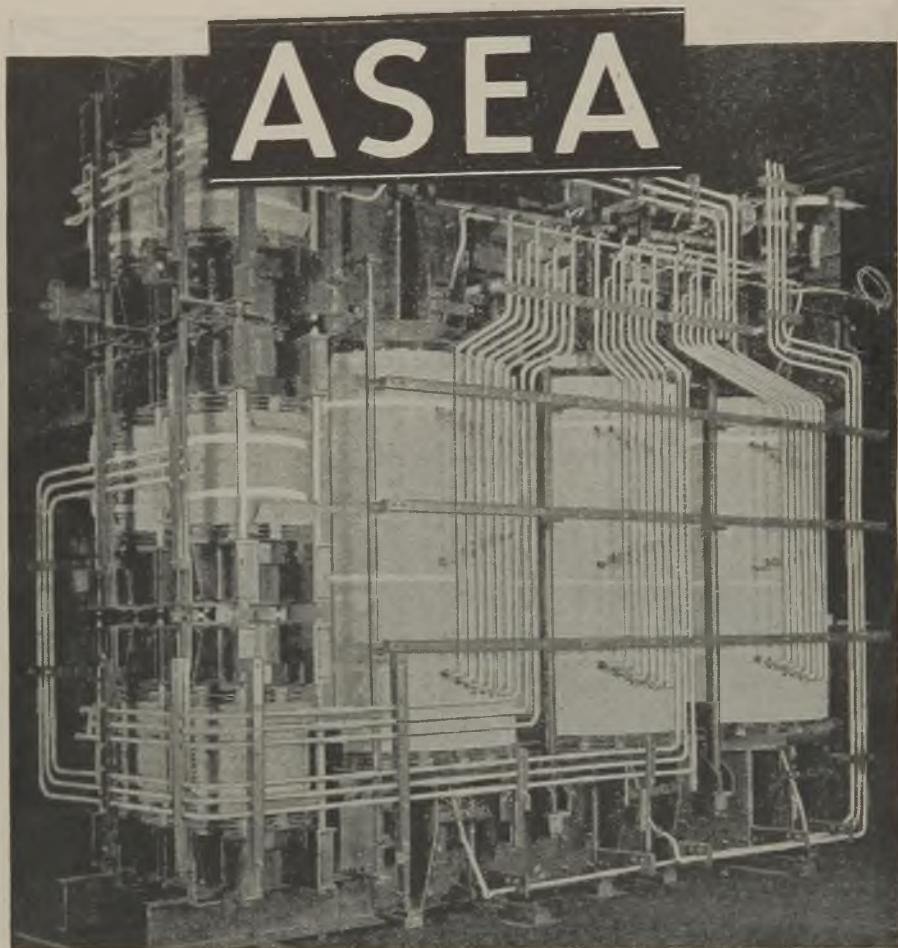
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...the muscles of his brawny arms

ONE of the grave disadvantages of Desoutter Tools is that they don't develop a boy's muscles. The heart of many a growing lad leaps to hear that he will be allowed to use a Power Drill. In his mind he sees those brawny lumps of humanity boring their way

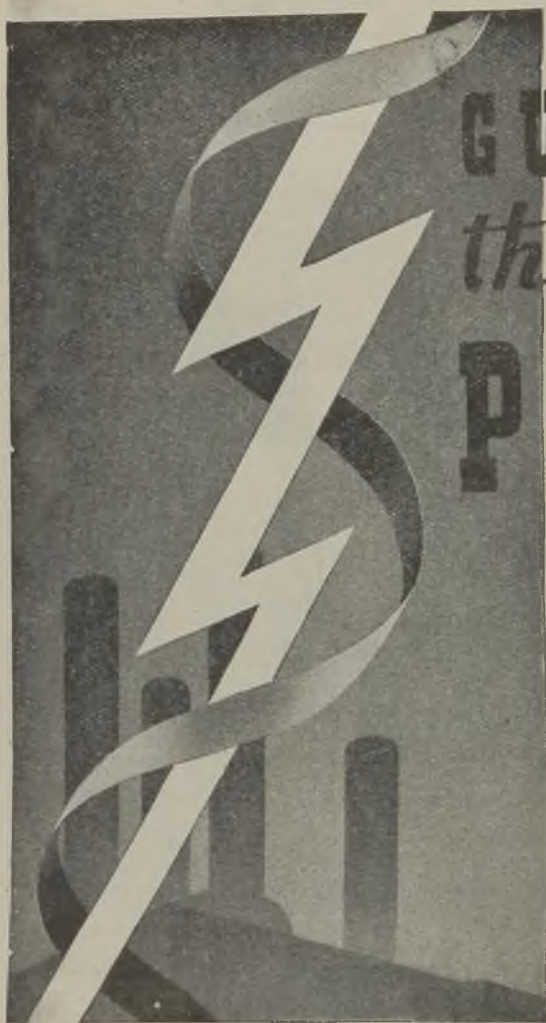
through massive chunks of concrete, their great muscles rippling and shuddering from wrist to neck and all down the back and front. He sees himself the pride and envy of his pals. He sees great cricket balls appearing all over his arms. But Desoutter brings disillusion. He can handle a Desoutter all day and every day for months on end, but the old bicep still looks like a very small grey mouse.



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Barrel constructed of special ceramic. Ends precision ground to form perfect bedding for spun-on end caps

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Special lattice construction of fuse elements allows full advantage to be taken of arc-quenching properties of graded quartz filling.



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G.E.C. installations of materials handling plant, with capacities up to 2000 tons an hour, are operating in electric power stations, mines, collieries, gas works, steel works, docks, harbours and factories in all parts of the world.

The Company's long experience in this specialised branch of engineering has been devoted to the war effort, as have all its technical and manufacturing resources.

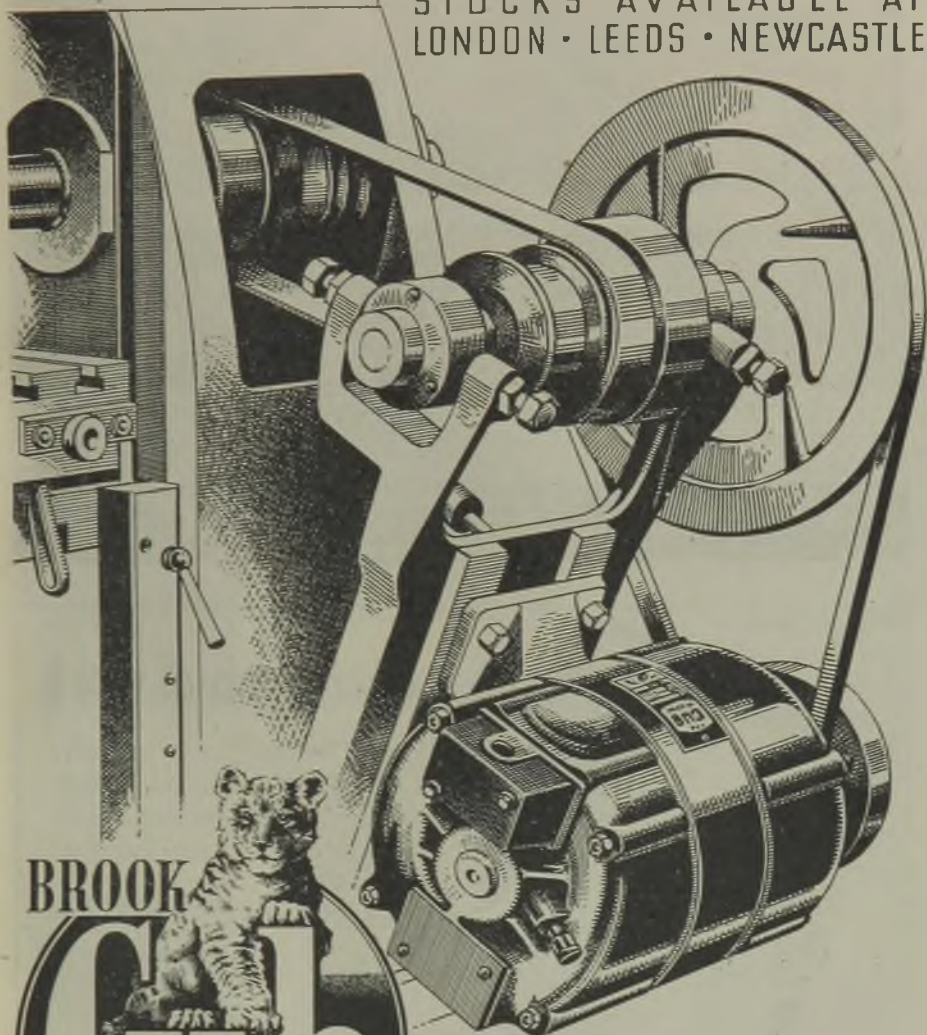
When peace returns, the important advances made by the G.E.C. in every application of electricity, including electronics, during this period of great endeavour, will be available to all concerned with electrification schemes in any part of the world.

G.E.C. always in the forefront of electrical progress

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They are not a substitute at all in the sense in which this irritating word is generally used. DURAWIRES AND DURACABLES have their own OUTSTANDING PROPERTIES and will play their part in building the New World as they are helping to win the war.

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she's doing. Making life more homely for the boys. When she runs a home of her own, she'll deserve everything that makes life easier—including, of course, a BURCO.

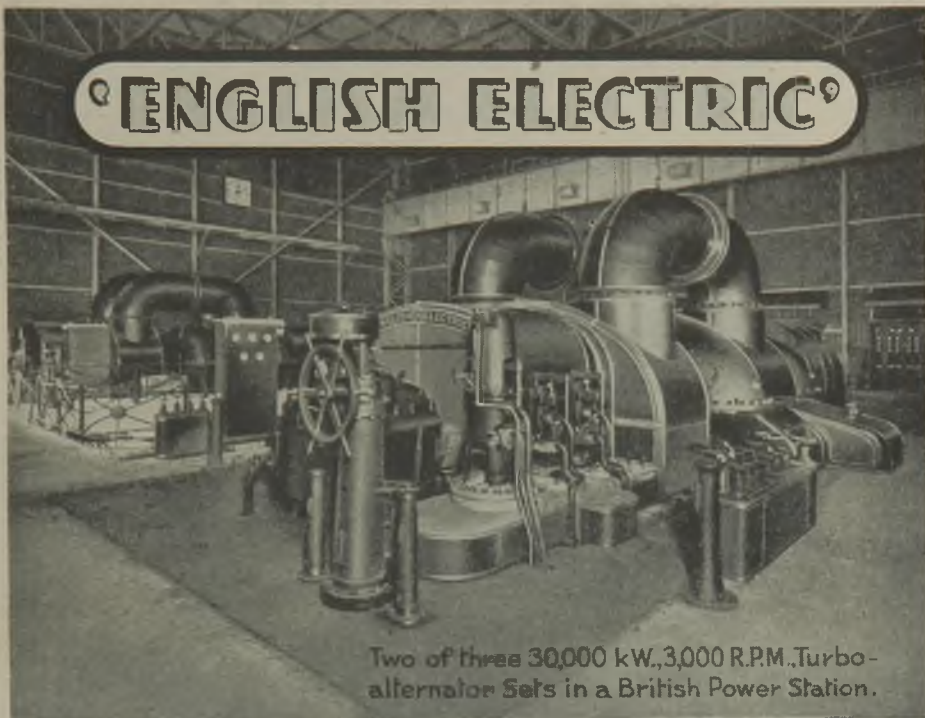
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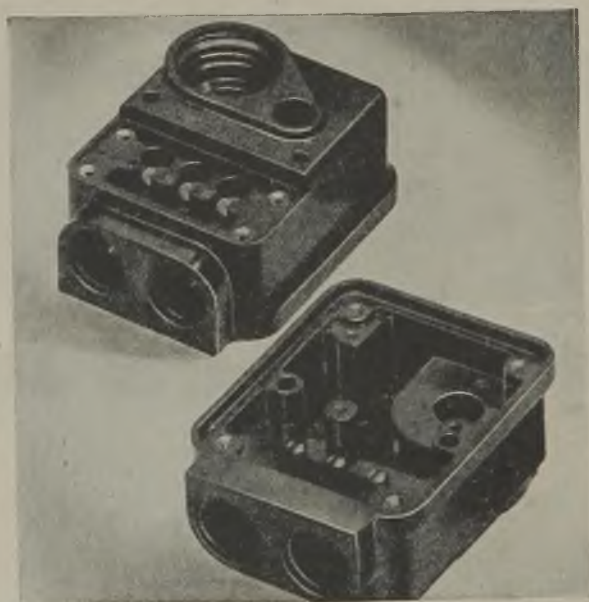


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- II** SIZE must be sufficient so that the reflecting surface shall not be too bright.
- III** REFLECTING SURFACES must be chosen so that they do not reflect bright spots into the eye.
- IV** VISOR GLASS FRONTS besides keeping out dirt can be supplied with frosted or opal glass to diffuse the light.



★ This is No. 6 of a series of data sheets.
Paper restrictions prevent our publishing all of them here but we will gladly send you copies of the rest.

BENJAMIN

THE BENJAMIN ELECTRIC LTD.
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Telegrams:

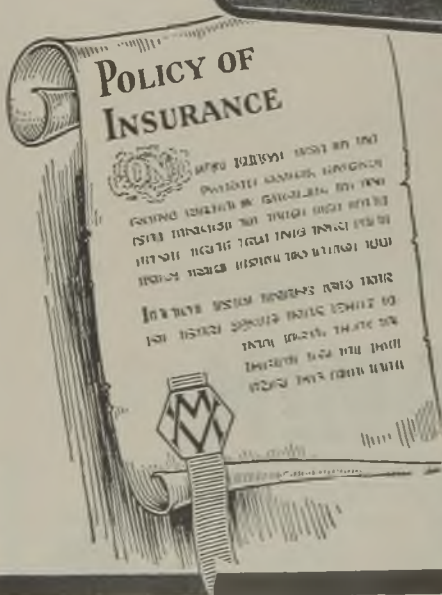
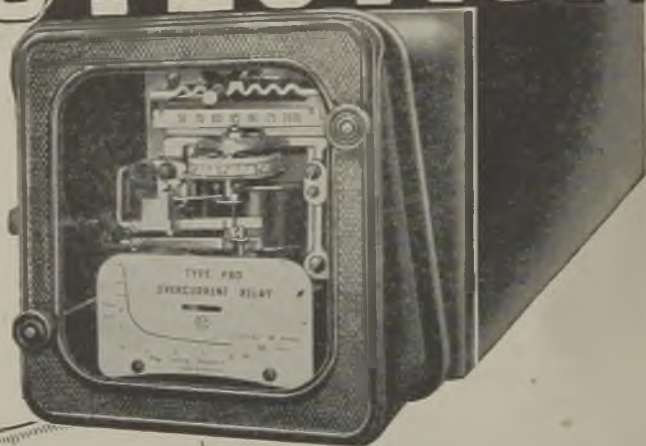
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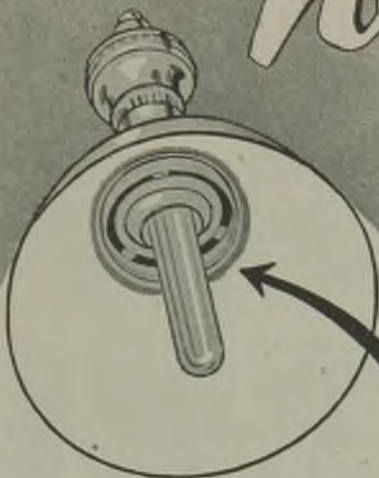
Single, double and triple-
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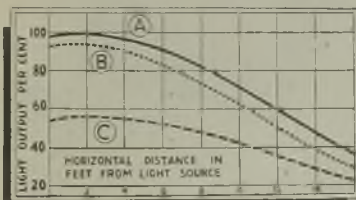
INCREASE PRODUCTION BY *Consulting* METROVICK'S
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What's New?

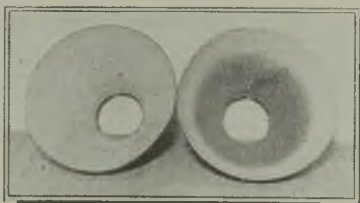


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SUITABLE FOR TUNGSTEN AND DISCHARGE LAMPS



Curve A—CLEAN REFLECTOR, 400w MV/F Lamp.
Curve B—'STAYCLEAN' REFLECTOR with 400w MV/F Lamp after five weeks' service in foundry.
Curve C—STANDARD REFLECTOR, exactly the same conditions as above.



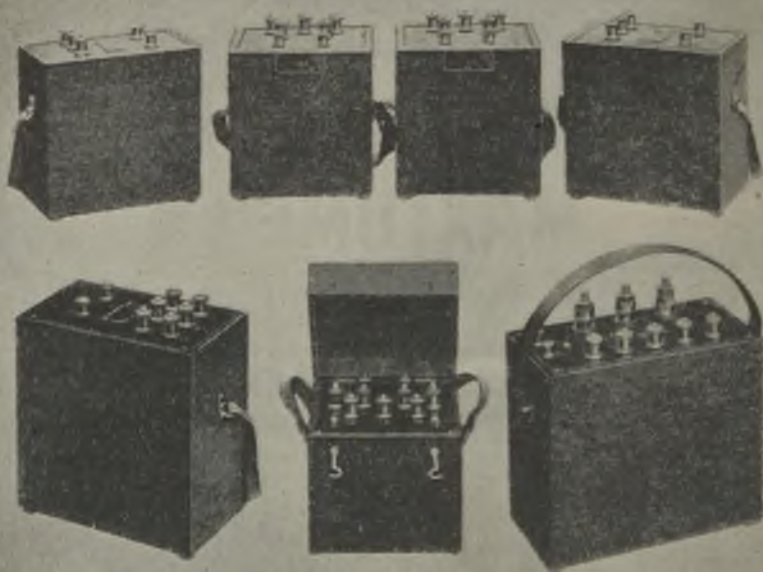
This is a reproduction of an untouched photograph of a 'Stayclean' Reflector and an ordinary Reflector after being used in similar positions for one week only.

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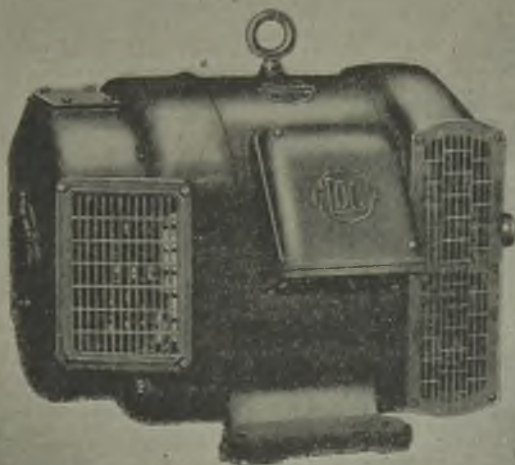
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Lancashire Dynamo & Crypto Ltd.

• Crypton Equipment Ltd.



MOTORS



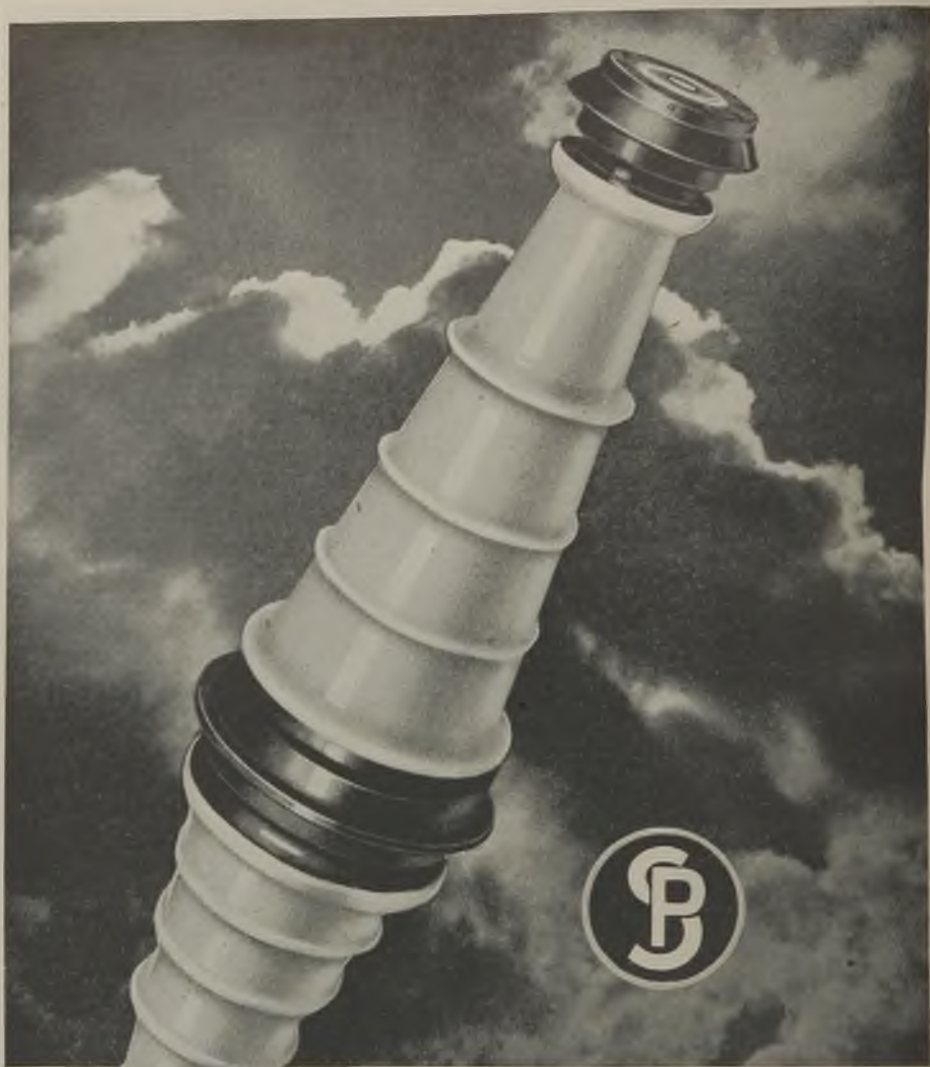
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BP35

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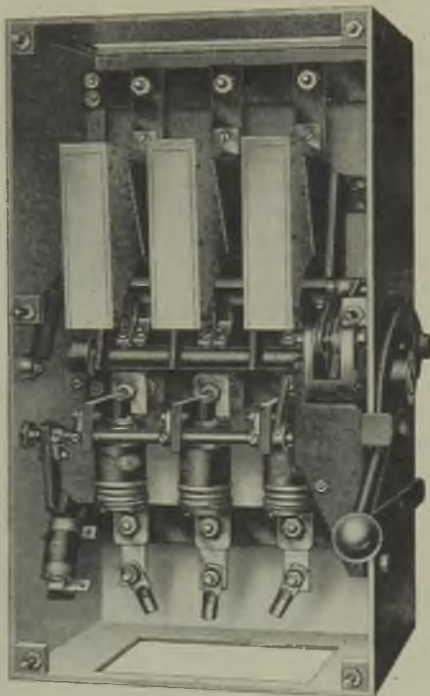
Earth Leakage Protection

(“Electrical Review,”
July 28, 1944, page 113.
Patent No. 563060)

now followed by Type S.F. Air-Break Switchgear

incorporating
this form of
protection

Our recent invitation to apply for copies of the reprinted article on earth leakage protection met with a great response. If you have not had your copy, please write for one now. In this connection, our S.F. air-break switchgear (Publication S.G.26) has now been adapted to incorporate earth leakage protection to patent No. 563060. In this design the E.L. striker trips out all phases simultaneously. The equipment has a current range up to 800 amps. and for voltages up to and including 600. May we send you details?



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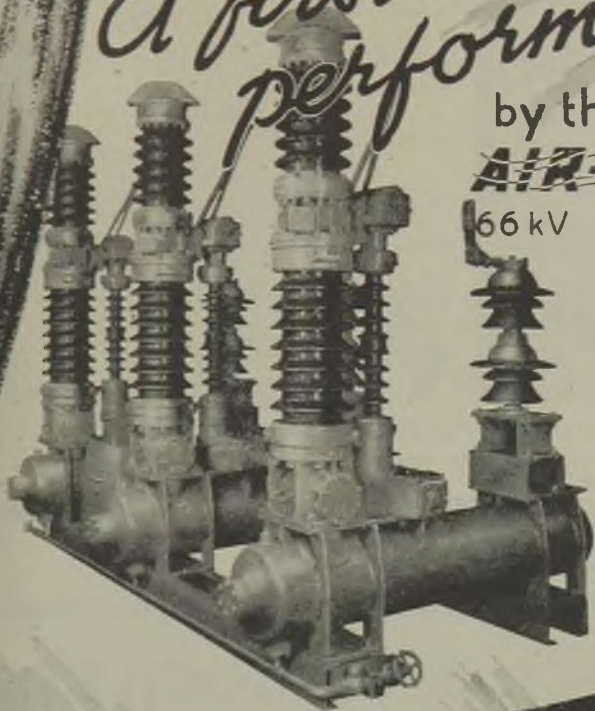
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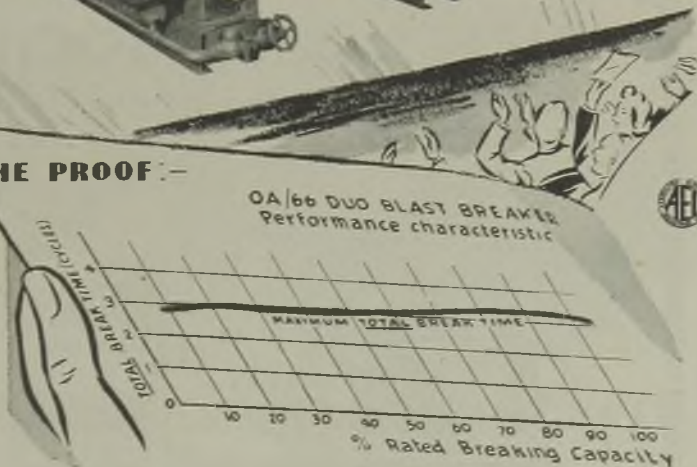
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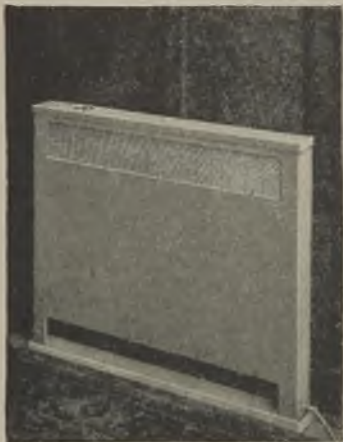
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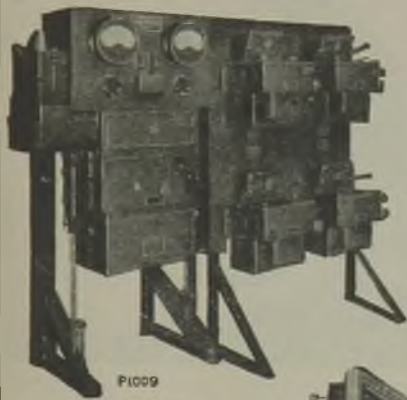
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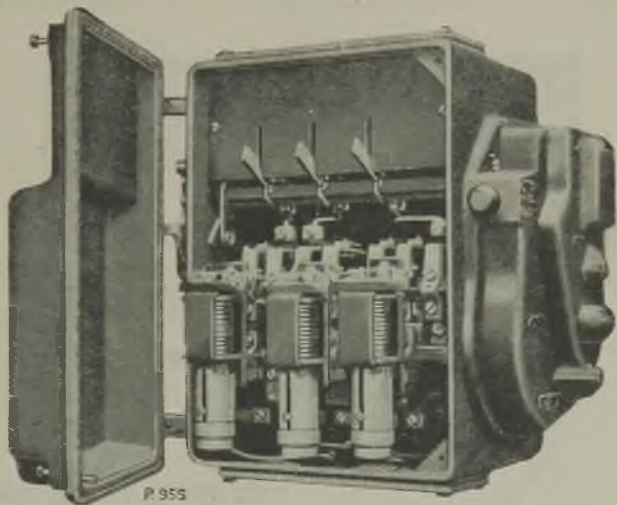


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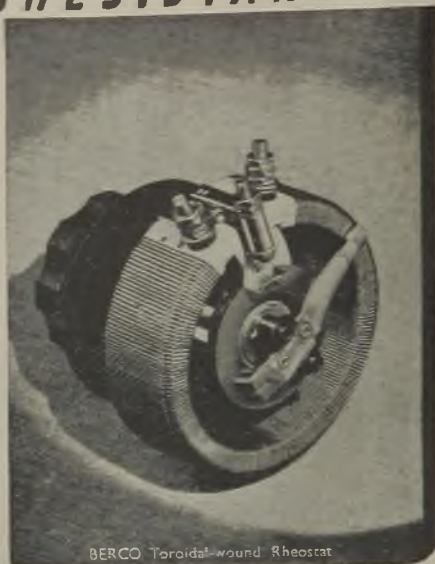
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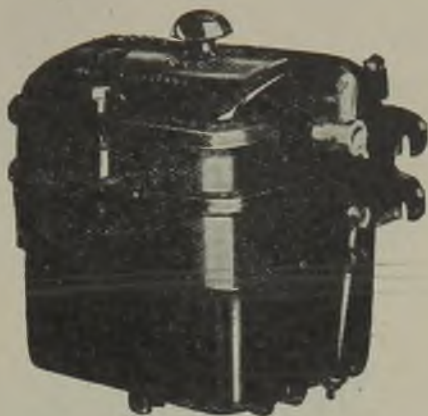
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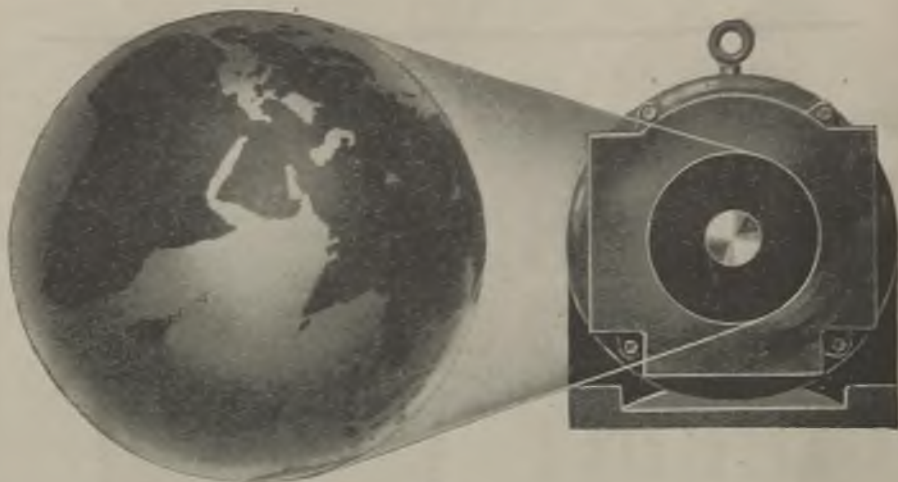
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ELECTRICAL REVIEW

December 8, 1944

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Managing Editor :
Hugh S. Pocock, M.I.E.E.
Technical Editor :
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ELECTRICAL REVIEW

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Vol. CXXXV, No. 3498.

DECEMBER 8, 1944

9d. WEEKLY

River Power

A Welsh "T.V.A." and the Severn Barrage

MUCH magic is thought to reside in such a phrase as "the Tennessee Valley Authority." It was heard during the preliminary discussions of the Scottish hydro-electric scheme and now it is common currency in Wales. A "T.V.A." has even been suggested for the North-East Coast. It is evident that many who murmur this incantation are not aware of its true nature. The Tennessee Valley scheme was not primarily a means of producing cheap electricity; it had its origin in the need to control the Mississippi whose unruly habits are familiar to readers of Mark Twain and other American authors. In conjunction with this the T.V.A. scheme was meant to improve navigation and to restore fertility to the overworked soil of the vast area involved.

Incidence of Capital Cost

To accomplish the last-named object cheap electricity for fertiliser production was essential and the obvious way of obtaining this was to utilise the power held up by the flood-control dams. This power was not only adequate for the purpose; there was an immense surplus for distribution to the population of the Tennessee Valley at very favourable rates. The way in which capital costs have been apportioned is not clear, but it seems that the bulk of the civil engineering work behind the generation of electricity is not being paid for by the electricity consumers, as it probably would have been for a straightforward hydro-electric undertaking.

Conditions in Wales are hardly com-

parable to those in the Tennessee Valley unless, of course, those who use the T.V.A. parallel have in mind a Severn Barrage as a possible background (and that would be half "English" anyway). A great deal of the talk of a "Welsh T.V.A." is purely nationalistic, but this cannot be said of a memorandum on the Severn Barrage by the South Wales and Monmouthshire Bulk Supply Association, which advocates the scheme as a means of maintaining *Britain's* industrial strength and conserving coal.

Elimination of Reservoir

The memorandum, which generally approves the 1933 Severn Barrage Committee's report (but seems to ignore the Donkin Committee whose report is now in the hands of the Minister of Fuel and Power), relates the barrage to a road and railway bridge and new harbour facilities the cost of which would be borne by the Exchequer. This would reduce the expenditure (including compound interest) chargeable to the scheme by about £12,000,000. A further £12,000,000 could be saved by the elimination of the reservoir and storage station proposed by the 1933 Committee; it is contended that the grid would be capable of absorbing the output from the barrage irrespective of the state of the tides. In this the Association may be anticipating to some extent the findings of the Donkin Committee. Here we may recall that Mr. Tom Smith said in the House of Commons three or four weeks ago that the Donkin Committee recommended that the proposals for a road and

rail bridge over the Severn should be considered separately. If the Donkin Committee considers that a Severn Barrage is desirable for the well-being of the country (not necessarily Wales alone) and can be constructed at a reasonable, though perhaps not strictly "economic" cost, it will be as well to get on with the work as soon as possible, for the most optimistic estimate puts the time for construction at six years.

LEND-LEASE arrangements with the United States involved an undertaking on Great Britain's part that none of the materials received, or similar materials, would be used for export purposes—apart, of course, from those exports necessary to the conduct of the war. This necessarily exercised a restrictive effect upon our export trade and in some directions prevented us from exporting even limited quantities of goods which would have served to maintain overseas trade links. Now an agreement has been reached which will remove at least a part of this obstacle. Any materials or equipment received from the United States which it is desired to use for export purposes will be paid for. The existing Lend-Lease system will be confined to the supply of goods for the manufacture of munitions and the maintenance of our essential wartime economy. Little more can be done until Germany is defeated but, as the Prime Minister said last week, exporters will now be able to make their plans for post-European-war trade with much more certainty.

Smaller Fluorescent Tubes HITHERTO the only fluorescent lamp available in this country has been the 5-ft. 80-W tube.

During the war, although it has still been obtainable, it has been necessary to secure a licence for the purpose. Recently in a rather quiet way a smaller size has been introduced and may be seen in experimental operation in one of the "Underground" coaches. It is a 2-ft. tube rated at 20 W and twenty-four of these used practically end-to-end, give excellent results. The London Passenger Transport Board hints that this is the sort of lighting which it proposes to install in the future. When the smaller size (or sizes) become generally available here, as they have been in the United States,

there will be an immense demand for the new lamps from commercial concerns and from the general public.

Dr. Paterson's Views SOME idea of the future of fluorescent lighting was given in an *Evening Standard* article last week by

Dr. C. C. Paterson, director of the G.E.C. Research Laboratories, in which much of the work on the subject has been carried out. Dr. Paterson points out that the war has held up developments in this country. The United States was not handicapped in this way for two years and in consequence is producing 50 million fluorescent lamps this year. It is stressed that industrial and public premises will be the first to be lighted by the new lamps; before they can be applied to domestic lighting it will usually be necessary to re-design the lighting installation.

District Heating A QUESTION in the House last week and our own Correspondence section indicate continuous interest in district heating. The subject was discussed in our leading article last week with reference to a new power and heating station which, with its plant constructed in Great Britain, was described in the same issue. Although the thermodynamic efficiency of this mixed station is appreciably in advance of that obtainable with conventional design, it is significant that no attempt is made to reach the very high values mentioned during the Parliamentary proceedings. The most important aspect of the question was probably the reply it elicited from the Minister of Fuel and Power to the effect that he regarded the pressing forward of the C.E.B. programme of generating extensions as a matter of urgency.

Heat Distribution ACTUALLY the modifications necessary in the power station present a simpler problem than does the disposal of the "surplus" heat outside, which is probably engaging the greater share of the attention of the Sub-Committee of the Department of Scientific and Industrial Research. The economic scope of district heating may well be found to be restricted to a few special areas. In any event the need for cheap electricity for motive power and metallurgical processes should be the first consideration and the

provision of heat should be looked on as a by-product. In order to safeguard industry, not only should the cost of steam per kWh be no more than at present, but the benefits of the technical advances that would otherwise have been made should still be credited in full to the generation of electricity.

So many independent variables enter into the cost of manufactured goods, particularly those so specialised as electrical equipment and appliances, that there are great differences in the proportions by which prices have risen during the war. This is illustrated by the few instances in the export trade returns in which both quantities and values are given. Worked out on a pounds sterling per ton, or per article, basis the price of exported generators rose by 63 per cent. between 1938 and 1943; that of convertors and transformers (combined in the 1938 returns) 56 per cent.; switchgear 36 per cent.; and motors only 24 per cent. Among the smaller equipment, the price of house service meters increased by 47 per cent. and that of lamps by 33 per cent. The official statistics show an increase for all electrical goods and apparatus of 64 per cent. and for machinery (including electrical) of 68 per cent. The method is very rough and ready and takes no account of variations in the make-up of the totals, but it would seem that in spite of the greater costs of labour, material, transport and insurance the increases in prices of exported electrical machinery and equipment have been comparatively moderate.

MR. E. A. PINTO, in a letter published in our issue of December 1st, resurrects a matter which became very acute during the two wars but has necessarily remained quiescent with the wartime demand for man-power. It is the frequent stipulation that applicants for positions shall not be more than forty, or sometimes forty-five. There are several reasons for this requirement: Mr. Pinto thinks that one of the most potent is the difficulty of fitting elderly men into pension schemes. In municipal service this is surmounted by the interchangeability of the arrangements between authorities, but of course this does not provide for newcomers to

the service. Such men must be prepared to make up a good deal of arrears if they are allowed to enter a pension scheme. The subject is one which will affect a good many returning men who have "grown old" in the service of the country since they joined up.

What Solution? THERE are difficulties in the way of excluding men from pension schemes when they join a concern

—public or private—at forty or thereabouts. No self-respecting firm wants to retire men without some form of provision for their retirement and it is consequently reluctant to engage them in the first place, even if they agree that they cannot participate in the firm's pension arrangements. It does not seem as though the Canadian suggestion, mentioned by Mr. Pinto, that it should be made an offence to refuse employment on account of age is practical politics. The only solution (and that not an immediate one) seems to be the establishment of a general scheme of pensions for professional men to which they and their employers would contribute from the beginning of their careers. This would almost inevitably be a matter for the State but there seems to be little chance of such sectional social legislation getting through.

Electricity in Mines IN addition to the ordinary electrical hazards of shocks and burns found in industry generally, there are especial risks in collieries. Of the thirteen fatalities, above and below ground, last year, three were caused by ignition of fire-damp and three by explosion of detonators. Sixty-one persons received non-fatal injuries, twelve owing to fire-damp ignition and three to the bursting of apparatus; even shocks and burns were of an unusual kind, no fewer than ten having been caused by damage to trailing cables by shot-firing. Altogether six fatal and twenty-nine non-fatal accidents were associated with trailing cables and plugs. Mr. G. M. Harvey, Senior Electrical Inspector of Mines, who gives the above figures in the *Mining Electrical and Mechanical Engineer*, regards them as evidence of the ill-treatment commonly meted out to trailing cables. And yet complaints are sometimes made of the heaviness of modern cables designed to mitigate these effects.

Aero-Engine Testing

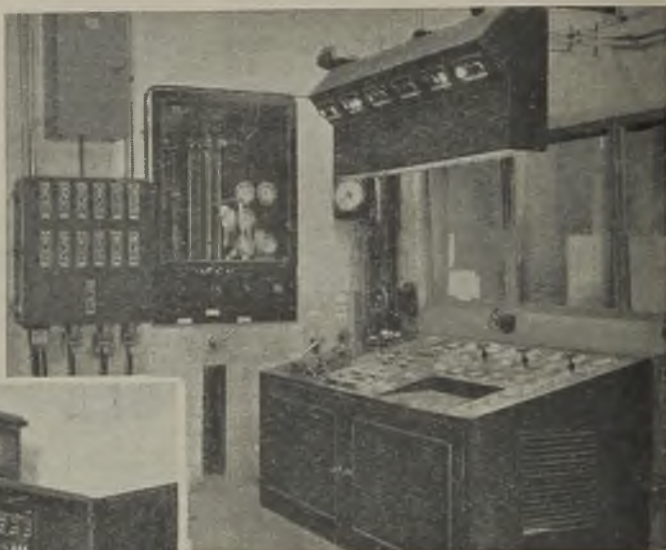
A New Test-Bed Installation

A MOST important factor in the establishment of four new aero-engine testing beds in a large Rolls-Royce factory lies in an attempt to line up with the Emergency Powers Statutory Rules and Orders, dealing with fire prevention measures in aero-engine testing equipment. Since it would be too expensive to make the whole job flameproof, the aim has been to make flameproof only that equipment in each bed which is likely to be in use when the engine is not on test. This includes the general lighting, roller doors, various switch-plugs on the beds, and pilot lamps which indicate A.R.P. messages. All the other equipment on the bed is not flameproof, but it cannot be made alive until the extract ventilation in the bed and in the petrol cubicle has been in operation for half a minute, so as to allow for the scavenging of any petrol which may have been present in the test-bed room.

All petrol-handling equipment has been segregated from the

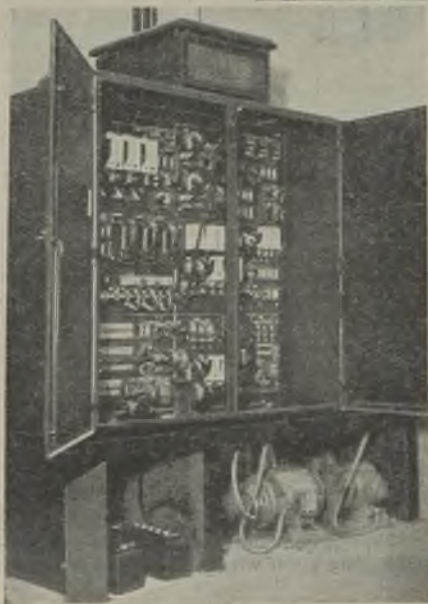
main control room for each bed, and is housed in a small flameproof cubicle adjacent to the control room. The cubicle has a window through which the petrol flowmeter, and pressure and boost gauges in the cubicle can be viewed by the operator standing at the control desk. In this way, the electrical equipment in the control room is exempted from being flameproof.

A solenoid-operated valve inside the petrol cubicle prevents petrol from being fed to the test bed until the ventilation of both the test bed and the cubicle is under way. As a pre-



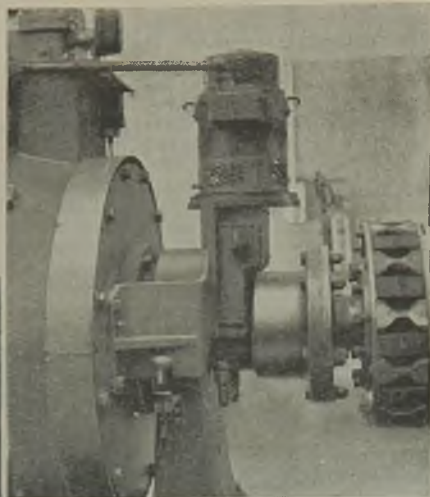
Control desk next to cubicle window; note illumination canopy with indicating lamps, and, to the left, push-button control station for petrol pump, cooling-water pump and water cooler fan motors

At the far end of the line of control equipment in each section of the control room are the main cubicle-housed contactor and control-equipment panels (left-hand picture). The m.g. set for the dynamic dynamometer excitation and the engine-starting battery are seen at the bottom

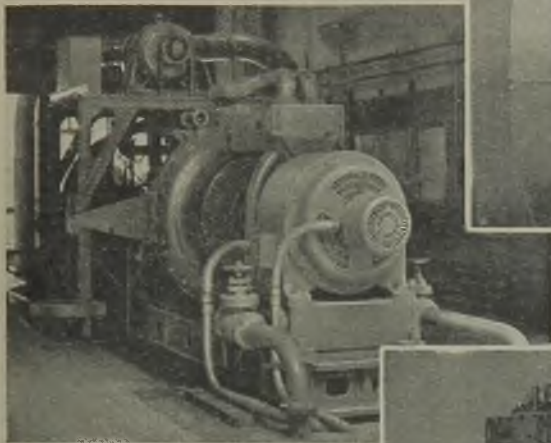


caution against fire originating in the petrol cubicle, carbon-dioxide fire-fighting equipment is provided and can be brought into operation by means of a heat fusible link. This link, in turn, isolates the cubicle ventilation and operates a pressure limit switch which both closes the solenoid valve and shuts down the petrol pumps supplying all the beds. To protect the engine against various factors depending on the human element, limit switches are provided on the valves of the

engine-coolant system and the main oil line to the engine pump. Further protection against lack of water in the dynamometer, excess temperature of the dynamometer cooling water, and overspeeding of the engine is provided by a water pressure switch, a thermostat and an overspeed relay, respectively. All these items are arranged to operate relays which will earth the engine ignition system in the event of the emergency equipment being brought into operation.

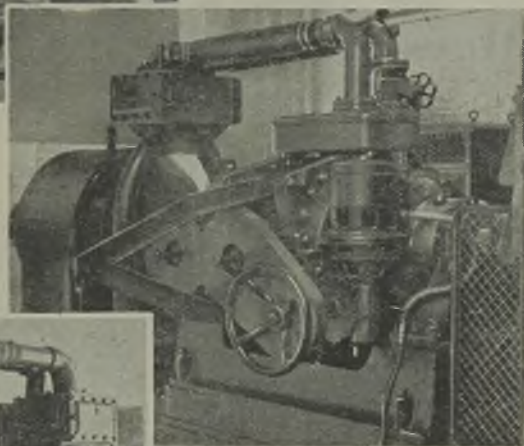


Excitation of the dynamic dynamometer is effected by a variable-speed exciter driven by gearing off the main shaft; note thermostat and pressure switch

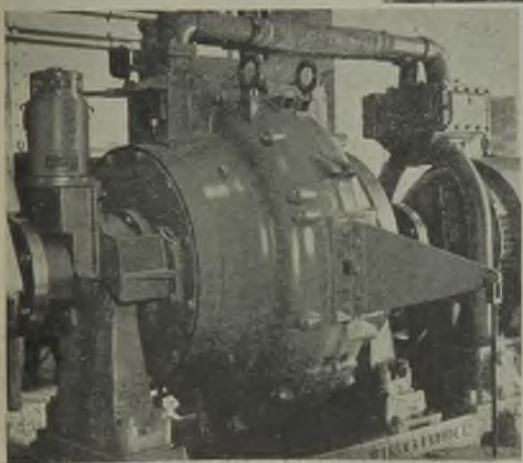


Main engine-starting motor (front) and engine-cooling fan motor surmounting the test-bed superstructure

The building which houses the new installation is so laid out that each control room serves two test beds, one on either side of the control room, with all the beds and

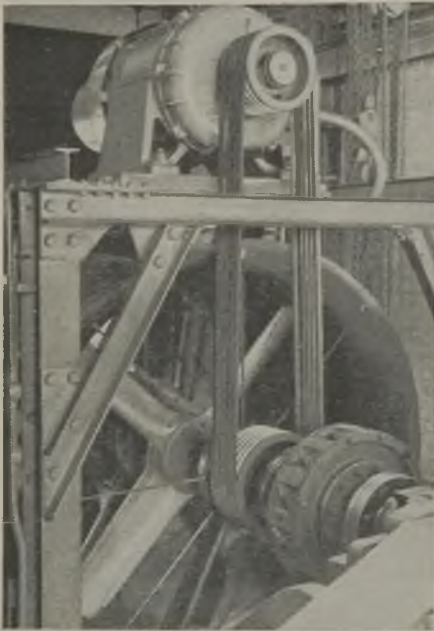


Load on the hydraulic dynamometer is controlled by means of a sluice valve which can be operated manually or by a geared motor seen to the right. The dynamometer (left) is not regenerative, and it dissipates its energy as heat which is conducted away by the cooling water



control rooms in one line. Separate from the main building are a petrol-pump room and a water-pump house with a water-cooling system, all common to the four test beds. Each test bed consists of an engine mounting upon which the engine is rigged, served by various supply pipes and

electrical connections. When the engine is in position, the airscrew shaft is coupled to a transmission shaft connected to the dynamometer. Between the engine and the dynamometer a cooling fan is mounted in such a way that it runs co-axially with the transmission shaft, but is free to run independently of this shaft. At the farther end of the dynamometer is a 120-HP motor which can be coupled to the dynamometer shaft by means of a dog clutch for engine starting. An extract fan is mounted on the roof trusses at the engine end of the bed, and draws air through a ducting system from a point just below the rear of the engine. Two intake fans,



Between the engine and the dynamometer is a fan which runs co-axially with the transmission shaft, but is free to operate independently of this shaft

fitted into the wall at the other end of the bed, are equipped with heaters to warm the incoming air in cold weather.

There are two entirely separate but identical sets of equipment in each control room, each set serving its own test bed. At the engine end of each set of control equipment is the petrol cubicle, next to which is the control desk, followed by the dynamometer weighing gear, and finally, at the other end of the line, are the electrical control panels.

There is an intake fan at each end of the control room, and this draws its air over a heating battery. The extract air is provided for by Robertson ventilation equipment

arranged in the centre of the control-room roof. Practically all starting and testing operations can be effected from the control desk. Push-buttons controlling all the motors on the test beds are suitably mounted on the desk, and a canopy containing "Mazda" fluorescent lighting fittings which provide the control desk illumination also accommodates a number of indicating lamps in a multi-way indicator which permits the operator to see, at a glance, the state of every drive, or what it is necessary to do if, say, the main engine-starting motor will not start up.

Another section of the desk is devoted to the dynamic dynamometer controls. All these controls are mounted adjacent to the engine throttle, supercharger change speed, and slow running cut-out levers on the control desk within easy reach of the operator. Various pressure gauges, thermometers and cooling-water control valves are also mounted on the desk, while the petrol gauges are in the petrol cubicle and are observed through the window, as we have already indicated. The engine tachometer is mounted on the wall behind the desk, next to the depression tele-gauge and close to the boost gauge in the cubicle, so that all three gauges may be easily observed by the operator. Near the petrol cubicle window is a push-button station for the six $\frac{1}{2}$ -HP petrol-pump motors, with direct-on starting, the three 27-HP water-cooler fan motors and the three 35-HP water-pump motors, with star-delta starting. The starters for these twelve motors are located in the pump house.

Testing Procedure

Let us attempt to describe the operations of an actual test, assuming, of course, that the engine is mounted, rigged and coupled to the transmission shaft. The main isolator on the main control panel is first switched on, and this operation is indicated by the appropriate pilot lamp over the control desk. Then the ventilation motors are started up by means of one push-button for the petrol cubicle ventilation, and one push-button for the test-bed ventilation. These operations are also indicated by the appropriate pilot lamps. At the same time the petrol pump, the water pump and the water-cooler fan motors are all started up, and the starting up of the water pump automatically operates a pressure switch which serves the appropriate indicating pilot lamp.

After a delay of half a minute "plant ready" is indicated by the appropriate pilot lamp, whereupon the Glycol (coolant) inlet valve, the Glycol outlet valve and the main oil valve are all opened, and these operations are indicated by the pilot lights. These valves are so interlocked that the engine cannot be started until they are opened.

The next operations are to engage the dog-clutch from the 120-HP engine-starting motor,

start up the motor-generator set which provides excitation for the dynamometer, start up the engine-cooling fan and then to run up the main engine motor. This motor is accelerated until the correct starting speed is reached. The main engine-starting motor is controlled by "start," "stop," "accelerate," and "retard" push-buttons. The accelerate and retard push-buttons control a reversing geared pilot motor on the control panel which drives a rotor regulator to vary the speed of the main motor, according to testing requirements. Whenever the main motor is stopped, the rotor regulator is returned automatically to the low-speed position, and the main motor cannot be started until the low-speed position is reached.

The magneto earthing switches are next turned to the "on" position. In order to make the engine fire an "ignition" push-button is pressed so as to actuate the earthing relays in the control cubicle. At this stage the engine is running under its own power, and when its speed exceeds that of the starting motor the dog-clutch is automatically

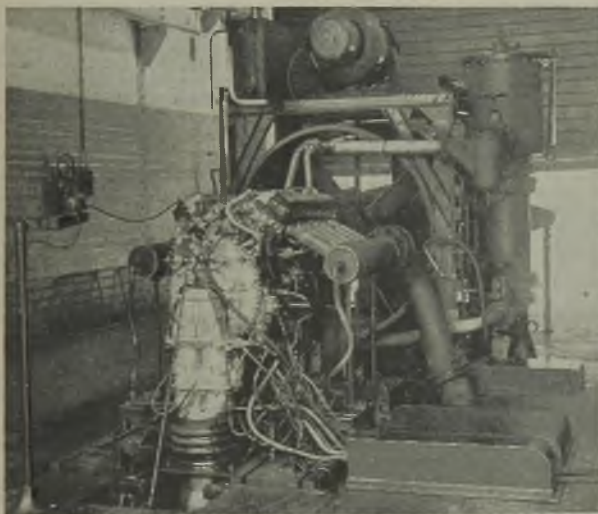
disengaged, and this operation actuates a limit switch which shuts down the main motor. Load can now be applied to the engine by operating the dynamometer regulators.



Practically all the test-bed operations are effected from the control desk top; left, push-button controls for sluice valve, battery, starter, bed fans, petrol fan, motor-generator and main motor; centre, engine controls; right, dynamometer controls

Provision is made for the use of both the dynamometer and the hydraulic types of dynamometer; indeed, both types are being employed at this early stage in the operation of the new installation, and base-plate accommodation is provided for either type of dynamometer at each test bed. The propeller law characteristic is inherent to the water brake and the load is controlled by means of a sluice valve which can be operated either manually or by means of a geared motor with transmission via a lead screw. The travel of this screw in both directions is curtailed by limit switches, and the motor is controlled from the desk by forward and reverse push-buttons which actuate suitable contactors.

The dynamometer is the type chosen for the new installation because there are no wearing parts other than the bearings. It is not regenerative, but it dissipates its energy as heat which is conducted away by the cooling water. The cast-steel stator is mounted on trunnions, and the torque reaction is transmitted through a system of levers linking up with the weighing gear in the control room. The stator is magnetised by a coil located centrally in a



Each test bed consists of an engine mounting upon which the engine is rigged, served by various supply pipes and electrical connections

duct right round the stator; consequently, in principle, the dynamometer is a homopolar unit.

The rotor is a solid steel casting, with teeth milled at the periphery. Hence, as the rotor revolves the magnetic concentrations at the teeth move round the stator wall, with the result that eddy currents are induced in the wall. These eddy currents give rise to heat which is dispersed in the cooling water which circulates round the stator. In order to create a propeller law characteristic the torque must be arranged to be proportional to the 1.8 power of the speed.

Since this characteristic is not inherent to this type of dynamometer the method of excitation used is that which will give the necessary torque as the speed rises. This is accomplished by means of a variable-speed exciter which is gear driven from the dynamometer shaft. The voltage of this exciter can be made proportional to the 1.8 power of the speed, and, in fact, this output can be varied by means of a pre-set regulator to give a response which is either higher or lower than this figure.

The actual excitation of the coil is provided by a motor-generator set whose field is controlled by the variable-speed exciter; thus the coil excitation is proportional to the output of the exciter.

As the torque absorbed by the dynamometer

throughout most of its speed range is approximately proportional to the excitation, it follows that the desired characteristic can be obtained. The m.g. set carries a further exciter, the purpose of which is to supply the field of the variable-speed exciter. But the fixed-speed exciter also has other duties such as providing reverse excitation on the main generator in order to neutralise the residual magnetism in the dynamometer carcass. Hand control is used for the purpose of selecting a speed-torque characteristic suitable for the engine output, bearing in mind that the index remains the same for any selected characteristic.

Both the dynamatic and hydraulic types of dynamometer and water coolers with their associated electrical equipment are products of Heenan & Froude, Ltd. All other electrical control equipment was supplied by the Igranic Electric Company.

The motors used throughout the test beds were supplied by Brook Motors, Ltd., with the exception of the six flameproof petrol-pump motors, which are of Crompton Parkinson construction.

Rolls-Royce were responsible for the layout and installation of the beds, control rooms, pump houses and associated equipment, and constructed such items as the control desks, indicating lamp canopies and various electrical connection boards.

District Heating

Major Lloyd George's Statement

IN the House of Commons on November 28th, Mr. Bossom asked the Minister of Fuel and Power what proportion of the thermal units generated in our larger power stations was converted into electricity and what percentage would be available, if appropriate machinery were installed, for providing circulating district heating and circulating district hot water. Would the new electricity generating stations to be erected under the auspices of the Central Electricity Board be equipped so as to use their surplus heat after the generation of electricity for the purpose of providing circulating district heating and circulating district hot water in the areas in which they were constructed?

Major Lloyd George replied that district heating was at present being considered by a Sub-Committee of the Heating and Ventilation (Reconstruction) Committee appointed by the Department of Scientific and Industrial Research. The Government would wish to see the report of that Committee before it could formulate any policy on this matter. The development programme of generating stations just published was so urgent that it could not await the formulation of a policy on district heating which would require legislation. The proportion of heat units in the electricity sent out from the larger and more modern generating stations as compared with the heating units in the coal used ranged from 25 to 28 per cent. If certain difficulties were overcome and district

heating from generating stations adopted, it might be possible to have made available 70 to 75 per cent. of the heat units in the coal for combined electrical and district heating purposes. The quantity of electricity, however, produced from every lb. of coal would be considerably less than with present methods and a proportionate increase in generating plant would be required to produce as much electricity.

Mr. Bossom asked the Minister if he considered it desirable that we should go on generating electricity in this unscientific manner when our national supplies of coal were diminishing.

Major Lloyd George agreed that we must utilise coal to the best possible advantage. While a certain amount of heat could be obtained from thermal units a considerable portion of electricity would be lost. It might be that future generating stations would have to be proportionately bigger to meet the demand for district heating.

Mr. A. Hopkinson: Is it not a fact that modern methods of electrical generation use up almost the theoretical amount of heat?

Mr. Bossom: Will the report of the Committee be out in time for the big housing development after the war?

Major Lloyd George: I have no doubt that it will be out before that time but with the extremely severe strain upon electricity at present we cannot wait for the report before putting up new stations.

Improved Installations

Discussion of I.E.E. Committees' Reports

AT last week's meeting of the Installations Section of the Institution of Electrical Engineers a discussion took place on (a) Section B (installation only) of the report on "Electricity Supply, Distribution and Installation" prepared by Sub-Committee No. 3 of the I.E.E. Post-War Planning Committee; and (b) the report of the Electrical Installations Committee convened by the Institution on behalf of the Ministry of Works: "Post-War Building Studies, No. 11: Electrical Installations." The chair was taken by MR. FORBES-JACKSON and the discussion was opened by MR. W. N. C. CLINCH who reviewed both reports. At the close of the discussion, MR. J. R. BEARD, chairman of the Committees responsible for the two reports, replied briefly to the various points that had been raised. A considerable number of speakers took part in the discussion.

The greatest attention was concentrated on plugs and sockets. Some objection was raised to the proposed 3-kW (230-V) socket-outlet and fused plug, one view being that at the present time there were some 10,000 pieces of apparatus requiring a 1-kW plug or less against one which required the larger size.

The idea of a single standard plug was strongly supported, but the size chosen was regarded with some doubt. Interchangeability of plugs and sockets was urged, but the view of one speaker was that B.S. 546, with its three sizes, rendered this impossible. It was asked whether one of these three sizes could not be adopted to avoid duplication as it was clear that the existing range of B.S. 546 plugs would remain in being for many years.

Replacement or Revision of Rules

Views were expressed for and against the recommendation that the I.E.E. Wiring Regulations should be replaced by Basic Safety Regulations and Codes of Practice. A supply engineer welcomed the proposed change, pointing out that strict adherence to the Regulations would have precluded the use of ring or room circuits in certain experimental houses with which he had been concerned. On the other hand, some speakers deprecated the idea of superseding the I.E.E. Regulations, and made suggestions as to how they might be revised.

It was felt that the claim in Report No. 11 that a saving of approximately 25 per cent. might be achieved by a ring circuit in a given case might be misleading. This statement should not be construed as meaning that the more adequate provisions recommended for post-war housing would be obtained at a

25 per cent. reduction on pre-war costs, but that the improved facilities would be obtained at a cost proportionately less than with pre-war wiring methods.

One speaker said that by doing away with the ring circuit the greater part of local fusing would be also done away with. It was agreed, however, that local fusing might be necessary for certain apparatus. It was urged that the fuse should be in the socket where it was out of the way rather than in the plug.

Incidentally, the suggestion was made that fuses should be rated in watts as soon as a national standard voltage was established. An architect expressed appreciation on behalf of his profession of the work done by the Institution for so many years through the Wiring Rules. He also mentioned with approval the extensive use in America of circuit-breakers instead of fuses.

Fires and Refrigerators

It was suggested that socket outlets should not be in the skirting but at hand level. Another suggestion was that instead of one 3-kW fire at one end of a room with the occupants grouped round it, there should be more than one fire in different positions. The proposed 4 cu. ft. capacity for refrigerators was thought to be too big for some small houses. A capacity of 2 cu. ft. was considered by this speaker to be more suitable in these circumstances.

An all-insulated system was advocated, thus eliminating the use of conduit, although it was admitted it might not be possible to achieve this immediately and that the question of interference with radio reception would need to be borne in mind. The aim of the Study Committee in securing a neat, well-housed and unobtrusive design of consumers' supply control unit was applauded.

With regard to electricity in farm buildings, the lack of legal obligation on the part of the landlord to compensate the departing tenant for the improvement of farm property was regarded as more important now than the question of wayleaves. Mr. Beard, in replying to this point later, said the question was what could be done. The electrical case was merely part of a larger and most controversial matter, hence it might be difficult to secure legislation with regard to it.

Representatives of all sections of the industry concerned with installation work took part in the discussion, and the constructive comments made will receive further consideration by the Committees.

Mr. J. R. Beard in some concluding remarks, as chairman of the Committees,

said that the reports indicated general matters which it was thought should be discussed and which, after discussion, would lead to action. He did not think the question of the availability of two-part tariffs should affect consideration of control arrangements, although uniformity in form of tariffs was sincerely to be hoped for. The "No. 3 Committee" in dealing with this matter in its report had put forward what he hoped were useful suggestions.

Concerning the comments on the suggested 25 per cent. reduction on pre-war cost if ring circuits were used, he said this was intended to be an over-all figure and was based on a complete installation arranged to provide given facilities. Since the report was issued, arrangements had been made with six different parties representing contractors, supply authorities, etc., to prepare comparative estimates for certain typical houses of the class intended to be built after the war, using (a) ring circuits, (b) room circuits and (c) pre-war practices, and the figure mentioned in the Report had been fully confirmed.

The various arguments, put forward with regard to plugs and sockets had all been carefully weighed by the Committee but it was necessary to subordinate individual views to the choice of what was most likely to meet needs of users, and it was hoped there would be some common action on this important question as the result of what had been said during the discussion.

Impedance Measurement

Propagation Constants of R.F. Cables

THE measurement of balanced and unbalanced impedances at frequencies of the order of 500 Mc/s as a means of determining the propagation constants of radio-frequency communication cables is dealt with in a paper presented by Dr. L. ESSEN (Radio Department, N.P.L.) before the Radio Section of the Institution of Electrical Engineers.

The investigations described formed part of the programme of the Radio Research Board, which received confidential reports on the subject in 1941-42. Although the general features of the electrical resonance of transmission lines had already been utilised for ascertaining impedance, no tuned-line apparatus suitable for routine measurements at the frequency mentioned had previously been developed. The author's work was an attempt to fulfil an urgent requirement for such apparatus, which was put into operation at once without its potential capabilities being thoroughly explored.

He employed an air-spaced concentric line for unbalanced and a screened twin line for balanced impedances, the length in

each case being variable by means of a movable bridge carrying a thermo-junction. The component to be measured is connected to the open end of the line, which is then adjusted to current resonance by movement of the bridge, enabling the impedance to be evaluated from the readings of resonant length and the width of the resonant curve according to the Chipman principle. Only the bare outline of that form of computation is given, but convenient working equations are developed and results are quoted to check the validity of the assumptions which are involved.

The number of methods of making these measurements which are described have been designed to eliminate experimental errors, which are discussed in some detail in an appendix to the paper, the accuracies achieved being ± 2 per cent. and ± 5 per cent. respectively for a wide range of values of reactance and resistance.

Empire Broadcasting

Director-General's Forecast

IN the course of an address on post-war broadcasting at the monthly luncheon in London last week of the Radio Industries Club, Mr. W. J. Haley (Director-General, B.B.C.) declared his personal opinion to be that a sensibly modified system of world broadcasting should go on.

In the immediate post-war years the B.B.C. would have no more urgent task than that of stimulating broadcasting within and about the Commonwealth, to foster which the B.B.C. was anxious to do all it could in giving of its experience and help. Invitations issued by the B.B.C. to a conference to be held in London in February, 1945, had been accepted by the heads of all the Dominion organisations (Mr. Frigon, Canadian Corporation; Mr. Moses, Australian Commission; Mr. Shelley, New Zealand Company; and Mr. Bokhari, All-India Radio). From that meeting it was hoped that great benefits would accrue to all listeners at home and throughout the Commonwealth. One of the things the B.B.C. was keenest to develop was interchange with Dominion organisations, not merely the exchange of programmes but also of personnel.

Only the most careful management of wavelengths made ordinary listening possible and to cover even so small an area as the United Kingdom involved the use of many transmitters. It was necessary to emphasise that fact because there was extraordinary ignorance about that aspect of the subject. Only by the most careful and highly co-ordinated planning would the B.B.C. ever be able to ensure good listening to each and every villager and city dweller in this country, let alone a choice of services. Only by utilising every wavelength it could reasonably expect to have at its disposal and by employing every one of the large number of transmitters it possessed, would the B.B.C. be able to evolve a plan. As it was, the Corporation expected in due course after the war to have to introduce frequency modulation as a means of improving national coverage.

Thermostatic Control

Some Simple Forms

By T. Thorne Baker, F.Inst.P., A.M.I.E.E.

NOWADAYS thermostatic control is utilised largely for all sorts of purposes. Countless industrial chemical operations are carried out within a degree or so of a critical temperature by their use, while in the laboratory and workshop one is frequently confronted with the problem of maintaining a given temperature, often of comparatively small apparatus, when any large outlay would be prohibitive for the purpose concerned. In such cases the type of thermostat that depends on the high co-efficient of expansion

the capillary tube as required for coarse adjustment.

The thermostat is very readily tuned up so that at, say, 50 deg. C. the toluene has expanded sufficiently to push the mercury upwards so far that it just touches the top contact, thus closing the circuit to the ends of which the top and side terminals are connected. With careful adjustment these thermostats will operate for months without attention within ± 0.5 deg. C. The thermostat is usually placed in series with one or two dry cells and a relay which operates the make-and-break device.

The Hearson Capsule

Although the Hearson capsule was originally invented to control the heat of an oil lamp for egg incubators, it works admirably as a delicate and highly reliable regulator of any form of electrical heating. I have had many years of experience of it in connection with the thermostatically controlled digesting baths used in the making of sensitised photographic products. The capsule itself is a small hermetically sealed envelope of copper filled with a liquid having a high co-efficient of expansion. It is fixed

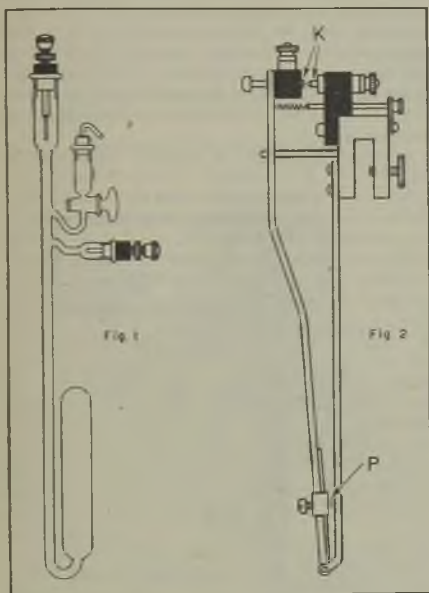


Fig. 1.—Toluene expansion thermostat (Griffin and Tatlock, Ltd.). Fig. 2.—Wide-range thermostat (C. Hearson and Co., Ltd.)

of liquid toluene is very handy; it is accurate, simple, and inexpensive.

One of these (Fig. 1) made by Griffin and Tatlock, Ltd., is a vertical cylindrical bulb about 6 in. high by 1 in. wide which tails off at the bottom in U-form to a capillary side arm. The bulb is filled with toluene (methylbenzene) which also runs about two-thirds the way up the capillary tube; on top of the toluene is a thread of mercury. A contact with adjusting screw is provided at the top of the thermostat and a second one at the side; just above the latter is a small cup and stopcock, mercury from the cup being flowed into

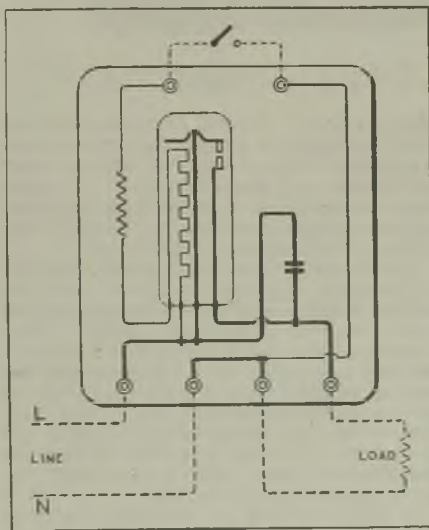


Fig. 3.—Controlling relay circuit

in the liquid or oven to be controlled. In the electrical form it forces a pin P (Fig. 2) outwards by expansion and, when above the

pre-set temperature, a simple lever opens or closes the contacts K K which, in turn, control the relay circuit, as indicated in the

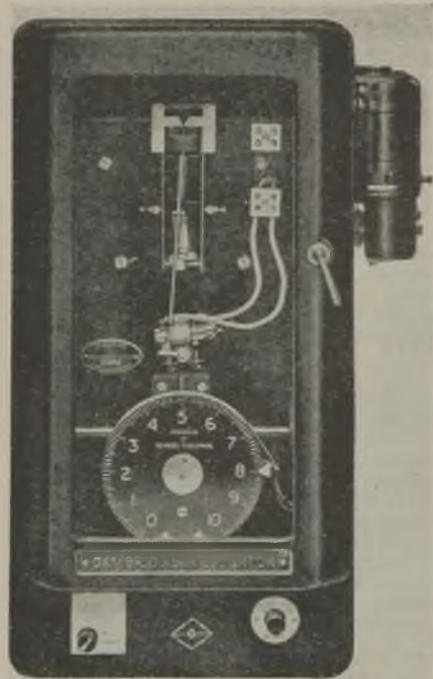


Fig. 4.—Precision temperature regulator (Cambridge Instrument Co., Ltd.)

diagram Fig. 3. A small pilot lamp indicates when the heater is functioning. This system is excellent for hot water baths between room temperature and about 80 deg. C. A somewhat modified type is supplied for maintaining low temperatures between 10 and 22 deg. C. for bacteriological incubators, etc.

A wide-range thermostat is also made by C. Hearson and Co., Ltd., in which the capsule is replaced by a thick plicated band of brass, faced in places with "Isidur" steel. The brass has a high co-efficient of expansion, the steel a negligible one. The brass and steel are so arranged that on expansion of the brass it recedes from the steel, acting on a lever which puts the platinum electrodes out of contact. This type will control a range of temperatures from 100 to 300 deg. C., working equally on AC or DC.

A high accuracy is obtainable, such as ± 0.1 per cent. over a range of 1,000 deg. C., with the Cambridge controller, which operates normally on a potentiometer principle, but if used with electrical resistance thermometers it operates as a Wheatstone bridge. Iron-constantan, titan and platinum-rhodium

thermocouples may be used, according to the range of temperature; a galvanometer is the sensitive detecting instrument and the balanced or null position of the pointer is established by means of a rheostat to correspond with the desired control temperature. Mercury switches are used to make and break the circuit, the whole instrument being enclosed in dustproof metal casing for flush or panel mounting.

New Controlled Oven

A new corrosion-proof electrically heated oven thermostatically controlled within ± 2 deg. C. at a temperature of 300 deg. C. is made by Griffin and Tatlock, Ltd. Asbestos-cement walls are lined with aluminium. Gravity convection is utilised in heating. A new type of thermostat with spring loaded contacts actuates a universal AC-DC relay with mercury switch make-and-break. The range of this laboratory oven is from 20 to 300 deg. C. The internal dimensions are 12 by 12 by 12 in. and the external dimensions 20 by 17 by 17 in. It is known as the "Microid Temperostat."

Another instance of applied thermostatic

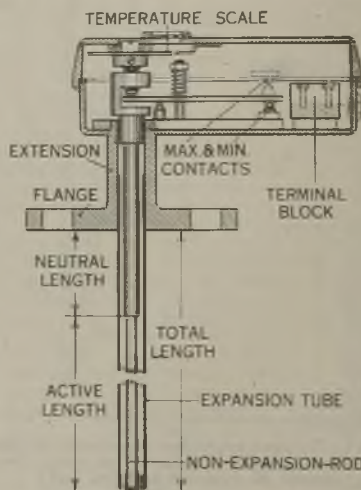


Fig. 5.—Room air thermostat (British Airca Regulators, Ltd.)

control is the thermal protective device for single-phase capacitor fractional horse-power motors, a B.T.H. device which affords automatic protection against injurious overloads. The motor is automatically switched off before it becomes overheated, and is restored to service when the machine has cooled sufficiently. A bi-metallic helix is assembled in close association with a heater helix connected in series with the motor windings. At a predetermined temperature the bi-metal helix twists and opens a pair of

silver-to-silver contacts which are normally closed.

Another motor protective thermostat, which is also being utilised for medical appliances, is made by Salford Electrical Instruments, Ltd. It is a small disc supported at the centre and concave when cool, changing with a snap action to convex shape when heated, so that appreciable current can be broken around the disc edge at normal voltages.

A simple form of control for laboratory electric furnaces, such as the combustion type, has been recently devised by Hurst and Cannon (J. Sci. Inst., Aug., 1943). A potentiometer bridge and a photo-cell relay are employed. A chrome-alumel thermocouple is used, the EMF of which is opposed by a standard EMF from a potentiometer. The differential EMF deflects a taut-suspension mirror galvanometer, which reflects a beam of light on to a commercial photo-cell relay (G.E.C. Type B 4). Several furnaces can be controlled simultaneously by the same photo-cell unit.

Precision Thermostat Bath

A toluol-mercury regulator is used in an interesting type of low temperature thermostat bath recently introduced by Townson and Mercer, Ltd. Its overall dimensions are 20 by 12 by 8 in., with a clear working space of 16 by 12 by 6 in. deep; 5.4 gal. water is thus required to fill the bath. A heating element and a cooling element are placed in a high-velocity stream of water which is pumped through the bath at about 80 gal. per hour through a fan-shaped opening facing one side of the bath. As an example of performance, it is stated that if the cooler be fed with water from the mains at 18 deg. C. the bath would stabilise at 22 deg. C. with a normal variation of ± 0.04 deg.; without the cooler element the bath would stabilise at about 30 deg. C.

Precision thermostats for temperatures up to 850 deg. C. are made also by British Arca Regulations, Ltd. They are constructed both to open and to close an electric circuit when the temperature rises above or falls below given values and to control a given temperature difference between, say, the incoming air and the interior of a workshop or building. The thermostat consists essentially of a head carrying an extension rod or "feeler" of suitable length which is exposed to the temperature to be controlled. The feeler (Fig. 5), has a negligible co-efficient of expansion, and is surrounded by a tube of the second material with the usual high co-efficient of expansion. As the temperature rises the difference between the expansions of tube and rod operates a lever mechanism contained in the head which, in turn, actuates palladium-copper alloy contacts. The dimensions of the head are $5\frac{1}{2}$ by $2\frac{1}{4}$ by $1\frac{1}{2}$ in.,

the length of the feeler being arranged to suit the job. A special mercury relay has been developed for use with thermostats with loads above 10 A. AC.

It is thus evident that automatic regulation of temperature can be achieved by the use of the differential expansion of two metals having widely different co-efficients of expansion (or by the expansion of a liquid or vapour) and electrically by the use of some form of galvanometer and relay operated by a thermocouple. Contact patterns of the latter are made by the Cambridge Instrument Co. for controlling the temperature of heated rollers, etc. To the electric type must be added resistance thermometers consisting essentially of a metal dome, the inner surface of which is wound with silk covered platinum wire, a large surface being thus offered. For controlling temperatures up to and around the boiling point these are very sensitive; water-tight patterns are also made for cold storage.

Chile's Imports

Marked Reduction Last Year

IN the electrical import trade of Chile in 1943, for which summary figures have recently been released, there was a marked decline on 1942, relieved only by a small increase in the power plant group. The only branch in which mention is made of supplying countries is lamps. There the falling off was nearly all in imports from Argentina.

The statistics available for 1943 are shown below, with notes of increase or decrease compared with 1942 (Peso = 6d.).

The recently published account of the 1943 operations of the official Development Corporation of Chile, which covers practically every type of industry, refers to the electrification

Class of Goods	1943 Pesos (000)	Inc. or dec. on 1942 Pesos (000)
Dynamos, alternators, etc.	1,440	+ 140
Electric motors	1,260	- 240
Parts and accessories for motors	1,860	- 340
Cables and flex	3,740	- 660
Meters and parts	370	- 180
Telegraph and telephone apparatus	125	- 605
Radio receivers and transmitters	1,440	- 3,060
Radio valves	480	- 220
Lamps, incandescent, for lighting		
and heating	1,360	- 240
From Argentina	25	- 205
" United States	1,304	- 16

programme. It says that the Pilmaiquen and Saual stations made further progress, and work was begun on the Abanico central station which is expected to furnish power to all the zone of which Concepcion is the centre. The transmission line from Ovalle to Punitaqui is expected to be in service very shortly. The extension of the Tocopilla, Copiapo, and Ovalle electric services continued, with the number of new customers surpassing the most optimistic expectations. The Corporation extended loans for increasing domestic production of electrical articles.

CORRESPONDENCE

*Letters should bear the writers' names and addresses, not necessarily for publication.
Responsibility cannot be accepted for correspondents' opinions.*

District Heating

TO argue that because our climatic conditions are not rigorous therefore district heating is unjustified does not bear investigation. To say that the process whereby heat is rejected from a heat engine is reversed in the electric radiator is untrue.

District heating is a means of utilising the latent heat of steam after it has done mechanical work in a heat engine and as such is thermally justified in any event. Whether it is economically justified is another matter, but in my opinion the subject requires more than the cursory investigation it is getting, and the potential demand is greater than is commonly supposed.

The efficiency of a heat-electric station in terms of power is, of course, not raised by distributing the rejected heat, but as a national process in which at least 50 per cent. of the heat of the fuel (won at so great a cost and sold at a greater) is now rejected to the nearest river or the surrounding air indiscriminately, the efficiency of use of fuel is raised by the distribution of the rejected heat in a way which makes provision of that heat by other means unnecessary.

B. S. GYLES, B.Sc.(Eng.), A.M.I.Mech.E.
Clearwell, nr. Coleford, Glos.

IN the correspondence columns of your issue of November 24th, Mr. B. Lloyd Price lucidly analyses the thermodynamics of district heating but in the last paragraph detracts from the value of his letter by drawing a wholly unjustified conclusion.

Stating that what district heaters are after is rejected heat (true in the sense that rejected heat is economical heat, and hence to be preferred), he concludes with the remark that "we may have the paradox of finding that our most efficient station is that in which power production has been squeezed out altogether."

That surely is incorrect. From what source other than loaded pass-out or back pressure turbines could rejected heat be obtained? Rejected heat is necessarily a by-product of power production, and there is no possibility of the power production being squeezed out or even reduced.

The most efficient heat station (not rejected heat) would naturally be one from which power production was excluded, this being a raw-heat station and operating at boiler efficiency. In a modern community, however, power demands would still have to be met, thus necessitating a separate (and less efficient) power station.

The most economical source of both power and heat from the community aspect would necessarily be a combined station, the heat rejected by the one process being utilised for the other. The thermal efficiency of such a station would lie somewhere between the boiler efficiency of a raw-heat station and the steam cycle efficiency of a power station.

It is true that the paper efficiencies of such combined stations would be difficult of comparison for competitive purposes, since they would depend more on the ratio of the demands for heat and power by the community than, as now, upon small refinements in largely standardised plant, but what of that if the result is to reduce the total fuel consumption to a minimum?

Presumably Mr. Lloyd Price meant that the most efficient station would be that in which comparative efficiency figures were squeezed out altogether. That would be true, but not a paradox or much loss. To accord chief importance to comparative efficiency figures which, be it noted, are "paper" figures only, is to mistake the shadow for the substance.

It is possible, even probable, that in time to come the need for fuel conservation will involve the combination of both functions in most undertakings, but before that time engineers will have to be capable of thinking in terms of both electricity and heat supply and not the former alone. It is satisfactory that some at least are thinking along these lines at the present day.

Bath. J. P. S. PILLANS, M.I.E.E.

Single-Pole Fusing

MY letter published in your issue of November 17th described an incident which I implied may not be infrequent when single-pole fusing is in general use. Mr. W. E. Steward points out that the circuit on which the fault occurred should not have had its polarity wrong and that gas pipes should be separated from conduits.

This, of course, is correct, but it does not dispose of the fact that changes of polarity can occur for a variety of reasons. The most thorough check up by the supply undertaking to ensure correct polarity of circuits and separation of the conduit system from gas pipes is no guarantee that the conditions will continue unaltered for a period of many years. In this case a composition gas pipe was laid across a conduit long after the job was inspected.

The objects of my letter were twofold.

not carried out, was to communicate with his office and a man would then be sent to make the necessary connection. There was no risk if the cable was connected to the ship, then run ashore, connected to the plug and switched on. What might have happened was that deceased carried the cable across to the ship with the switch already on. It was raining heavily and this would increase the severity of the shock. A verdict of "Death by misadventure" was recorded.

Damages Award

At Manchester Assizes last week a settlement of £1,326 was approved by Mr. Justice Stable in a claim for damages by Mrs. Lena Cook against the Stalybridge, Hyde, Mossley and Dukinfield Joint Transport and Electricity Board for the death of her husband who received a fatal shock while working on a 6,300-V line at Hollingworth. The Board, it was alleged, had been negligent in allowing the line to be charged with electricity.

Dutch Order for U.S. Generating Sets

It is expected that the cost of a Dutch order for six generating sets placed with the Westinghouse Electric and Manufacturing Company will amount to more than \$1,000,000. Delivery is expected between February and April, 1945. The plant is part of a drainage programme costing \$12,000,000, half of which will probably be expended on power plants to run the pumps which are to drain Holland's flooded lowlands. Orders for 200 pumps have already been placed with an American manufacturer, reports the *Wall Street Journal*. The power plants comprise four 2,000-kW and two 1,000-kW generating sets. They will all be driven by high-pressure steam turbines.—*Reuter's Trade Service*.

Control of Effluent

At Jedburgh Sheriff Court a fine of £1 was imposed on the manager of North British Rayon, Ltd., for contravening the Tweed Fisheries Act, 1857. It was stated that effluent from the acid house, after being neutralised, was carried into the River Jed, but on the day of the offence the neutralising system failed to act. The result was that crude acid flowed into the river. For the company it was stated that the flow of acid was electrically controlled, and on that day the system was brought to a standstill by a breakdown of the Jedburgh electricity supply. The breakdown lasted eight minutes.

Fluorescent Lighting Prosecutions

At Bolton on November 30th George H. Cobb, Derby Street, Bolton; the Engineering Service Co., 18, Market Street, Bolton; Edwin Lees, St. Helens Road, Daubhill; Ernest Kirby, Phillip Street, Bolton; and the Hulton Motor Co., Over Hulton, were summoned for installing fluorescent lighting without a licence. For the prosecution it was stated that the Order was introduced because the demand for the lamps was greater than the supply, and they were required for essential work. In only one case, at a mill, would a licence have been granted.

Counsel for Cobb said that, as an electrical engineer, if he had applied for a licence it would have been granted. Such lighting was beneficial and saved electricity. The Engineering

Service Co. contended that the lamps were not in short supply as had been suggested. The company had a considerable number in stock. It received travellers regularly who offered these lamps and was being pressed by manufacturers to accept delivery. Such lighting was a saving and helpful to workpeople. Lees was stated to have installed the lighting at Oaken-bottom Mills and other premises and also on his own premises for demonstration purposes. Kirby claimed that it was possible to buy the lamps anywhere.

Cobb was fined a total of £13, the Engineering Service Co. £12, Lees £11, Kirby £3 and the Hulton Motor Co. £3, with costs in each case.

Preston Tenants' Choice

The Preston Town Council recently defeated, by 31 votes to 11, a move to delete a decision informing the Housing Committee of the Electricity Committee's opinion that all new Corporation dwellings should be provided with electric cooking and heating facilities. The Town Clerk said the resolution would not prevent a Corporation tenant having gas installed if desired. Alderman Rhodes expressed surprise at the Town Council which was the custodian of the electricity undertaking "boosting another manufacturers' goods." On Holme Slack site, 95 per cent. of the tenants had themselves borne the cost of electrifying their dwellings.

Exports to Turkey

Applications for licences to export a number of classes of goods to Turkey can only be considered if recommended by the British-American Co-ordinating Committee. Turkish consignees should therefore be advised by their British exporters to submit their orders for these goods through the Turkish Bureau Centrale des Commandes for examination by the B.A.C.C. The exporter will be advised of recommendations through the United Kingdom Commercial Corporation. The goods scheduled include electrical machinery and apparatus (not including parts unless elsewhere specified); insulated wire and cable; refrigerators; and welding electrodes.

Colombian Schemes

The Colombian Minister of Economy has proposed to Congress a plan to increase Colombian industrial production by a thousand million pesos in five years. *Reuter* learnt recently that the Colombian Government is considering a scheme to join the Chinchina and Campalegre Rivers by a canal about 4,375 yards long and a tunnel of about 1,300 yards, whereby 4,500 kW could be generated. There are also schemes in hand for the erection of six hydro-electric plants in Boyaca which will cost five million pesos. The construction of a plant on the Anchicaya River has been started, and its capacity in about three years will be 12,500 kW, eventually rising to 60,000 kW.—*Reuter's Trade Service*.

Trade Announcement

Read & Partners, Ltd., have moved to 28/30, Hatfields, Stamford Street, London, S.E.1. The telephone number and telegraphic address remain the same. The stores address is 79, Broadwall, Stamford Street, London, S.E.1.

Turbo-Generator Design

Suggested Unification of Performance Requirements

ECONOMY in the use of materials and in the expenditure of man-power, together with assurance of maximum availability of a particular item of equipment, are most satisfactorily effected by making the machine, or its parts, completely interchangeable. The benefits are greatest in the case of articles made in large quantities for uniform conditions of service, whereas standardisation to the same extent in the case of large electrical plant is very complicated because the performance demanded varies so much.

Therefore, as is argued in the paper prepared by MR. G. A. JUHLIN (Metropolitan-Vickers Electrical Co., Ltd.) for the Institution of Electrical Engineers, unification of requirements must be an important first step towards standard types of AC turbo-generators. The divergence in design is probably wider in England than elsewhere because at least six manufacturers cater for the needs of 46 million people, whereas in the United States there are only three for 130 millions and three for 80 millions in Germany, while there is only one purchaser and one manufacturer (the State) in Russia.

Standardisation would, of necessity, introduce changes in design and methods of manufacture that have been based on long experience; they are not likely to be readily accepted by machine builders unless they offer compensating advantages, while the

technical difficulties involved are formidable.

The author accordingly reaches the conclusion that for both commercial and technical reasons complete unification of turbo-alternator designs must be regarded as impracticable at present, and he seems to be very doubtful whether the alternative of mechanical interchangeability would be feasible. He considers it to be extremely uncertain whether sufficient advantage would be obtainable in that way to warrant the expenditure involved and suggests that there is real danger of future developments being retarded thereby.

The necessity for unification of plant performance requirements is stressed (most of the paper being devoted to this aspect of the subject) and must precede any attempt to standardise design. The complexity of the problem makes it clear that no single section of the industry can, by itself, come to any generally acceptable conclusion on this matter. Close collaboration between all interests (meaning all the engineers involved in the design of power stations as well as those concerned with the design and operation of plant housed in them) will be essential to the solution of the problem; it would undoubtedly be beneficial to all concerned and the author suggests that steps should be taken to bring it about in order that all aspects of this vital question may receive consideration.

Revision of Lend-Lease Arrangements

Export Restrictions to be Eased

THE mission to the United States to discuss the operation of the Lend-Lease system, headed by Lord Keynes, has been able to arrange an agreement for the future working of the system with the American authorities. Mr. Churchill told the House of Commons last week that the Lend-Lease programme would be so reduced that we should be able to begin at once to increase our vital export trade and this would be intensified after the defeat of Germany.

From the beginning of next year this country would not receive under the Lend-Lease arrangements any manufactured articles for civilian use which entered into export trade nor of many raw and semi-fabricated materials, such as iron and steel and some non-ferrous metals. This would leave us free to export a wide range of goods made from those materials. We would not, of course, devote to this purpose any critically scarce materials unless the exports concerned were essential to the effective prosecution of the war. Until the German war was over there could be no significant release of resources, but after that (subject to the calls in respect of the war with Japan) it would be possible to turn over an increasing part of our

resources to civilian production, including export trade.

Where we continued to receive any raw materials the quantities received under Lend-Lease would be limited to our domestic consumption for the manufacture of munitions and the maintenance of our essential wartime economy. Cash would be paid for any additional supplies which we might need for export purposes.

The Prime Minister said that this removed one uncertainty about future conditions and it should now be possible for exporters to make plans with the assurance that they would be able to give effect to those plans with the least possible delay when the defeat of Germany released man-power, capacity and materials.

An American statement made at about the same time said that during 1945 Lend-Lease supplies would amount to £1,400,000,000, roughly half of the 1944 shipments. It was understood that, as in the past, the United States and the United Kingdom would both endeavour to ensure to the extent practicable that the exporters of one nation would not receive undue competitive advantages over the exporters of the other as a result of the war situation.

Registration and Inspection—I

A Study of Canadian Methods

INFORMATION reaching Canada from England indicates that the allied questions of compulsory registration of both contractors and journeymen and of compulsory inspection and regulation of all installations are once more to the fore. It may therefore be appropriate to give some particulars of the actual working of such compulsory measures in areas where they have, in varying forms, long been in operation, thereby indicating some of the difficulties and pitfalls which may have to be met as well as showing, by a description of the procedure adopted, how such schemes can be made to operate to the satisfaction of all concerned.

It should at once be stated that registration of contractors, either with or without licensing of journeymen, is taken for granted in both Canada and the United States. No one wants to be without it and it has undoubtedly come to stay. Similarly, the compulsory observation of wiring regulations ("The Code") is the logical consequence of the registration of the men who execute the work.

On account of the very much longer distances between centres of population and the great areas to be covered, both these countries have decentralised control: in Canada by Provinces and in the United States by large cities and by States. Much of this "separatism" may be due to inter-Provincial or inter-State jealousies or to politics. From my own observation I am emphatically of opinion that no such difficulties or "politics" need, or should be allowed to, creep into the formation of any British system. Even if it is considered that different parts of the country may require different regulations, this can be effected by suitable variation of one national scheme. This would do away with the system whereby each local supply authority attempts to impose its own regulations.

With this division between cities, States and Provinces, there are, of course, differences in rules, procedure and so on between the various areas. Yet there is a great deal of uniformity as regards general principles.

Wherever I have found a strong registration authority in existence, as in the four areas which will later be described, there is a rule that licences granted in one licensing area are not valid in another. This applies both to contractors' and to journeymen's licences. There are partial exceptions and concessions in certain cases, but these are rare and always involve additional fees. This policy, as already indicated, is greatly to be deprecated and in such a congested country as England,

with the very short distances between centres of population, it would lead to endless trouble.

The officials of each of the licensing authorities who were interviewed for the purpose of this article frowned upon any suggestion that supply authorities should be the licensing authorities. Bitter personal experience of the treatment meted out to contractors by supply authorities in some areas in England leads me heartily to support them in this. Their contention is, indeed, strengthened by the fact that, so far as I was able to ascertain, the power companies carry out no installation work. They recognise—and in two of the areas I visited this was very strongly emphasised—that the business of a power company is to supply power, no more and no less.

One apparent exception should be explained lest it be used as a justification for granting these powers to supply authorities in England. In the Province of Ontario, inspection is carried out by the Government but is administered by the Hydro-Electric Power Commission of Ontario. Although the H.E.P.C. is the largest supply authority, there are also numerous small companies, but for inspection purposes they come under the jurisdiction of the rules and regulations as administered by the H.E.P.C. But this body is something different from the ordinary supply authority. It does no installation work, but it carries out a vast programme of research work and it operates a great testing and standardisation department. The mark "H.E.P.C. Approved" is recognised throughout all the other Provinces—this in itself places the Commission on a pedestal seldom, if ever, attained in any other path of life in Canada—and it is agreed that this mark complies with the requirements of all recognised codes.

Little Opposition

The Hydro's chief electrical inspector says: "There is very little or no objection by supply authorities or others in the electrical industry to the Commission being engaged in the inspection business. There was a little opposition many years ago when it first undertook to do this work, but any such opposition has long since disappeared."

Closely linked with, though not a part of, the installation industry itself is the registration of engineers in Canada and the use of the word "engineer" itself. Unless one is a member of an "association of professional engineers," covering all engineers, not only

By E. Arthur Pinto,
A.M.I.E.E., M.E.I.C.

electrical, a man may not practice as an "engineer." Membership is usually by examination, though there are some alternatives in certain areas. Infringement is subject to severe penalties including imprisonment, and the holding of the highest qualifications is no defence.

Enough has now been said to make clear the strength of the power of licensing and registration authorities and how completely the whole question is covered by legislation, independent of private whims or ideas. Particulars will now be given of the actual operation in four large centres, namely the Provinces of Quebec and Ontario in Canada and, in the second part of this article, the cities of New York and Boston, U.S.A. The information given is authentic and official, having been obtained first-hand in interviews with leading officials in these areas.

Province of Quebec

Apart from the registration of engineers, which has already been dealt with, the licensing of contractors and journeymen and the inspection of installations are in the hands of the "Board of Examiners of Electricians," set up by an Act of Parliament of 1925. The rules are contained in two books published by the Ministry of Labour. These are: "Electricians' and Electrical Installations Act" (25 pages, 48 sections); and "Regulations respecting Electricians and Electrical Installations" (26 pages, 34 rules).

The Act begins with a series of definitions and provides, in general terms, that no new installation or any alteration to an installation may be made without a permit and that no permit shall be issued to anyone not in the possession of an "A" or "B" licence (see below). Other clauses provide that no public service company nor a municipal service may connect up any installation until it has been inspected and approved by the examiners and a certificate of acceptance and an order to connect have been received. The examiners may declare any existing installation to be defective and may order the necessary alterations to be made. Penalties are provided for non-compliance. Supply authorities, on an order from the examiners, must disconnect any installation declared to be defective. The Lieut.-Governor in Council may prescribe the materials and apparatus which may be used in the Provinces. He may also prohibit the sale, use of, or trading in accessories, appliances, materials, wires and cables, motors, heaters, etc., which have not been approved. The Act also deals with the fixing of fees, conduct of examinations, details of licences and many other matters.

The "Regulations" are the rules put into force by Order-in-Council under the authority of the Act. They are mainly financial, though not entirely. Six general classes of licences are provided for: "A"—Full contractors

qualified by examination. "B"—Contractors being firms or companies, who must employ as a member of the company a holder of a journeyman's licence. "AZ" and "B2" are licences similar to the above where the holder is in the employ of the owners of a public building. "C" is the full journeyman's licence, requiring four years' experience. "D" is for persons in charge of cinematograph machines. "E" is for "persons with a knowledge of electricity" for work only on the premises where they are employed; they must pass an examination. The "F" licence is for persons in charge of machinery such as cranes, lifts, etc. Apprentices must be registered and must train for four years. They must take the journeyman's examination within three months of concluding their apprenticeship. They do not appear to be indentured, so may change employers during their term.

Annual fees for licences are (taking the dollar at 4s.): "A" and "B," £5; "C," £1 first year, 8s. after one year; "D," "E," "F," 12s. For a temporary "A" or "B" licence for a firm whose place of business is outside the Province a fee of £10 is payable. Heavy penalties ranging from a minimum of £2 2s. per day to £10 per day with or without imprisonment up to 8 days are provided for working without the necessary licence or employing an unlicensed man. The owners of a public building, factory or the like employing electricians to carry out their own work pay a licence fee depending on the total number of persons employed: up to 100 employees £2, over 250 employees £10 for each 500, and so on.

Heavy Inspection Fees

The most serious matter, however, is the amount of fees payable for the inspection of installations. The scales occupy no less than twenty pages in the book of rules. It is quite impossible here to give a lengthy extract, but the following examples will give at any rate some idea of what these fees mean: Service switches:—Up to 60 A, 4s.; 201 to 400 A, 12s.; 601 to 1,200 A, 25s.; over 1,200 A, 33s. Wiring installation, wiring and switches only:—Up to 24 outlets, approximately 7½d. per outlet; over 24 outlets, 5d. per outlet. For fittings and apparatus, calculation is on a lampholder basis, the fees being approximately half the fees for wiring, as above. Motors:—Not exceeding 750 V: Under ½ HP treated as lighting outlets; ½ to 5 HP, 4s. each; 7½ to 10 HP, 6s. each; over 10 HP, 8s. each. Exceeding 750 V: Up to 50 HP, £2 each; 50 to 100 HP, £2 8s. each; over 100 HP, £3 each.

There are annual inspection fees for all installations in public buildings ranging from 8s. up to 30 A to £4 for over 600 A. All other types of work and apparatus are covered, such as garages, circuses and fairs,

farms, floor polishers and many other items. The fees are high but there does not seem to be any serious complaint and if a scheme is to be self-supporting it does not appear possible to avoid these payments. In England, on account of the lower wages and the shorter distances to be covered I estimate that a reduction of the figures I have given could be made to the extent of about 25 per cent.

A plant in which I was engaged was controlled by the Federal Government and we therefore thought we were beyond the control of the Provincial examiners. However, a man was electrocuted whilst at work and the coroner ordered the Board of Examiners to report on the installation. This took three weeks and we were presented with a bill for nearly £400. Moreover, having thus been placed under the Board and as we employ our own electrical staff we shall now apparently have to pay also an annual inspection fee, to say nothing of an annual licence of £10 for every 500 of our 5,000 or more employees.

The Province has two main offices, at Montreal and Quebec. Three examiners are employed, one being the Chief Examiner and Director of Service, who presides over all deliberations of the Board. Examinations of candidates for licences are dealt with by the Board exclusively. Sub-branches are established at thirteen other centres. In quite small districts where there would not be enough work for a full-time man, suitable local arrangements are made. Since its inception the scheme has been self-supporting, an occasional loss in one year being made up by a profit in another. It is estimated that the overhead expenses of a branch office, apart from the inspector's salary, are about £800 per annum.

The population of the Province is about 3½ millions. There are 68 inspectors, in addition to the three examiners. In Greater Montreal there are 32 inspectors and this office has 12 others covering other towns in its area. These deal with about two million of the population, the remaining 24 inspectors, under the City of Quebec's jurisdiction, being responsible for the balance. The number of inspections made varies from 70,000 to 100,000 per annum.

Province of Ontario

The system in force in Ontario in many ways resembles that for Quebec, but the differences are of sufficient interest to be worth while quoting, as they indicate a number of variations which would probably be of value in any English scheme. The rules here are not quite so stringent, in that there is a certain amount of "local option," but the final result is very similar as regards inspection and examinations, but less binding concerning registration. As already men-

tioned, the Hydro-Electric Power Commission holds powers as regards inspection and licensing, which are treated as separate matters.

There is no provincial law as regards licensing, but power is given to municipal authorities to enact by-laws for licensing contractors and journeymen. Many municipalities, especially the larger ones, have taken advantage of this. Examinations for licences are carried out by a Board appointed by the Police Commissioner's Department where such by-laws are in force. In each case both contractors and journeymen are represented and there is in most areas a representative of the Inspection Department of the H.E.P.C. The entire Province is covered by inspection, even the remotest parts (and some parts of Ontario are remote, though they have an electricity supply). Inspection is statutory, as in Quebec, and a series of rules as well as the Canadian Electrical Code, also carry statutory force.

Design and Construction Approval

An Act of Parliament gives the H.E.P.C. wide powers over design and construction of electrical work, issue of orders relating to alterations and repairs to faulty installations, connection or disconnection of installations, fees to be paid for various services of the inspectors, provision of penalties for infringement of regulations, and so on. All materials used must be "approved." Rules follow which are to put the Act into effect. The fees are also set out in detail; they cover some 14 pages of print and are arranged under 32 classifications. For the purposes of this article they may be taken as being very similar to those already described for the Province of Quebec, although there are certain variations.

The Province has 24 offices throughout its whole area. There are, in all, 59 inspectors of whom 16 deal with Toronto (about 750,000 inhabitants), Hamilton 5, Ottawa 4, London 3, etc. The others are mostly one-man areas, but in very sparsely populated areas the inspectors are part-time men with some other occupation, often with the local branch of the H.E.P.C. These men receive 75 per cent. of the total fees collected in their respective areas. The whole of the organisation is under the direct control of the Chief Electrical Inspector at the H.E.P.C. headquarters, Toronto.

The income for the whole Province rose from £38,000 in 1935 to £65,000 in 1939. The numbers of inspections carried out during the last pre-war year, 1939, in the principal towns were: Toronto, 66,159; Ottawa, 17,566; Hamilton, 11,605; London, 12,644; Chatham, 6,706. The population of the Province is about four millions.

Arrangements in the United States will be dealt with in Part II.

Bedford's Jubilee

Progress After Hesitant Start

THE fiftieth anniversary of the day on which a public supply of electricity was first afforded in Bedford by the Corporation occurred on Tuesday last and a lunch will be held next Friday to celebrate it. It was on May 1st, 1889, that the Council had under consideration a report by a Committee appointed "to consider and report to the Council upon electric lighting." On consideration of this report the Council resolved to take steps to obtain powers under the Electric Lighting Acts, and on November 22nd formally resolved to apply for a Provisional Order to supply electricity within the borough. The Order was duly granted and confirmed by the Electric Lighting Orders Confirmation (No. 3) Act, 1890, which received the Royal Assent on August 4th in that year.

Some uncertainty as to the extent of the demand for a supply of electricity appears to have existed, and there was some delay in exercising the powers. Indeed, on July 18th, 1892, it was resolved "That under the circumstances the Authority do not consider it advisable to proceed further with the Provisional Order and instruct the clerk to make application to the Board of Trade for the revocation thereof at the latest period for such application," but in September of the same year, after an interview with the Board of Trade, the resolution was rescinded.

Further delay ensued, and during the following year and a half there was some possibility of competition by a company, entitled the Bedford Electric Light Co., Ltd., which actually applied to the Board of Trade for an Order. However, following further negotiations with the Board the Council resolved, on April 9th, 1894, "That this Authority do carry out the supply in the compulsory area set out in the proposed Provisional Order of the Bedford Electric Light Co., Ltd., before January 1st, 1895."

Completed in Six Months

After that events moved rapidly, and on May 18th, 1894, the Council had under consideration and approved a scheme prepared by Mr. F. H. Medhurst, consulting engineer. A month later the Council resolved to apply to the Local Government Board for sanction to borrow £12,000 for the necessary buildings, machinery and plant. On June 25th tenders totalling £9,121 were accepted for the erection and equipment of a generating station on land belonging to the Corporation and forming part of the present site. Mr. W. Hope-Johnstone was appointed engineer and a supply of electricity was actually afforded on the following December 5th.

The Electricity Committee informs us that it hopes later to publish a history of the undertaking from the days of the first chairman, the late Councillor Robert Richards, whose portrait was lately bequeathed to the Corporation by his son, through a long line of successors culminating in the present chairman, Alderman W. E. Sower, M.B.E. This will trace its technical development under the first engineer, Mr. W. Hope-Johnstone and his successors, Mr. R. W. L. Phillips (appointed November 1st, 1901), and Mr. P. G. Campling (appointed October 25th, 1938).

Forthcoming Events

Saturday, December 9th. — London. — Lysbeth Hall, W.1, 6-10 p.m. I.E.E. London Students' Section informal dance.

London.—Lighting Service Bureau, Savoy Hill, W.C.2, 2.15 p.m. Association of Supervising Electrical Engineers. "P.V.C. in Practice," by P. H. Barton.

London.—39, Victoria Street, S.W.1, 2.30 p.m. Junior Institution of Engineers. Presentation of awards and induction of new president.

Bristol. — Merchant Venturers' Technical College, 3 p.m. I.E.E. Bristol Students' Section. "Power System Operation and Maintenance," by K. H. Hope and W. A. Storey.

Leeds. — Electricity Department Offices, 2.30 p.m. I.E.E. North Midland Students' Section. "Is there a Future for Graduates in Synchronous Machine Design?" by H. C. Parker.

Monday, December 11th. — Bristol. — At Merchant Venturers' Technical College, 5 p.m. I.E.E. Western Centre. "Influence of Maintenance Requirements on the Design of Electrical Installation Equipment," by Hamlyn Drake.

Newcastle-on-Tyne.—Neville Hall, 6.15 p.m. I.E.E. North-Eastern Centre. "Restricting Voltage as a Factor in the Performance, Rating and Selection of Circuit-Breakers," by J. A. Harle and R. W. Wild.

Tuesday, December 12th. — London. — Lighting Service Bureau, Savoy Hill, W.C.2, 5.30 p.m. Illuminating Engineering Society. "The Automobile Headlamp," by Dr. J. H. Nelson.

Glasgow.—Royal Technical College, George Street, 6.15 p.m. I.E.E. Scottish Centre. "Design and Performance of Domestic Electrical Appliances," by W. N. C. Clinch and F. Lynn.

Manchester.—At Engineers' Club, 6.30 p.m. I.E.E. North-Western Students' Section. "Theory and Design of Air-Blast Circuit-Breakers," by W. M. Butler.

Wednesday, December 13th. — Birmingham. —James Watt Institute, 7 p.m. I.E.E. South Midland Students' Section. "Mica and Micanite," by W. B. Robertshaw.

Edinburgh.—Heriot-Watt College, 6 p.m. I.E.E. Scottish Centre. "Design and Performance of Domestic Electrical Appliances," by W. N. C. Clinch and F. Lynn.

London.—Institution of Electrical Engineers, 5.30 p.m. Transmission Section. "Valuation and Capitalisation of Transformer Losses," by W. Szwander.

Thursday, December 14th. — London. — Institution of Electrical Engineers, 5.30 p.m. Installations Section. "Organisation of Industrial Electrical Maintenance," by J. C. B. Nicol.

Birmingham.—Imperial Hotel. Illuminating Engineering Society (Birmingham Centre). Annual dinner.

Friday, December 15th. — Newcastle-on-Tyne. — At Literary and Philosophical Society's Theatre, 6 p.m. N.E. Coast Institution of Engineers and Shipbuilders. Parsons Memorial Lecture by Prof. C. E. Inglis.

Saturday, December 16th. — Birmingham. — Grand Hotel, 12.30 for 1 p.m. Birmingham Electric Club. Luncheon-reunion.

ELECTRICITY SUPPLY

Safeguarding Belfast Plant. Highland Distribution Scheme.

Bakewell.—SUPPLY TO HOUSES.—The Rural District Council is arranging for the Mansfield Corporation Electricity Department to provide an electricity supply to houses to be erected by the R.D.C., in the parish of Pleasley. Mansfield Corporation reports that the estimated cost is £4,100.

Bexhill.—DOMESTIC APPLIANCES.—The borough electrical engineer estimates that by the end of January every available cooker will be in use. The Electricity Committee has authorised the purchase of new cookers and utensils suitable for use with them. The utensils are to be sold and not covered by the hire scheme.

Glasgow.—MODERNISATION OF SEWAGE DISPOSAL WORKS.—A special sub-committee appointed by the Corporation Committee on Sewage Disposal recommends that the boilers at the Dalmarnock works shall be dispensed with and electric motive power used. Three electric pumps are to be installed capable of dealing with the average daily flow of 25,000,000 gallons; the cost of these is estimated at £7,800. New screens are also to be installed at an estimated cost of £2,370. The Electricity Department will be asked to carry out the necessary work in connection with the new electric cable, equipment for transformer house, supply and erection of the switchboard, etc., at an estimated cost of £2,500. It is expected that when the new plant is installed there will be an annual saving of £4,197 on present working costs. As the proposals are essential to meet immediate requirements only, the question of the post-war modernisation and future operation of the works will be further investigated.

Guildford.—SUCCESS OF METER READING EXPERIMENT.—To avoid many fruitless journeys by meter readers of the Corporation Electricity Department a scheme has recently been tried by which consumers are asked to indicate on postcards the position of the pointers on their meters. These cards are left at houses when the meter readers cannot obtain admission. The borough electrical engineer reports that the scheme has proved a great success and during the September quarter 859 postcards were delivered and 669, or 78 per cent. returned.

Lower Gornal.—OVERHEAD LINE.—The Midland Electric Corporation, Ltd., is to erect an overhead line to the Londonfields Colliery.

Macclesfield.—ELECTRICITY FOR FARMS.—The Electricity Committee is to erect overhead lines to Smith Green and Brook farms, Lower Withington.

Morecambe.—LIGHTING POLICY.—The Watch Committee has decided that future street lighting shall be by electricity and that there shall be a gradual conversion to electric lighting.

North-East Coast.—EXTENSION OF TIME.—The Councils of Sunderland, Boldon, Felling, Hebburn and Jarrow have applied to the Electricity Commissioners for an extension of one year in the time allowed to them to purchase the electricity undertakings situated in their areas under the South Shields Electric Lighting Order, 1903.

Northern Ireland.—SILENT VALLEY SCHEME.—It was announced at a meeting of the Belfast Water Board that the Works Division of the Ministry of Finance had been granted conditional permission to make borings in the Silent Valley area to test the practicability of a hydro-electric scheme.

PLANT FOR BELFAST.—The Corporation Electricity Committee has authorised the city electrical engineer to take immediate steps to expedite the ordering of equipment which will prevent a repetition of the breakdown which occurred on September 26th. The engineer recommends the purchase of a house set for installation at the Harbour power station to safeguard auxiliary supplies under abnormal system conditions. This will cost £22,000. Modifications to switchgear costing £20,000, the erection of a temporary switchboard costing £7,500 and fire extinguishing apparatus costing £520 have been approved.

North Scotland.—INQUIRY INTO BOARD'S SCHEME.—The Secretary of State for Scotland has appointed Mr. John Cameron, D.S.C., K.C., to be in charge of an inquiry which is to open at 10.30 a.m. on December 27th in Parliament House, Edinburgh, into the objections made to the First Constructional Scheme of the North of Scotland Hydro-Electric Board.

The scheme, which has been approved by the Electricity Commissioners, relates to projects at Loch Sloy, Lochalsh, and Morar. The clerk of the inquiry will be Mr. John McKenzie, and all communications should be sent to him at Parliament House, Edinburgh, 3.

DISTRIBUTION PROPOSALS.—Mr. T. Lawrie, secretary of the Board, speaking at Glasgow on November 30th said that the Board had just heard that its first distribution scheme, which covered the Lochalsh area, had been approved by the Electricity Commissioners and would be published very shortly. The Board would very soon, too, be giving an experimental supply to a factory in South Vist processing seaweed, and it hoped to encourage crop-drying and other developments. Dealing with the provision of domestic supplies, Mr. Lawrie said it was no use pretending that electricity could be supplied in the Board's distribution area in the West Highlands and the Islands at a profit. In every area which had yet been examined, the Board found that an appreciable annual loss must be incurred in providing domestic supplies.

Perthshire.—ELECTRIC LIGHTING AND HEATING.—It is recommended to Dunkeld (Perthshire) Presbytery that all church manse be equipped with electric light and heating as soon as possible after the war in order to reduce inside work. There are 25 manse within the Presbytery.

Sunderland.—COMPREHENSIVE LIGHTING PLAN.—The Highways Committee proposes to relight all the street lamps at a cost of £4,000. They will be controlled by a master switch.

Swancombe.—STREET LIGHTING.—The U.D.C. is to ask the Kent Electric Power Co. to arrange a demonstration of street lighting for members of the Council to attend.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Electric & Musical Industries, Ltd.—The consolidated profit statement for the year ended June 30th shows that, after providing for depreciation and obsolescence and crediting £3,308 (£2,188) interest on gilt-edged securities, there was a trading profit of £1,139,311 (£926,802). Pensions take £56,127 (£46,967), directors' fees £5,893 (£4,978), taxation £572,013 (£283,278) and reserve for estimated liability for income tax £323,254 (£417,222), leaving a net profit of £182,024 (£174,357). The net profit of the parent company is £149,250 (£127,500). A dividend of 8 per cent. is to be paid (compared with 8 per cent. for the previous nine months) and the carry-forward is increased from £248,539 to £253,360.

The chairman, Mr. Alfred Clark, states that it is the directors' intention after the war to continue to manufacture all the products made before the war with the exception of bicycles. The report of Lord Sankey's committee on television broadcasting is eagerly awaited and it is hoped that the recommendations will include a scheme for extending the service throughout the country immediately after the end of the war with Germany.

Crompton Parkinson, Ltd.—The accounts for the year ended September 30th last show a profit of £432,099 compared with £431,413 for the previous year. The directors recommend a final dividend on the ordinary and "A" ordinary stock of $7\frac{1}{2}$ per cent. actual, making 15 per cent. for the year. A special cash bonus of $7\frac{1}{2}$ per cent. on the ordinary and "A" ordinary stock is also to be paid (same). It is also recommended that £5,000 shall be paid to the trustees of the Central Benevolent Fund. A balance of £588,256 (against £488,657) is carried forward.

The British Electric Transformer Co., Ltd., reports a profit of £24,569 for 1943-44, compared with £37,000 in the preceding year. A final dividend is recommended on the ordinary shares of 6d. per share, making 9d. per share for the year (against 2s. 4½d. for 1942-43). A balance of £180 (£142) is carried forward.

General Electric Co., Ltd.—The extraordinary meeting to consider the creation of 2,000,000 4½ per cent. "C" preference shares of £1 each is to be held at Magnet House, Kingsway, on December 21st.

D. Napier & Son, Ltd., which is now controlled by the English Electric Co., Ltd., reports a profit for the year ended September 30th last of £174,376, as against £209,699, after taxation and all charges arising in connection with the transfer of control. After providing for fees and £88,038 (£131,933) for depreciation there is a net profit of £85,588 (£76,802). The ordinary dividend is maintained at $7\frac{1}{2}$ per cent. and £278,061 (£231,478) is carried forward.

The Perak Hydro-Electric Power Co., Ltd.—Mr. William Shearer, the chairman, stated at the annual general meeting on November 30th that they had had some preliminary consultation with the authorities engaged in

making plans for the rehabilitation of Malaya, but until they could ascertain the state of their property it had not been possible for them to do much more than to indicate approximately what they considered might be the minimum plant requirements to enable them to recommence operations in Malaya.

Cape Electric Tramways, Ltd.—Preliminary figures show that for the year ended June 30th last increased revenue amounting to £37,000 has been offset by increased operating expenses. Profits amounted to £47,809 (£52,740). Replacements reserve again receives £20,000 and a dividend of 6 per cent. (same) is to be paid, leaving £61,769 (£63,433) to be carried forward. Capital expenditure fell from £46,041 to £16,477.

The British Thermostat Co., Ltd., records a profit for the year ended January 31st last amounting to £34,799, as compared with £34,754 in the previous twelve months. Obsolescence reserve again receives £5,000 and a final dividend of 11 per cent. maintains the total distribution at $18\frac{1}{2}$ per cent., leaving £17,833 (£15,783) to be carried forward.

The St. Austell & District Electric Lighting & Power Co., Ltd., is to hold a meeting on December 19th to consider alterations to the articles permitting an increase in the number of directors from five to seven. It is also proposed that a director unable to attend board meetings may appoint a proxy.

John I. Thornycroft & Co., Ltd., are to pay a final dividend of 8 per cent., again making 13 per cent. for the year. A sum of £50,000 (same) is transferred to general reserve and the carry-forward is increased from £105,533 to £110,718.

Dictograph Telephones, Ltd., are paying a final dividend of 6 per cent. and a bonus of 1 per cent., making 11 per cent. (10 per cent.) for the year. The net profit, after providing for E.P.T., amounted to £36,318 (£35,005).

Aeronautical & General Instruments, Ltd., report a net profit of £29,527 for 1943-44 (against £28,930) after providing for fees, depreciation and E.P.T. (£30,000). The final dividend is $7\frac{1}{2}$ per cent., making 14 per cent. (against $12\frac{1}{2}$ per cent.).

Heenan & Froude, Ltd., from a net profit of £47,368 (against £42,487) are paying a final dividend of 5 per cent., again making 10 per cent. for the year, plus a cash bonus of 5 per cent. (same).

David Brown & Sons (Huddersfield), Ltd., announce that they have acquired control of Muir Machine Tools, Ltd., makers of high-speed turbine gears and gear-making machines.

Joseph Lucas, Ltd., have declared a final dividend of $12\frac{1}{2}$ per cent., making 15 per cent. (same) for the past year.

Marco Refrigerators, Ltd., is paying a dividend of $2\frac{1}{2}$ per cent., which compares with 5 per cent. for last year.

Thomas de la Rue & Co., Ltd., are maintaining their interim dividend at 10 per cent.

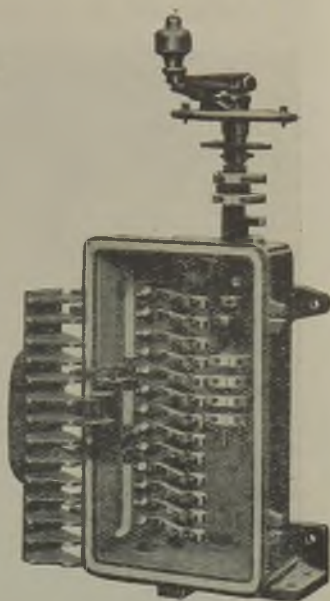
Edmondsons Electricity Corporation, Ltd., is again paying an interim dividend of $2\frac{1}{2}$ per cent.

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New Companies

John R. Jenkins & Co., Ltd.—Private company. Registered in Edinburgh November 23rd. Capital, £2,000. Objects: To carry on the business of electrical engineers, manufacturers of and dealers in all classes of electrical machinery and plant, etc. Directors: J. R. Jenkins, Carriden, Arthur Avenue, Airdrie, and Agnes Main, 18, Anderson Street, Airdrie. Registered office: 44, Graham Street, Airdrie.

Controls & Switchgear, Ltd.—Private company. Registered November 24th. Capital, £500. Objects: To carry on the business of specialists in electrical control gear and switchgear, electrical, acoustic, radio and television engineers, manufacturers of instruments and ray equipment, etc. Subscribers: E. C. Gimbell, 77, Beresford Crescent, Newcastle, Staffs; W. Jackson, 56, Buckingham Road, Morecambe; and C. N. Fraser, 5, Valley View, Jarrow-on-Tyne.

William E. Potter, Ltd.—Private company. Registered November 25th. Capital, £5,000. Objects: To acquire the business of an electrical and wireless engineer and manufacturer carried on by W. E. Potter at 135, Prescott Road, Liverpool. Directors: W. E. Potter and Winifred A. Potter, both of Wynstead, Southport Road, Freshfield, Lancs. Registered office: 135, Prescott Road, Liverpool.

Savage Transformers, Ltd.—Private company. Registered November 28th. Capital, £1,000. Objects: To carry on the business of electrical, radio and acoustic engineers, etc. Directors: W. B. Sawyer and Mrs. Jeanne L. Sawyer, both of 51-52, Northgate Street, Devizes. Registered office: 51-52, Northgate Street, Devizes.

H. N. Gray, McFarlane & Co., Ltd.—Private company. Registered in Edinburgh November 28th. Capital, £1,000. Objects: To acquire the business of a radio engineer carried on by H. N. Gray, 10, West Campbell Street, Glasgow. Directors: H. N. Gray, 87, Hillhead, Kirkintilloch; and R. McFarlane, 24, Rockbank Street, Glasgow. Registered office: 187, West George Street, Glasgow.

Radio Subscriptions, Ltd.—Private company. Registered November 23rd. Capital, £1,000. Objects: To carry on the business of television and radio engineers and dealers, etc. Subscribers: R. B. Stoney, Holmlea, Durrington, Wilts, and Elfrida E. Weaver, 1, Queen's Park Gardens, Bournemouth. Registered office: Upper Hinton Chambers, Bournemouth.

Ranelagh Radio & Electrical Co., Ltd.—Private company. Registered November 28th. Capital, £500. Objects: To acquire the business carried on by F. H. Brooke and E. R. Bird at Paddington as the Ranelagh Radio Repair Service. Directors: E. R. Bird, 11, Hereford Road, W.2, and F. H. Brooke, 10a, St. Edmunds Terrace, N.W.1. Registered office: 55, Westbourne Grove, W.2.

Companies to Be Struck off Register

Unless cause is shown to the contrary the following companies will be struck off the register at the expiration of three months from December 1st and will be dissolved:—Kenselectric, Ltd.; Neon Signs (Sheffield), Ltd.; Northern Electric (London), Ltd.; and Piccadilly Radio, Ltd.

Companies' Returns Statements of Capital

National Accumulator Co., Ltd.—Capital, £350,000 in £1 shares (175,000 preferred ordinary and 175,000 deferred ordinary). Return dated June 21st. All shares taken up. £292,616 paid. £57,384 considered as paid. Mortgages and charges: Nil.

East Anglian Electric Supply Co., Ltd.—Capital, £1,000,000 in £1 shares (40,000 preference and 960,000 ordinary). Return dated May 10th (filed July 15th). 2,581 preference and 600,000 ordinary shares taken up. £563,419 paid. £39,162 considered as paid. Mortgages and charges: £750,000.

Cornwall Power Co., Ltd.—Capital, £400,000 in £1 shares (250,000 ordinary and 150,000 preference). Return dated May 10th (filed July 15th). All shares taken up. £190,007 paid. £209,993 considered as paid. Mortgages and charges: Nil.

Merthyr Electric Traction & Lighting Co., Ltd.—Capital, £100,000 in £5 shares (6,000 preference and 14,000 ordinary). Return dated June 30th. 6,000 preference and 13,000 ordinary shares taken up. £95,000 paid. Mortgages and charges: Nil.

Bideford & District Electric Supply Co., Ltd.—Capital, £160,000 in 160,000 ordinary shares of £1 each. Return dated July 6th. All shares taken up. £148,400 paid. £11,600 considered as paid. Mortgages and charges: Nil.

G. L. Adamson, Ltd.—Capital, £7,500 in £1 shares. Return dated August 4th. 6,236 shares taken up. £1,736 paid. £4,500 considered as paid. Mortgages and charges: Nil.

Union Cable Co., Ltd.—Capital, £100,000 in £1 shares. Return dated June 29th. All shares taken up. £100,000 paid. Mortgages and charges: Nil.

Increase of Capital

Thomas Hill (Steam & Electrical Vehicles), Ltd.—The nominal capital has been increased by the addition of £8,000 in £1 ordinary shares beyond the registered capital of £2,000.

Mortgages and Charges

Stokes Appliances, Ltd.—Assignment of proceeds of contract, dated November 13th, to secure all moneys due or to become due from the company to Midland Bank, Ltd.

Euston Manufacturing Co., Ltd.—Satisfaction to the extent of £316 13s. 4d. on October 20th, of debentures registered November 6th, 1942.

Bankruptcies

T. Johnson, mechanical and electrical engineer and contractor, lately carrying on business as Tom Johnson & Co., 25, Granville Street, Sheffield.—Order made November 2nd, discharging debtor as from December 2nd.

H. A. Mayhew, electrical contracting engineer, 96, London Road, Apsley, and 30, Elmer Gardens, Edgware.—First and final dividend of 1s. 0½d. in the £ payable December 15th, at the Official Receiver's Office, 42, Tavistock Square, London, W.C.1.

STOCKS AND SHARES

TUESDAY EVENING.

MONEY in plenty seems to be available for investment in Stock Exchange securities. Gilt-edged prices are on the rise; Home Railway stocks make a good showing; domestic industrials are in persistent demand. The ambitious post-war policy of the Central Electricity Board serves to augment the previous strength of shares in the many companies likely to participate in the proposed expenditure of ninety million pounds upon power plant extensions.

Rises in British Insulated, Callender's and Henley's indicate the favourable post-war prospect which the buyers foresee. The Crompton Parkinson dividend and bonus are the same as last year, 22½ per cent. together. Some optimists had looked for an increase.

Rising Prices

Most of the advances secured last week by prices in the equipment and manufacturing group have been held. In some cases there are further gains. English Electrics have put on 1s. 6d., to 55s. General Electric at 97s., General Cable at 16s., and Revo at 44s., are all 1s. better. Electric Construction at 58s. 9d. improved by 1s. 9d. Tube Investments at 5½, and Switchgear & Cowans at 20s. 9d., are 1/16 up. Electricity supply shares are a quiet market. Electric Supply Corporation, at 50s. 6d., have added 6d. to their last week's rise. In the overseas list, Victoria Falls are up to 87s. 6d., Tokyo Electric sixes reacted 2 points to 26 and Perak Hydro-Electrics eased off to 13s. Burco at 16s. 7d. have lost 9d.

The radio market is quiet; interest has drifted for the time being into various other directions. Philco came back to 14s. 6d.; McMichael to 8s. and Cossor to 24s. E.M.I. remain at 36s. 3d.

Home Railway Possibilities

Home Railway stocks are again better. Whether or not there is any solid ground for it, the impression has spread that the Government will offer, as a matter of grace, better terms to the companies than the present ones. Southern Railway stocks are better, the preferred at 78½, and the 5 per cent. preference at 120½, being a point to the good. London Passenger Transport 5 per cent. "B" and the "C" stocks have gained about 1 in each case. Tilling shares hold their rise at 62s. British Electric Traction deferred has gone back to 200.

Crabtree Electrical

Since the annual report of Crabtree Electrical Industries appeared in the middle of November, the price of the 10s. ordinary shares has hardened to 43s., at which the yield is £4 1s. 4d. per cent on the money.

The company has been paying 17½ per cent. annually for years past, the earnings being, as a rule, considerably above this rate. The trading profit for the year ended October 31st, 1938, was £169,000; for the year ended October 31st last it was £244,000. Taking the same two years for comparison, tax in 1938 cost the company £61,684, being just £100,000 less than that of the year recently ended. The company came out in November, 1938, the object being to acquire shares and interests in companies engaged in the manufacture of electrical apparatus and equipment. The present issued capital is £950,000, of which £600,000 is in 10s. ordinary shares.

General Electric

The General Electric Co., Ltd., has called a meeting for December 21st in order to consider a resolution for creating 2,000,000 4½ per cent. "C" preference shares. These will be subscribed for, as already mentioned, by Morgan Grenfell & Co., at 20s. per share. The firm is to be paid a commission of 1½ per cent., £30,000, for so doing. The G.E.C. will therefore receive about 19s. 8½d. per share from the bankers, for shares which the company's own shareholders would have been glad to subscribe for at 20s. The General Electric's 7½ per cent. preference shares stand at 37s. and the 6½ per cent. preference at 33s., giving an average yield of 4 per cent. on the money. This implies that the new 4½ per cents. will probably stand upon a 4 per cent. basis of yield, making the price about 21s.

High Prices : Low Yields

The extent to which confidence is felt in the post-war prospects of industrial companies receives practical illustration from the manner in which prices of the ordinary shares in such companies have advanced to levels at which the return is meagre. British Insulated, Callender's, General Electric, and Associated Electrical Industries yield, for example, less than 3½ per cent.; Henley's return £3 15s. Crompton Parkinsons pay less than 3½ per cent. Ordinary shares such as English Electric return about 3½ per cent. Consolidated Signals, Crabtrees and Brush pay slightly over 4 per cent. The list could be considerably extended but these examples indicate the optimism which surrounds the post-war outlook for this branch of industry.

Edmundsons

Edmundsons Electricity Corporation has declared an interim dividend of 2½ per cent. on its ordinary shares, repeating the rate regularly paid since 1939. In each of the years since then, the final has been 3½ per cent., making 6 per cent. for the year, which ends with March 31st. It was in 1938 that

(Continued on page 834)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Dec. 5	Rise or Fall	Yield p.c.	Company	Dividend Previous	Dividend Last	Middle Price Dec. 5	Rise or Fall	Yield p.c.
Home Electricity Ordinary						Equipment and Manufacturing					
Bournemouth and Poole	12½	12½	62/6		£ s. d. 4 0 0	Aron Elec. Ord.	15	15	61/-		4 18 4
British Power and Light	7	7	33/-		4 4 10	Assoc. Brit. Eng.	6	7	57/6		2 8 9
City of London	7	5½	30/-		3 13 4	Assoc. Elec. :					
Clyde Valley	8	8	42/-		3 16 0	Ord.	10	10	57/-		3 10 5
County of London	8	8	43/-		3 14 5	Pref.	8	8	39/6		4 1 0
Edmundsons	6	6	31/-		3 17 5	Automatic Tel. & El.	12½	12½	67/-		3 14 7
Elec. Dis. Yorkshire	2	2	45/6		3 19 6	Babcock & Wilcox	11	11	53/-		4 3 0
Elec. Fin. and Securities	12½	13½	60/6		4 9 0	British Aluminium	10	10	46/-		4 7 0
Elec. Supply Corporation	10	10	50/6	+6d.	3 18 6	British Insul. Ord.	20	20	54½	+½	3 10 0
Lancs. Light and Power	7½	7½	37/-		4 1 1	British Thermostat (5/-)	18½	18½	20/-		4 12 6
Llanelli Elec.	6	6	26/6		4 10 7	British Vac. Cleaner (5/-)	30	30	32/6		4 12 3
Lon. Assoc. Electric	4	4	26/-		3 1 6	Brush Ord. (5/-)	8	9	11/-		4 1 9
London Electric	6	6	30/6		3 18 8	Burco (5/-)	15	15	16/-xd	-9d.	4 13 9
Metropolitan E.S.	8	8	43/-		3 14 5	Callender's	15	20	31½	+½	3 11 5
Midland Counties	8	8	41/6		3 17 0	Chloride Elec. Storage	15	15	85/-xd	+6d.	3 10 7
Mid. Elec. Power	9	9	44/-		4 1 10	Christy Bros.	12½	17½	77/6		4 10 4
Newcastle Elec.	7	7	32/-		4 7 6	Cole, E. K. (5/-)	10	15	34/6		2 3 6
North Eastern Elec.	7	7	34/6		4 1 2	Consolidated Signal	24	27½	62		4 1 6
Northampton	10	10	50/-		4 0 0	Cosson, A. C. (5/-)	7½*	10*	24/-	-6d.	2 1 8
Northmet Power	7	7	41/-		3 8 4	Crabtree (10/-)	17½	17½	43/-	+1/6	4 1 4
Richmond Elec.	6	6	26/-		4 12 4	Crompton Parkinson Ord. (5/-)	20	22½	33/6		3 7 3
Scottish Power	8	8	40/6		3 19 0	De La Rue	35	40	9½	-½	2 8
Southern Areas	5	5	23/-		4 7 0	E.M.I. (10/-)	6	8	36/3		2 4 1
South London	7	7	30/-		4 13 4	Elec. Construction	10	12½	58/9	+1/9	4 5 0
West Devon	5	5	24/-		4 3 4	Enfield Cable Ord.	12½	12½	64/-		3 18 4
West Glos.	4½	3½	25/-		2 16 0	English Electric	10	10	55/-	+1/6	3 12 8
Yorkshire Elec.	8	8	43/-		3 14 5	Ensign Lamps (5/-)	35	15	21/3		3 10 8
						Ericsson Tel. (5/-)	22*	20*	53/9		1 17 8
Public Boards						Ever Ready (5/-)	40	40	42/-		4 15 3
Central Electricity :						Falk Stadelmann	7½	7½	34/6		4 7 0
1955-75	5	5	115		4 7 0	Ferranti Pref.	7	7	31/3		4 9 7
1951-73	4½	4½	106xd		4 5 0	G.E.C. :					
1963-93	3½	3½	104		3 7 4	Pref.	6½	6½	33/3xd	+6d.	3 18 4
1974-94	3½	3½	100½		3 4 8	Ord.	17½	17½	97/-	+1/-	3 12 2
London Elec. Trans.	2½	2½	98½		2 19 9	General Cable (5/-)	15	15	16/-	+1/-	4 13 9
London & Home Counties 1955-75	4½	4½	112		4 0 4	Greenwood & Batley	15	15	46/9		6 8 0
Lon. Pass. Trans. Bd.						Hall Telephone (10/-)	12½	12½	31/6		3 19 4
A	4½	4½	121½xd		3 14 1	Henley's (5/-)	20	20	26/9	+3d.	3 15 0
B	5	5	122½xd	+1½	4 1 8	4½% Pref.	4½	4½	24/-		3 15 0
C	3	3½	69	+1	4 14 2	Hopkinsons	15	17½	71/9		4 17 9
West Midlands						India Rubber Pref.	5½	5½	23/-		4 15 9
J.F.A. 1948-68	5	5	106½		4 14 0	Intl. Combustion	30	30	6½		4 12 4
						Johnson & Phillips	15	15	74/-		4 1 1
Overseas Electricity Companies						Lancashire Dynamo	22½	22½	100/-		4 10 0
Atlas Elec.	Nil	Nil	7/3		—	Laurence, Scott (5/-)	12½	12½	13/3		4 14 2
Calcutta Elec.	6*	6*	46/6	+6d.	2 11 9	London Elec. Wire	7½	7½	38/-		3 19 0
Cawnpore Elec.	10	7	41/3	+1/-	3 7 9	Mather & Platt	10	10	56/3		3 11 2
East African Power	7	7	35/-xd	+6d.	4 0 0	Metal Industries	8	8½	50/-	-6d.	3 8 0
Jersalem Elec.	7	5	29/-		3 9 0	Met. Elec. Cable Pref.	5½	5½	21/3		5 3 6
Kalgoorlie (10/-)	5	5	10/6		4 15 3	Mid. Elec. Mfg.	25	25	7½		3 10 3
Madras Elec.	Nil	4	32/6		2 9 4	Murex	20	20	5	-½	4 0 0
Montreal Power	1½	1½	22½		—	Newman Ind. (2/-)	20	20	7/3xd		5 10 0
Nigerian Elec.	8	10	35/-		5 14 5	Philco (2/-)	—	—	14/6	-6d.	—
Palestine Elec. "A"	5*	5*	39/-		2 11 3	Power Securities	6	6	29/-		4 2 9
Perak Hydro-elec.	6	7	13/-	-6d.	—	Pye Deferred (5/-)	25	25	32/6		3 17 0
Tokyo Elec. 6%	6	6	26/6		3 8 7	Ransome & Marles	20	20	87/6		4 11 4
Victoria Falls Power	15	15	26/6	+½	3 8 7	Revo (10/-)	17½	17½	44/-	+1/-	3 19 7
Whitehall Inv. Pref.	—	6	26/-		4 12 4	Reyrolle	12½	12½	71/3		3 10 3

(Continued on next page)

* Dividends are paid free of Income Tax.

Company	Dividend Pre- vious	Dividend Last	Middle Price Dec. 5	Rise or Fall	Yield p.c.	Company	Dividend Pre- vious	Dividend Last	Middle Price Dec. 5	Rise or Fall	Yield p.c.
Equipment and Manufacturing (Continued)											
Siemens Ord.	7½	7½	36/3	--	4 2 9	Cape Elec. Trams	5	6	26/-	--	1 12 4
Strand Elec. (5/-)	10	12½	12/-	--	5 4 2	Lancs. Transport	10	10	47/6	--	4 4 3
Switchgear & Cow- ans (5/-)	20	20	30/9	+1/3	4 16 7	Southern Rly. :					
T.C.C. (10/-)	5	7½	23/9	--	3 3 2	5% Prefd.	5	5	78	+1	6 8 2
T.C. & M.	10	10	56/-	--	3 11 6	5% Pref.	5	5	120½	+1	4 3 0
Telephone Mfg. (5/-)	9	9	12/-	-xd	3 15 0	T. Tilling	10	10	62/-	--	3 4 6
Thorn Elec. (5/-)	20	20	28/9	+3d.	3 9 6	West Riding	10	10	47/6	--	4 4 2
Tube Investments	20	22½	5½	+½	4 8 9	Telegraph and Telephone					
Vactrie (5/-)	Nil	22½	17/6	--	6 8 6	Anglo-Am. Tel. :					
Veritys (5/-)	7½	7½	8/3	--	4 11 0	Pref.	6	6	123	--	4 17 7
Walsall Conduits (4/-) 55	55	52/6	52/6	+6d.	4 3 10	Def.	1½	1½	30	--	5 0 0
Ward & Goldstone (5/-)	20	20	30/6	--	3 5 8	Anglo-Portuguese	8	8	28½	+6d.	5 14 6
Westinghouse Brake	12½	14	75/-	--	3 14 8	Cable & Wireless :					
West, Allen (5/-)	7½	7½	8/9	--	4 5 9	5½% Pref.	5½	5½	116½	--	4 14 5
Traction and Transport						Ord.	4	4	83½	+½	4 16 5
Anglo-Arg. Trans :						Canadian Marconi	\$1 Nil	4cts.	9/-	--	--
First Pref. (£5)	Nil	Nil	2/6	--	--	Globe Tel. & Tel. :					
4% Inc.	Nil	Nil	8	--	--	Ord.	8½	5*	39/6	--	2 10 8
Brit. Elec. Traction :						Pref.	6	6	31/-	--	3 17 5
Def. Ord.	45	45	1200	-5	3 15 0	Great Northern Tel. (£10)	Nil	Nil	29	+1	--
Pref. Ord.	8	8	190	--	4 4 3	Inter Tel. & Tel.	Nil	Nil	19	--	--
Bristol Trams	10	10	57/-	--	3 10 2	Marconi-Marine.	7½	7½	36/5	--	4 2 4
Brazil Traction	1½	2	26½	--	7 9 7	Oriental Tel. Ord.	16	10	49/6	--	--
Calcutta Trams	6½	7½	72/6	-½	2 1 5	Telephone Props.	Nil	6	21/3	--	5 13 0
						Tele. Rentals (5/-)	10	10	12/3	--	4 1 8

* Dividends are paid free of Income Tax.

Stocks and Shares (Continued from page 832)

the capital was increased 50 per cent. by a bonus issue. In those days, the dividend was 9 per cent., so that the succeeding 6 per cent. was at relatively the same rate. The company controls, or is financially interested in, electricity supply undertakings which are owned by associated companies. In addition to this, it carries on business as electrical engineers and contractors. The authorised capital is £11½ million, of which rather over £8½ million has been issued. Of the latter, £6½ million is in ordinary stock of £1 units, quoted at 31s., to give a yield of £3 17s. 5d. per cent. The company's shares rank as a first class investment in this group.

Lesser-Known Shares

Inquiries arise every now and then for the prices of the lesser-known preference shares dealt in by the Home electricity supply market, and it may be of service to set out a few of those to which public attention is occasionally directed. The quotations rarely appear in the Press, owing to lack of general business in them. Taking half a dozen examples, the appended table gives the present prices, with the yields. How seldom some of the shares are dealt in, can be seen by reference to Northampton Electric Light & Power preference; the price is 23s. 9d., but shares have not changed hands in the Stock Exchange market since May, 1941. In

Urban Electric preference the last recorded transaction was in December, 1942. Others in the following list have come to market comparatively recently.

Preference	Div.	Price s. d.	Yield £ s. d.
Egham & Staines	7½	32 6	4 12 4
Isle of Wight	5	95 0	5 5 3
Lincolnshire & Central	4½	21 0	4 3 9
Northampton Electric	5	23 9	4 4 3
St. Austell & District	7	26 3	5 6 8
Urban Electric	6	28 9	4 3 6

The Isle of Wight shares are of £5 each; the rest are £1 shares.

Indian Shares

Violent fluctuations in the price of Calcutta Tramway ordinary shares have been one of the Stock Exchange features during the past week. From 77s. 6d. the price fell away to 67s. 6d., upon a statement that the Government of Bengal had declined to allow the Calcutta Corporation to acquire the tramway undertaking. The Government of Bengal justified its refusal by the statement that such a transaction would involve the raising of a loan by the Corporation. The price fell 7s. 6d. in a day. The Calcutta Corporation promptly announced that Government sanction was not necessary, and there at the time of writing the matter rests. On balance the shares show a recovery of half-a-crown at 72s. 6d. Calcutta Electric Supply at 46s. 6d. and Cawnpore Electrics at 2½ are respectively 6d. and 1s. better. Madras Electrics retain, at 32s. 6d., their last week's rise of 2s. 6d.

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 (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

R. N. ARNOLD and Metropolitan-Vickers Electrical Co., Ltd.—"Apparatus for testing the balance of rotors." 5990. April 14th, 1943. (565606.)

Automatic Telephone & Electric Co., Ltd., C. Gillings and C. E. Beale.—"Telephone or like systems." 7770. May 15th, 1943. (565639.)

Babcock & Wilcox, Ltd.—"Return bends of tubulous heat-exchangers formed with openings closed by pressure-tight closure devices." 7551/43. July 11th, 1942. (565585.)

British Thomson-Houston Co., Ltd.—"Electric valve systems for energising a load circuit through a capacitance and transformer." 2794/43. February 28th, 1942. (565602.)

"Apparatus for starting and controlling electric discharge devices." 5921/43. April 21st, 1942. (565604.) "Lamp sockets." 7245/43. May 8th, 1942. (565608.)

A. C. Cossor, Ltd., D. A. Bell and H. Moss.—"Cathode-ray tubes." 7024. May 4th, 1943. (565547.)

Dubilier Condenser Co., Ltd. (W. Dubilier).—"High-voltage terminals for electrical apparatus." 6793. April 29th, 1943. (565521.)

Duratube & Wire, Ltd., and J. Veit.—"Extrusion apparatus for thermoplastic material." 2703. February 18th, 1943. (565601.)

Electric Transmission, Ltd., and E. C. Gumbrell.—"Operating mechanism for combined air-break power switch and earth switch." May 10th, 1943. (565553.)

Electro Metallurgical Co.—"Manufacture of cast iron." 1438/43. September 30th, 1941. (565598.)

W. T. Henley's Telegraph Works Co., Ltd., W. T. Macdonald and P. R. Stevens.—"Insulated electric conductors." 10178. June 24th, 1943. (565619.)

International Combustion, Ltd., and J. W. Wray.—"Travelling grates." 9822. June 18th, 1943. (565618.)

Johnson & Phillips, Ltd., and J. T. Sanders.—"Electric water heaters for domestic purposes." 4271. March 16th, 1943. (565505.) "Electric water heaters." 4270. March 16th, 1943. (565603.)

W. MacKirdy.—"Power plant for aircraft." 17226. December 3rd, 1942. (565531.) "Power plant for aircraft." 16260/44. December 3rd, 1942. (Divided out of 565531.) (565560.)

M. & C. Switchgear, Ltd., and S. Pfob.—"Push-operated electric switches." 7596. May 12th, 1943. (565555.)

Marconi's Wireless Telegraph Co., Ltd.—"Cathode sleeves and indirectly heated cathodes including such sleeves." 1841/43. January 1st, 1942. (565578.)

P. H. Morrison and Plessey Co., Ltd.—"Linear electric switches." 7192. May 6th, 1943. (565524.)

Partridge, Wilson & Co., Ltd., and F. A. Loach.—"Automatic contactors or switches of

the change-over and simple on-off types." 8921. June 3rd, 1943. (565614.)

L. F. Reeve.—"Pneumatically-operated pick-up unit for use in electric organs and the like." 5880. April 13th, 1943. (565546.)

Standard Telephones & Cables, Ltd., and E. O. Willoughby.—"Adjustable aeriels." 7329. May 8th, 1943. (565526.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea and C. T. Scully.—"Thermionic valve circuits." 7710. May 14th, 1943. (565609.)

Standard Telephones & Cables, Ltd., L. W. Houghton and D. M. Ambrose.—"Frequency dividing arrangements." 7602. May 12th, 1943. (565638.)

Synco Machine Co.—"Drawing wire." 7385/43. March 13th, 1942. (565554.)

J. H. Watson and H. E. Anderson.—"Paper insulation of electrical conductors." 9650. June 16th, 1943. (565617.)

Western Electric Co., Inc.—"Shock-absorbing mountings for electrical apparatus." 6389/43. April 21st, 1943. (565549.) "Anti-vibration mechanical coupling for rotary power transmission systems." 6856/43. May 28th, 1942. (565522.)

Amended Specification

558143. **Philips Lamps, Ltd.**—"Velocity modulated electron discharge tubes."

TRADE MARK APPLICATIONS

THE following applications for British trade marks have been made. Objections may be entered within a month from November 29th:—

ELGA (design). No. B628,509, Class 7. Electric welding machines and parts thereof not included in other classes.—Aktiebolaget El- & Gassvetsning, Frigangen, Gothenburg. Address for service: c/o Edwin C. Axe, 27, Chancery Lane, London, W.C.2.

WHITE CROSS. No. 630,676, Class 9. Electric coffee percolators or brewers.—S.L.R. Electric, Ltd., 58-9, South Harrow Viaduct, South Harrow.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

Suppliers of machinery for vitriting lamp caps.

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.

Australia.—VICTORIA.—April 26th. Melbourne City Council. Supply and erection of electrostatic flue gas dust collecting equipment. Specification from City Electrical Engineer's Office (£1 ls.).

Eye.—December 18th. Borough Council. Supply and installation of a centrifugal borehole pump and vertical spindle electric motor with automatic control equipment. Lt.-Col. W. Herbert Bateman, consulting engineer, Batheaston, Bath (deposit, £1 ls.).

Fife.—December 13th. County Council Catering Committee. Work (including electrical) in connection with central kitchen at Muiredge, near Buchhaven. Schedules (£1 ls.) from the surveyors, C. R. Douglas & Son, 15, East Port, Dunfermline.

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.

Barnsley.—Nurses' home and maternity home; H. Taylor, borough surveyor, Town Hall.

Bolsover.—Houses, Moor Lane; S. Hoten, surveyor, Council Offices, Bolsover, near Chesterfield.

Brighouse.—Houses, Huddersfield Road, Daisy Road and Woodhouse Lane; trustees, Woodhouse Settled Estates.

Works additions, Brookfoot Lane; S. Marshall & Sons, Ltd., quarry owners, Southowram, Halifax.

Works additions, Lower Edge Lane; S. Gledhill & Sons, quarry owners, Rastrick.

Works additions; S. G. Whiteley & Co., blacksmiths, Ogden Lane, Rastrick.

Works extensions, Mission Street; Helliwell & Co., Ltd., Perfection Glazing Works.

Works extensions, Mill Lane; Wood, Robinson & Co., Ltd., silk spinners, Wilkin Royd Mills.

Bristol.—Additions, Ham Green Sanatorium; borough engineer, 7, College Fields, Clifton, Bristol.

Cheshire.—Home for the blind (in co-operation with county boroughs); E. M. Parkes, county architect, The Castle, Chester.

Colchester.—Community centre (£10,000); borough surveyor, Town Hall.

Essex.—Youth centre, Great Bardfield (£2,109) and school huts (£3,690); county architect, Chelmsford.

Glasgow.—Works reconstruction; Strathclyde Paint Co., Ltd.

Gosport.—Additions at Brockhurst Infants' School, and kitchen at Alverstoke School; borough surveyor, Town Hall.

Hampshire.—Additions, Alton and Andover Grammar Schools (£2,250) and maternity home, Basingstoke (£21,000); county architect, Winchester.

Hull.—Works extensions; Hall's Barton Ropery Co., Ltd., High Street.

Kilmarnock.—Building (£1,100) for Glenfield & Kennedy; manager.

Lancashire.—School, Garstang; county architect, County Offices, Fishergate Hill, Preston.

London.—BERMONDSEY.—Works additions, Raymouth Road; Skelton, Sleat & Co.

Macclesfield.—Theatre, Derby Street and Church Street; Whittaker & Bradburn, architects, 5, Jordangate, Macclesfield.

Newcastle-on-Tyne.—Reinstatement of Pendower School for the City Council; city estate and property surveyor, Town Hall.

Northampton.—Leather factory extension; Manfield & Sons, Ltd.

Northumberland.—Canteen, Hexham Lowgate School; H. Wallace & Son, builder, Hexham.

Canteen, Ingoe School; M. Hogarth & Son, builders, Corbridge.

Nottinghamshire.—Colony for mental defectives, Newark (£300,000); county architect, Shire Hall, Nottingham.

Portsmouth.—Junior technical college (£52,250), site of Hilsa College; F. J. Sparks, town clerk, Municipal Offices, Royal Beach Hotel, Southsea.

Salisbury.—Extension of maternity department at Salisbury Infirmary; A. Smart, town clerk, Council House, Bourne Hill, Salisbury.

Sevenoaks.—Extensions, Chiddingstone Causeway; John Wisden & Co., Ltd., Baltic Road, Tonbridge.

Spalding.—Nurses' home (£3,800), in grounds of Institution, for Holland C.C.; county architect, County Hall, Boston, Lincs.

Staffordshire.—Central kitchen and canteen, Baddeley Green, Leek; C. M. Coombs, county architect, County Buildings, Stafford.

West Sussex.—Junior technical school for building (£5,385), Worthing; county architect, County Hall, Chichester.

Wigan.—Central kitchen, Poolstock; L. Lyons, borough engineer, Municipal Buildings, Library Street.

Wolverhampton.—Schools on Willenhall Road and Bushbury estates; W. M. Law, borough engineer, Town Hall.

Edinburgh Illuminating Engineers

At a meeting of the newly formed Edinburgh group of the Illuminating Engineering Society at Heriot-Watt College, Mr. A. L. Randall spoke on "Fluorescent Tubes and their Applications." The next meeting of the Society will be held on December 15th, at Edinburgh University Physics Department, when Dr. C. Bernard Childs will speak on "Light and Colour."



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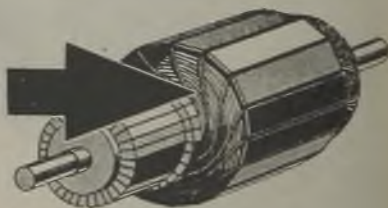
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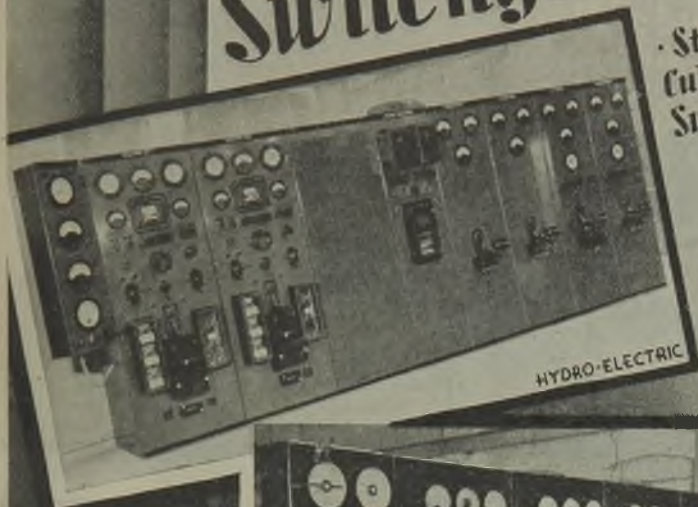
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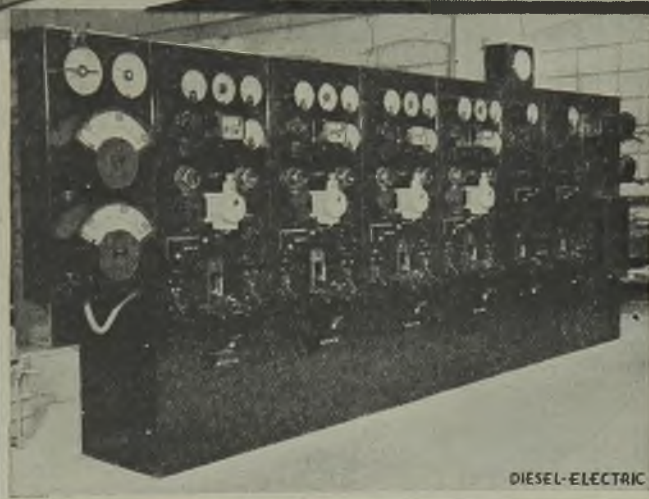
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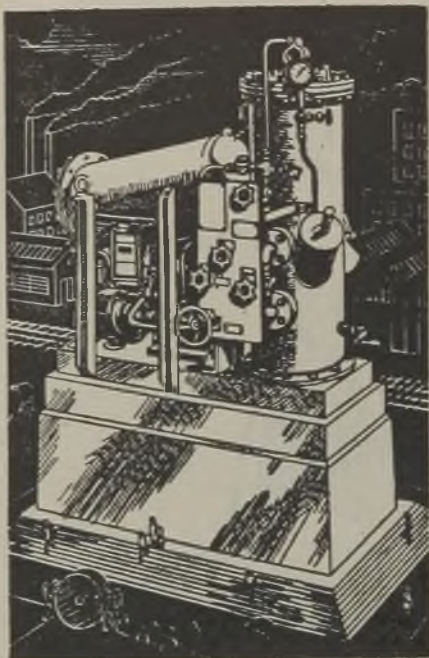
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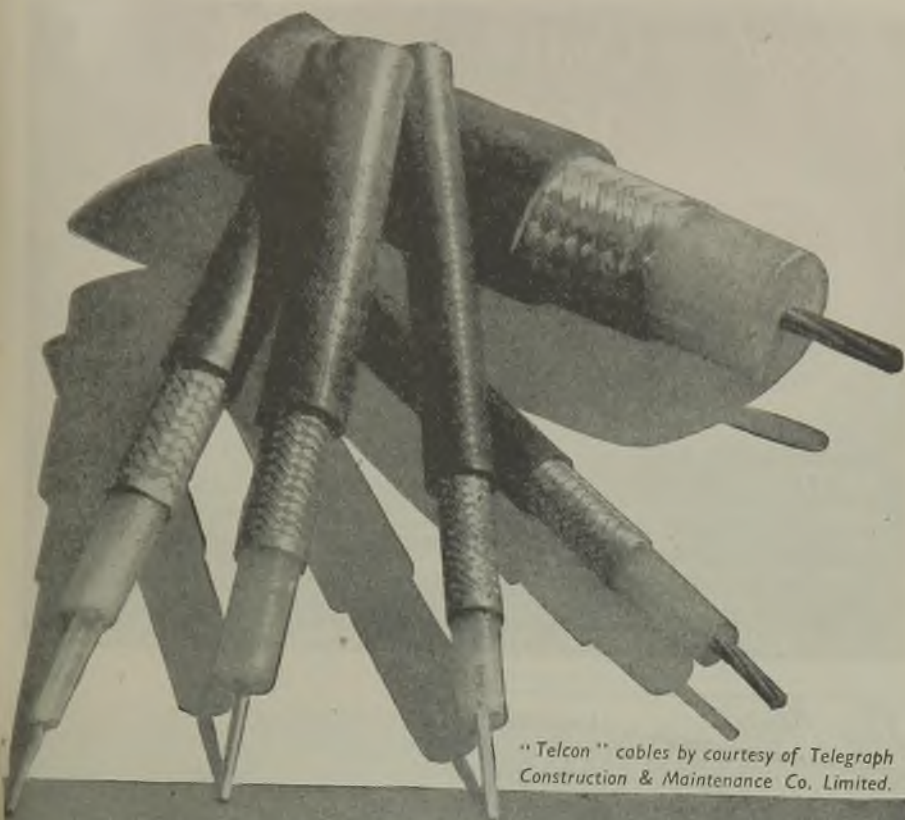
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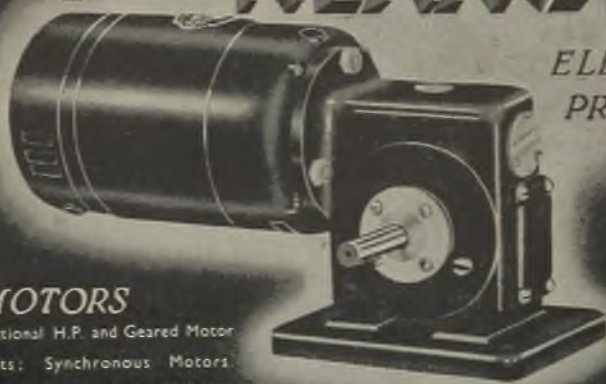
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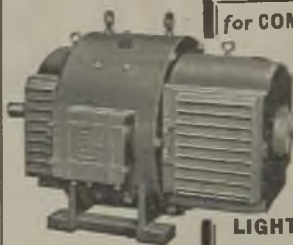
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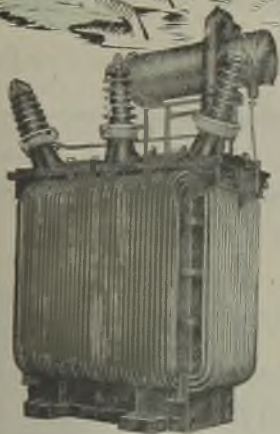
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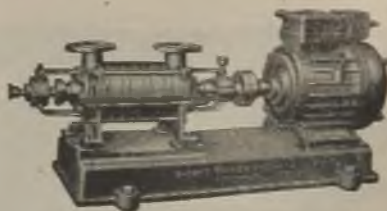
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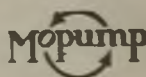
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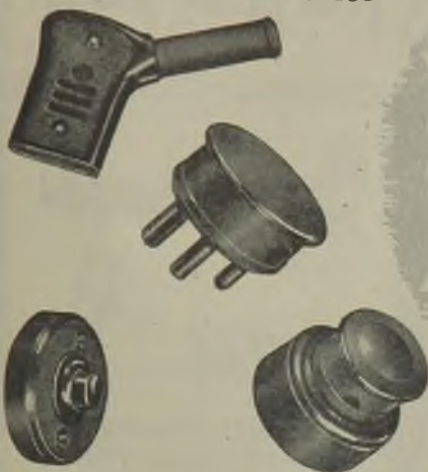
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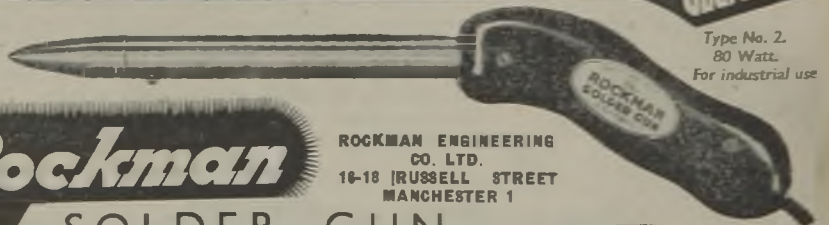
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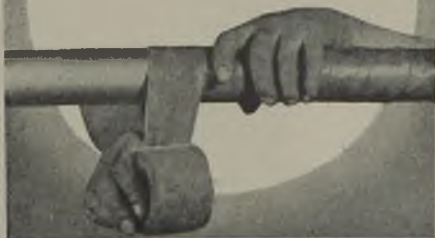


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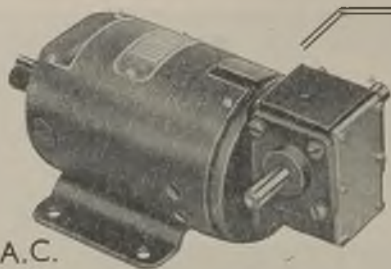
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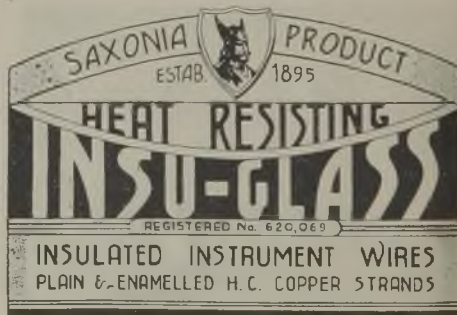
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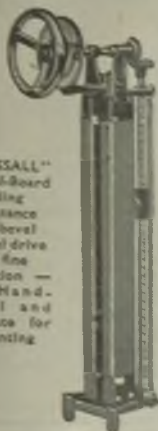
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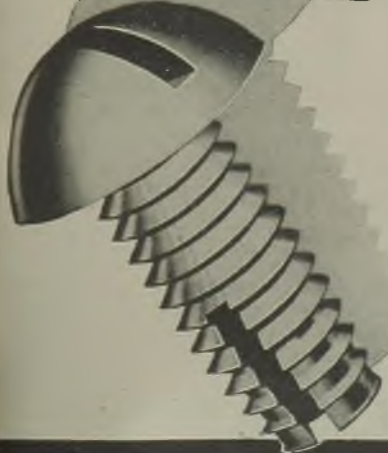
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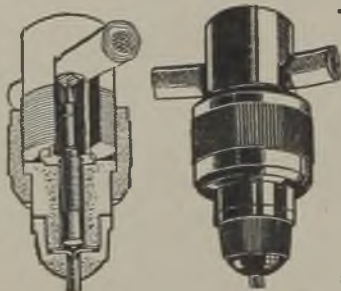
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THE CHARGE for advertisements in this section is 2/- per line (approx. 8 words) per insertion, minimum 2 lines 4/-, or for display advertisements 30/- per inch, with a minimum of one inch. Where the advertisement includes a Box Number there is an additional charge of 6d. for postage of replies.

SITUATIONS WANTED. — Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

Original testimonials should not be sent with applications for employment.

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None of the vacancies for women advertised in these columns relates to a woman between 18 and 41 unless such woman (a) has living with her a child of hers under the age of 14, or (b) is registered under the Blind Persons Acts, or (c) has a Ministry of Labour permit to allow her to obtain employment by individual effort.

PETERBOROUGH

Appointment of Deputy City Electrical Engineer and Manager

APPPLICATIONS are invited for the above appointment from persons with experience of the operation and maintenance of a modern Selected Generating Station and of an underground and overhead high and low tension distribution system, with modern substation equipment. Sales, development and commercial experience is also desirable.

Candidates must be between the ages of 35 and 48 and preference will be given to corporate members of the I.E.E. The salary will be in accordance with Grade 1, Class G, of the Schedule of Salaries of the National Joint Board for Employers and Members of Staff for the Electricity Supply Industry.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and terminable by one month's notice on either side.

Applications, giving age, present appointment and duties, particulars of past service and all other essential information, including the candidate's position with regard to liability for national service, must be accompanied by copies of not more than three recent testimonials and forwarded to the Electrical Engineer, Electricity Works, Peterborough, in sealed envelope endorsed "Application for Deputy Electrical Engineer," not later than Saturday, 30th December, 1944.

Canvassing, either directly or indirectly, will disqualify.

ARTHUR J. REEVES,

Town Hall, Peterborough. Town Clerk. 1080

BARKING CORPORATION

Electricity Department

APPPLICATIONS are invited for the position of Temporary Relief Substation Attendant.

Applicants must have had experience in the operation of Rotary Converter Plant and H.V. switchgear.

The appointment will be in accordance with the Electricity Supply Industry, District Council No. 10, wages at present £5 14s. 3d. per week.

Applications, giving particulars of age, education, training and details of experience of the above equipment, together with copies of three recent testimonials and endorsed "Substation Attendant," to be forwarded to the undersigned by 9 a.m. on Monday, the 18th December, 1944.

Canvassing in any manner will be deemed a disqualification.

E. R. FARR,
Town Clerk.

Town Hall, Barking, Essex. 1092
2nd December, 1944.

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.

CITY AND COUNTY OF KINGSTON-UPON-HULL

Electricity Department

Technical Assistant

APPPLICATIONS are invited for the above position from persons available now or immediately after the war.

Applicants should possess a sound knowledge and experience of electrical power engineering, should have served a works apprenticeship and possess an honours degree in engineering. Experience in consulting work would be an advantage.

Salary in accordance with N.J.B. schedule, Class J, up to Grade 3 (£713 p.a. at present), according to qualifications.

The appointment is subject to a medical examination. The person appointed must reside within the City Boundary (waived during the war), and after three months' satisfactory probation will be required to contribute to the Local Government & Other Officers' Superannuation Scheme.

Applications should give names of references who may be consulted, and should be submitted to the General Manager, Electricity Offices, Ferensway, Hull, by January 1st, 1945.

4th November, 1944.

973

COUNTY BOROUGH OF GREAT YARMOUTH

Electricity Department

Power Station Superintendent

THE Corporation invite applications for the position of Power Station Superintendent at their South Dunes Generating Station at Great Yarmouth.

Candidates should be Corporate Members of the Institution of Electrical Engineers and not over 45 years of age. They must have had a sound practical training and wide experience in the operation and maintenance of a "selected" generation station.

Salary will be in accordance with the National Joint Board Schedule, Class F, Grade 3.

The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to undergo a medical examination. Canvassing members of the Corporation in any form, either directly or indirectly, will be a disqualification.

Forms of application may be obtained from the undersigned and should be returned, in the official envelope provided, not later than the first post on Wednesday, December 20th, 1944.

FARRA CONWAY,

Town Hall, Town Clerk.

Great Yarmouth.

27th November, 1944.

1068

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46, Grainger Street,
Newcastle-on-Tyne.

1083

AFTER the restrictions controlling the engagement of personnel are removed there will be openings for young, energetic and ambitious engineers as below, and meantime applications are invited from electrical engineers with previous commercial and administrative experience in electrical contracting, preferably with good connections in Edinburgh and Glasgow, to take charge or assist in taking charge and developing branches in these cities for an established and well-known national electrical contracting firm. Commencing salary, with pension scheme, between £400 and £800 per annum, depending on qualifications. Apply, with full particulars, stating age, experience, salary required, and copies of testimonials, in the strictest confidence, to—Box 1076, c/o The Electrical Review.

CROMPTON Parkinson Limited have completed their plans for the maximum production and distribution of an extended range of electrical products both at home and overseas in the post-war period. They wish to have available for consideration a comprehensive list of potential Sales Managers and Sales Engineers. The list will include employees at present serving with H.M. Forces, men still in the organisation, and suitably qualified men not previously employed by the company. These last may at present be employed elsewhere or in the Forces, but applications would be welcomed setting out fully details of qualifications, experience and outlook. Some of the products to be dealt with are electric motors of all types, switchgear, transformers, cable, lamps, electric vehicles, electric trucks and accumulators. All correspondence, which will be treated in the strictest confidence, should be addressed to The Chief Personnel Officer, Crompton Parkinson Ltd., Electra House, Victoria Embankment, London, W.C.2.

941

DISTRICT Mains Engineer, West Midlands Joint Electricity Authority. Applications are invited for the above post from persons who have had extensive experience in the operation and maintenance of distribution works, including 33-kV and 11-kV transmission lines, together with low-tension network in urban and rural areas, high-tension and low-tension substations. A good works training with an electrical engineering firm of repute is essential. Applicants should preferably possess a University Degree and be corporate members of the I.E.E. Salary £508 p.a., in accordance with Class G, Grade 5, of the N.J.B. Schedule, plus £50 p.a. for additional responsibilities for maintenance of all 33-kV transmission. The appointment will be subject to the Local Government Superannuation Act, 1937, and a satisfactory medical report. Applicants should write, quoting D.1001XA, to the Ministry of Labour and National Service, Central (T. & S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 19th December, 1944.

1084

ENGINEER required by firm in North-West to contact users of electrical accessories throughout the country. Must have comprehensive experience and be able to discuss design. Car an advantage. Full details to—Box 1086, c/o The Electrical Review.

ENGINEER required by the Government of Iraq to take charge of the Central Technical Section of the Directorate of Municipalities for one year in the first instance. Salary between I.D.120 and I.D.130 a month according to qualifications and experience. High cost of living allowance at present I.D.24 a month (I.D.1 = £1). The post is not pensionable but there is a Provident Fund. Free passages. Candidates should hold a university degree in engineering or be Corporate Members of the Institutions of Civil, Mechanical or Electrical Engineers and have had not less than 10 years' experience in the running and maintenance of oil engine driven electrical generating and waterworks pumping plant, together with experience in the control of technical and clerical staff. Applicants should write, quoting C.2378A to the Ministry of Labour and National Service, Central (Technical and Scientific) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms which should be returned completed on or before 19th December, 1944.

1098

ELECTRICAL Engineer required as Works Manager, approx. 200 hands; must have had a thorough and practical training and have knowledge of mains transformers and chokes, up to 25 kVA, instrument and small electro-mechanical manufactures. Must be capable organiser and disciplinarian. State experience, connection, age, and salary required in confidence. Permanent and progressive position to right man. Employment subject to Ministry of Labour restrictions.—Box 1028, c/o The Electrical Review.

EXPERIENCED Technical Manager, with good all-round knowledge of factory planning and installation work; accustomed to preparing specifications for building layouts, with heating, lighting, gas, air, and other services, and also the necessary plant and machinery for power units and production. Applicants should have sound experience of consulting work, both electrical and mechanical, with ultimate responsibility for complete factory planning and production schemes. State salary required to—Box 1096, c/o The Electrical Review.

GOVERNMENT Department requires Temporary Assistant Electrical Engineers for service in Ceylon or Southern India. Candidates should possess B.Sc. degree or equivalent and have had experience in planning, erection and maintenance of Shore Electrical Installation, including machinery equipment, and should indicate whether they would be prepared to serve elsewhere abroad than at the places stated. Salary up to £500 p.a. according to age, qualifications and experience, plus war bonus £49 11s. p.a. In addition colonial allowance will be payable to compensate for additional cost of serving at a station abroad. Applicants should write, quoting D.982A, to the Ministry of Labour and National Service, Central (T. & S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 19th December, 1944.

1070

JUNIOR Engineer. While no offer of appointment can be made until relevant restrictions are withdrawn, a progressive company of electrical engineers situated in South London would like to contact a capable Junior Engineer. Ordinary National Certificate standard; telephone maintenance experience in Post Office or private telephone company of at least five years. Write, giving full particulars and experience, to—Box 1347, A. K. Advge., 212a, Shaftesbury Avenue, W.C.2.

1063

JUNIOR Shift for small station, Diesel and bulk supply, A.C. and D.C. switchgear. Salary, N.J.B. schedule, Class B, Grade 8b, at present £267 p.a. The appointment will be of a temporary nature to replace man serving with H.M. Forces, and will be terminable by one month's notice on either side. Travelling and other reasonable expenses will be paid, but in the case of the successful candidate these expenses will be paid upon taking up the duties. Applications, with full particulars of experience, reference and age, to—The Clerk, Horsham Urban District Council, Council Offices, Horsham Park, Horsham, Sussex. Mark the envelope "Junior Shift."

1006

LADY Demonstrator required. Applicants must be experienced in the demonstration of electric cookers and other electric domestic appliances and must possess the F.W.A. Diploma or other similar qualification. Apply in own handwriting, stating age, experience and salary required, to—The Resident Engineer and Manager, The Wigtownshire Electricity Co. Ltd., 76, George Street, Stranraer, Wigtownshire.

1099

LARGE electrical engineering company established in the manufacture of electric cookers, washing machines and domestic appliances, require additional Sales Representatives. Reply in confidence, giving full particulars, age, experience, connections and salary required, to—Box 1077, c/o The Electrical Review.

LOCAL Authority requires Overhead Linesman with experience of work on overhead low tension line construction and maintenance on both A.C. 4 wire and D.C. 3 wire systems, including servicing of consumers' premises, etc. Experience of tramway or trolley bus overhead line work and/or motor vehicle driving an advantage. D.J.I.C. wage rate at present 1s. 11d. per hour. Applications in writing to—Ministry of Labour, Employment Exchange, Pontypriid, Glam.

1097

MANAGER required for design and development work on small electrical fittings by medium-sized engineering works in South-West London. Excellent post-war prospects exist for the right man, who will be given plenty of scope and support. Please write, stating age, experience and remuneration expected, to—Box 1074, c/o The Electrical Review.

METER Tester and Repairer required, N.J.I.C. rate 24.52d. per hour. Applications, stating age and experience, to be forwarded to—The Resident Engineer, The Wigtownshire Electricity Co. Ltd., Electric House, George Street, Stranraer, Wigtownshire.

1087

OFFICE Manager, London district, capable of dealing with technical correspondence, enquiries and contracts. Electrical training essential. Knowledge of measuring instruments an advantage. Salary according to qualifications and experience.—Box 1046, c/o The Electrical Review.

REPRESENTATIVES required, all districts Great Britain, for small firm of Electrical and Mechanical Factors just starting in the Wolverhampton district. Commenced last. Keen and energetic persons only need apply, and those prepared to build up connections.—Box 1087, c/o The Electrical Review.

REPRESENTATIVE required for Lancashire and Cheshire for Industrial Electric Light Fittings. Apply in writing, with full details, to—Veritys Ltd., 66, Quay Street, Manchester, 3. 1100

REPRESENTATIVES wanted with connections in Electrical and Automobile Electrical trades. Territory available Wales, Midlands, North, South, East and West of England. Good commission only. Expenses by arrangement. References required.—Box 3558, Vernons, 17/19, Stratford Place, London, W.1. 1088

RESISTANCE Welding Machine Manufacturers, with established connection, require Sales Manager. Knowledge of resistance welding machines an asset, but with mechanical and electrical background, specialised training in resistance welding would be given. Applicant should be good correspondent with experience in publicity and advertising. Progressive position for keen, energetic man. State full particulars of experience and salary required to—The Managing Director, A.1. Electric Welding Machines Ltd., 64, Victoria Street, London, S.W.1. 1094

RUBBER Shop Product Manager required for modern electric cable works in North Midlands to control all processes connected with the manufacture of rubber and its subsequent process on to wire, up to the final operations in the production of rubber insulated cable. Applicant must have had comprehensive experience in this work, covering rubber mill extruding, lapping, trapping, vulcanising, braiding and compounding. Permanent progressive position, eligible for superannuation. Salary £500-£750, depending on qualifications. Applicants should write, quoting F.3140XA, to the Ministry of Labour and National Service, Central (T. & S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 16th December, 1944. 1062

SALES Representatives required for Atlas Lamps in Cornwall, Devon, Somerset, Dorset, Hants, Wilts, Glos, and North London. Remunerative positions with excellent post-war prospects for keen, energetic men not liable for military service. Connections in electrical and hardware trade and large users an advantage. Salary, commission and expenses. Write in confidence, details of past experience.—Box D.H.3, Thorn Electrical Industries, 105, Judd Street, London, W.C.1. 1095

STORES Clerk required by electrical wholesalers. Good knowledge of electrical material essential. Apply—London Electrical Company, 92, Blackfriars Rd., S.E.1. 25

TECHNICAL Assistant required by company manufacturing electrical remote control gear. Write fully, giving qualifications, age, remuneration, etc. Decontrolled person preferred.—Box 1075, c/o The Electrical Review.

TECHNICAL Sales Representative required to cover the East Riding of Yorkshire, operating from Leeds office of C.M.A. electric cable manufacturers and engineers. Good progressive position. State age, experience and salary required (in confidence). Apply—Box 1079, c/o The Electrical Review.

TEMPORARY Junior Electrical Inspector of Mines (Ministry of Fuel and Power). Applicants must be prepared to serve in any part of Great Britain. Age not exceeding 30 years. Commencing salary £400 to £550 according to age, qualifications and experience. Qualifications: Candidates must (a) hold a University degree in Electrical Engineering, the Graduateship of the Institution of Electrical Engineers, the National Certificate in Electrical Engineering or the First Class Certificate of the Association of Mining Electrical and Mechanical Engineers; or show that they have been trained as electrical engineers; and (b) have had at least two years' practical experience in the application of electricity to mining. Applicants should write, quoting D.996A, to the Ministry of Labour and National Service, Central (T. & S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 19th December, 1944. 1069

WANTED as soon as possible, General Manager for Thermostat Department manufacturing all types, including many novel ones. Must be good organiser, salesman and producer. Apply, giving full details of experience, salary, and whether free now or if not how soon.—Box 1066, c/o The Electrical Review.

VACANCY occurs for a Shift Charge Engineer in industrial power station. Salary according to E.P.E.A. schedule, Class B, Grade 8. Write—Box 998, c/o The Electrical Review.

WORKS Manager required for rubber cable factory. Applicants must have first-class practical experience in the manufacture of all types of rubber insulated cables and possess sound knowledge of factory organisation and labour control. Progressive and permanent position. Essential works. Applications, which will be treated in strictest confidence, to be sent in writing to Scottish Cables Ltd., Dundee. Renew, stating age, experience and salary expected. 1073

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.

BRIXHAM Gas & Electricity Co.—Electrical Engineer.

SITUATIONS WANTED

A Sales Engineer, for large manufacturing co., age 48, at present acting outside sales engineer (North England area), handling all classes switchgear, motors, etc., desires post as Branch Manager.—Box 6499, c/o The Electrical Review.

A DVERTISER, 20 years' experience electrical trade, cables, accessories, domestic appliances, etc., experienced Representative, desires contact manufacturer view to representation.—Box 6545, c/o The Electrical Review.

A DVERTISER (50) desires change, 14 years employed by supply undertaking operating in rural area, conversant with hire, H.P. maintenance, showroom, contracting and change-over. Employed at present as sales foreman.—Box 6494, c/o The Electrical Review.

A N Electrical Engineer, discharged R.N., seeks rehabilitation in responsible permanent post with good prospects. Age 40, wide administrative experience of public, industrial and domestic works, sales and maintenance, office and contract staffs. Thoroughly competent draughtsman and estimator, 24 years' commercial background, highest testimonials. Keenly interested in young people, capable of organising apprentice training and instruction, social activities and house journal publication.—Box 6547, c/o The Electrical Review.

ELECTRICAL Engineer desires position, experience including electric furnace design, nickel chromium and molybdenum element types.—Box 6505, c/o The Electrical Review.

ELECTRICAL Engineer, Diploma of Faraday House, British, single, age 42, seeks appointment with prospects. Several years' experience electricity supply industry, principally on the distribution side. Extensive experience installation, operation and maintenance of underground cables, overhead lines, substations and their equipment, consumers' services and installations, also contracting experience. Salary not less than £600 per annum.—W. Mitchell, 31, Graham Road, Weston-super-Mare, Somerset. 6510

ELECTRICAL Engineer (28) requires situation, Ordinary and Higher National, 1st and 2nd class certificates of Association of Mining Electrical Engineers. Wide experience at installation and maintenance of electrical apparatus.—Box 6543, c/o The Electrical Review.

ELECTRICAL Engineer (29 years) requires situation overseas, release can be obtained. Fully experienced in A.C., D.C. and general engineering, including combustion engines.—Box 6526, c/o The Electrical Review.

ELECTRICAL Engineer (38), seeks post-war job as Installation Inspector. Eight years with Supply Co. on similar, including change-over D.C.-A.C., war post 4 years supervising and maintaining large industrial installations (member A.S.E.E.).—Box 6503, c/o The Electrical Review.

ELECTRICAL Engineer (42), 23 years with leading lamp manufacturers in a technical capacity, requires executive position in a lamp factors' business. Modest capital available.—Box 6508, c/o The Electrical Review.

ELECTRICAL Instructor (32), 16 years' electrical experience on aircraft and automobiles, requires change. Position acceptable offering post-war possibilities. Sales organisation, production staff control or training.—Box 6502, c/o The Electrical Review.

ENGINEER (29), A.M.I.E.E., requires position abroad, 11 yrs. exp. radial design, development.—Box 6540, c/o The Electrical Review.

ENGINEER (45), good technical education and long experience in manufacturing electrical measuring instruments, communication and radio apparatus, F.H.P. motors, in all branches of the trade, also metallurgy, 15 years' administration as foreman, superintendent and manager, tactful disciplinarian, desires position with go-ahead firm as works manager or chief engineer. Four-figure salary required.—Box 6536, c/o The Electrical Review.

FOREMAN Electrician seeks appointment. Competent, large lay-outs, power, lighting, estimating, labour control, good organizer.—Box 6529, c/o The Electrical Review.

MECHANICAL DESIGNER, Engineering graduate (B.Eng.) with 8 yrs. engineering experience, including jig and tool design and assembly of light mechanical and electrical products, and with good electrical knowledge, seeks position as mechanical designer with firm South of England. No objection to combining jig and tool design with mechanical design in a small firm. Post-war prospects of paramount importance. Age 27.—Box 6522, c/o The Electrical Review.

PRACTICAL Engineer (24) wishes position, R.T.H. apprenticeship, electrical and mechanical diplomas.—Box 6542, c/o The Electrical Review.

PUBLICITY MANAGER, specialist in modern technical catalogue and advert. production, 16 years' advertising experience electrical, mechanical and machine tool eng'g firms, ex R.A.P., available immediately.—Box 6555, c/o The Electrical Review.

SALES Representative with excellent connection supply authorities, etc., desires contact manufacturers.—Box 6551, c/o The Electrical Review.

SERVING technical officer, Electrical Engineer, young, B.Sc. Eng. Hons., experience steelworks installation, etc., requires post-war appointment, pref. heavy engineering. No objection to overseas position.—Box 6544, c/o The Electrical Review.

TECHNICAL Electrical Engineer (33), B.Sc.(Hon.), A.M.I.E.E., 14 years' practical experience, last 5 years executive capacity, planning, installation and maintenance industrial power plant, H.T./L.T. sube. and mains, electro-chemical applications and equipment design. Free short notice, present department closing down.—Box 6539, c/o The Electrical Review.

TECHNICAL Sales Engineer (50) desires post. London and South. Good contacts amongst Govt. Depts., electrical manufacturers and trade. Free January.—Box 6548, c/o The Electrical Review.

YOUNG Engineer (22), public school education, Higher School cert., 4 years' premium apprenticeship with well-known manufacturing firm, Higher National cert. (electrical), desires progressive post. Any branch of engineering considered, either at home or abroad.—Box 6549, c/o The Electrical Review.

FOR SALE

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

NO COUPONS OR PERMITS REQUIRED

- 300 Scaffold Boards.
- 100 pairs 4 and 5-tread Steps.
- 100 tons Corrugated Sheets.
- 2,000 gallons Hard Gloss Paint, all shades.
- 2,000 gallons Undercoating, all shades.
- 5,000 gallons Emulsion Grey Paint.
- 5,000 gallons Red Oxide.
- 500 gallons Trebol, Bituminous Paint.
- 100 Aladdin Bomber Stoves, heating.
- 50 Slow Combustion Stoves.
- 20 tons Manila Rope.
- 50 4-drawer Tool Boxes.
- 10 Carpets, all sizes.
- 3,000 Hospital Bedsteads.
- 1,000 Tarpaulins, all sizes.
- 1,000 Rubber Aprons.
- 600 pairs Sheets.
- 500 Pillowslips.

WE also have Mackintoshes, Leggings, Oilskin Coats, Sou'westers, Industrial Aprons, Reeler Coats, Boiler Suits, Dungarees, Crockery, Butchers' Steaks, Rubber Boots, Dusters, Leather Jerkins, Ladders, Herringbone Clinths, Swabs, Steel Wheelbarrows, Doss Sheets, Ground Sheets, Canteen Forms, Canteen Tables, Rubber Thigh Boots, Huts and Tool Boxes.

CORNFORD'S, CENTRAL WORKS.

Sadbury Circle, Sadbury, Wembley, Middlesex.
Telephone: Arnold 4436.

1071

DISMANTLING SUNCOLE WORKS

For Sale

"PREMIER" chimney type WATER COOLING TOWER, 70' high x 36' x 20' at top and 45' 4' x 24' at base; air inlet 5' all round, with stairway; capacity 75,000 galls. per hour from 90 deg. F. to 75 deg. F., with wet bulb temp. 51 deg. F.; natural draught type; built of timber throughout.

"Premier" open type WATER COOLING TOWER, 19' high x 33' long x 15' wide; capacity 15,000 galls. per hour from 140 deg. F. to 77 deg. F., with wet bulb at 60 deg. F.; built of timber throughout.

5-kVA LIGHTING TRANSFORMER by E.C.C. 450 volts, single-phase, 50 cycles, to 230 volts, single-phase, 3-wire; No. 15541.

Two Foxboro "Stabilog" CALORIFIC VALUE CONTROLLERS, each comprising one Sigma No. 2 recording calorimeter, one Foxboro Model 10 "Stabilog" size 12 indicating controller; one primary, one secondary and one final gas filter; two single-column gauges, 0" to 24" w.g.; all mounted on metal instrument panel, black enamel, with stainless steel linings. Together with AUTOMATIC COMPRESSOR SET, 23" x 2" air-cooled compressor mounted on 27-gall. steel tank, driven by 4-h.p. Motor, 440 volts, 3-phase, 50 cycles, controlled by pressure switch; capacity 2.1 cu. ft. per min.; air pressure 60 lbs. per sq. inch. (One square Compressor only for above.)

Auld's relay-operated STEAM REDUCING VALVE, 300 to 110 lbs. per sq. inch pressure, adjustable; 15,000 lbs. per hour capacity; 5" bore, pressure gauge, dial thermometer and gunmetal strainer.

AUTOMATIC ELECTRIC COAL SAMPLER by R. O. Stokes, to take sample of coal every five minutes; complete with motor brake, time switch and cut-out; with rifle chute, framework and ladder.

GEORGE COHEN, SONS & CO. LTD.

Suncole Works, Cinderhill, Nottingham.

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1101

REBUILD MOTORS AND GENERATORS

LONG deliveries can often be avoided by purchasing rebuilt secondhand plant. We can redesign or replace surplus plant of any size.

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OVER 1,000 RATINGS ACTUALLY IN STOCK HERE.

DYNAMO & MOTOR REPAIRS LTD.,

Wembley Park, Middlesex.

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7,000 lengths in Brass and Steel for sale. Various lengths from 12" to 21" and small to large diameters, all at 1s. per length. Suitable for clock, instrument or toy makers. Samples gladly on request.

APEX SALES, 6, Leaside Road, London, E.5.
ST. 4. 7131

6505

ECONOMISERS IN STOCK

TWO Green's Economisers, 208 tubes, 250 lbs. W.P. Guaranteed re-insurable and first-class condition only, low prices. Quotations per return. Installations delivered and erected complete.

BURFORD, TAYLOR & CO. LTD.,

7, Commercial Street, Middlesbrough. Telephone 2622.

GEORGE COHEN, SONS & CO. LTD.

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**GUARANTEED ELECTRICAL
 PLANT.**

MOTORS, GENERATORS,

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27

WATER TUBE BOILERS IN STOCK

Four	25,000 lbs. evaporation.	175 lbs. W.P.
Three	20,000 lbs.	175 lbs.
One	15,000 lbs.	175 lbs.
One	12,000 lbs.	175 lbs.
One	12,000 lbs.	200 lbs.
One	12,000 lbs.	160 lbs.
One	9/10,000 lbs.	200 lbs.

We install complete, including brickwork. Economisers, Pumps, Piping Valves, Generating Sets and Motors in stock. Please send us your enquiries; we can give immediate delivery.

BURFORD, TAYLOR & CO. LTD.,

Boiler Specialists, Middlesbrough.

Telephone: Middlesbrough 2622.

32

BOROUGH OF BARNES**Electricity Supply Department**

OFFERS are invited for the purchase of: One Crompton Parkinson 500-kW Rotary Converter with Transformer, 6,600 volts, 3-phase, to 440/480 D.C., complete with A.C. Starter Panel and D.C. Control Panel.

The above is in running order, and can be seen on application to the undersigned.

The Corporation do not bind themselves to accept the highest or any tender.

K. D. BULLPITT,

Engineer and Manager.

Electricity Works,

High Street,

Mortlake, S.W. 14.

1065

BOROUGH OF ACTON

FOR Sale:—

- 50-kW Steam Electric Generating Set with Browett Lindley Engine and 120-volt D.C. Generator.
- Motor Generating Set by Crompton Parkinson: motor 67.5 b.h.p., 400 volts, 3-phase; 120-volt D.C. Generator, together with starting equipment.
- Switchboard, multiple panels, D.C.
- Various spare parts for the above equipment.

Full details may be obtained from the Borough Engineer, Officers, marked "Electrical Equipment," to be submitted by 27th December, 1944, to the Town Clerk, Town Hall, Acton, W.3.

1093

ENQUIRIES SOLICITED

BRASS & STEEL B. A. NUTS.

Sizes stocked for immediate delivery:

Brass: 0, 2, 4, 6, 8 and 10 B.A. Full and Lock.

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" 0, 2, 6. Lock.

Also Stocked: Brass & Steel Washers, Brass & Steel Studding.

APEX SALES.

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8441

ELECTRIC MOTORS AND DYNAMOS

WE hold one of the largest stocks of New and Second-hand Motors. Second-hand machines are thoroughly overhauled. Inspection and tests can be made at our works.

For Sale or Hire. Send your enquiries to:—

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CITY ROAD, LONDON, N.1.

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13

MODINSTAL ELECTRIC COMPANY LIMITED

INDUSTRIAL INFRA-RED APPARATUS FOR

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COMPLETE EQUIPMENTS OR SINGLE UNITS

PROVIDED.

GUARANTEED HEAT GENERATORS.

OLDHAM WORKS, OLDHAM TERRACE,

ACTON, W.3, LONDON.

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M.E.C. APPARATUS, DULL EMITTER SYSTEM.

59

ARC WELDING MACHINES FROM STOCK

WE offer our latest type No. 2 Max-Arc Welder for immediate delivery, 15/250 amperes. Operates off any A.C. supply voltage. Send for details.

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35

A large stock of Winches of our self-sustaining types, also Searchlights (sale or hire), Mirrors, Lenses, A.I.D. Turnbuckles, etc., also surplus Carbon Rods, Ebonite and Fibre. Hundreds of thousands supplied during the last 40 years to Government departments, corporations and innumerable traders.—London Electric Firm, Croydon. 42

A C. and D.C. House Service Motors, all sizes, quarterly repairs and prepayment, reconditioned, guaranteed one year. Repairs and recalibrations.—The Victoria Electrical Co., 47, Battersea High Street, S.W.11. Tel. Battersea 0780. 19

A C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 4422). 6463

A C. Motors, 1/50th h.p. to 3 h.p., from stock, for essential work only.—The Johnson Engineering Co., 5, Spencey Street, Leamington Spa. 87

A LTERNATOR, 500 kVA, 3-p., 50 c., 400/440 v., 750 revs., direct coupled exciter, 2 hrs., on bedplate.—Stewart Thomson & Sons, Fort Road, Seaford, Liverpool 21. 58

BATTERIES (B class only), all types, Torch Cases, Cycle Rear Lamps, Lease-Lend and Empire Bulbs, Household Lamps, Plugs and Socket, Switches, Soldering Irons, Flat-iron Elements, Fire Spirals, and other electrical accessories. Write for list.—Brooks & Bohm Ltd., 90, Victoria Street, London, S.W.1. (Vic. 1441.) 1038

BELT Grinders or Sanders, 4" wide belt, 55 5/8" 6" wide belt, £10 10s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 52

EXHAUST Fans, new 14", 1-phase, 200/250 v., 1,900 cu. ft./min., £11 15s.—Southern Ignition Co. Ltd., 190, Thornton Road, Croydon. 75

FOR sale ex site, one first class, 200-h.p., 970-r.p.m. Brush slip-ring Motor, 400 volts, 3-phase, 50 cycles, with switchgear, all new 1937. Available immediately.—Newman Industries Limited, Yate, Bristol. 1049

FOUR identical 150-kW. "Weir Sulzer/E.C.C." Diesel-driven Generating Sets, 220 volt D.C.—Stewart Thomson & Sons, Fort Rd., Seaford, L. pool, 21. 74

GENERATING Sets for sale, 3 kVA, petrol, 230/150; 24 kW, crude oil, 220 v. W.C.; 18 kVA, petrol, 400/350.—Frye, Wilson & Co. Ltd., Bishop's Stortford. 1089

HEAVY duty Arc Welding Plants, 200 amps. Price £31 10s. complete. Also Spot Welders, £36 15s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 50

IRON Connectors, Lampholders and Bakelite Wiring Accessories. Priority deliveries from stock at competitive prices.—ECM/Elec., London, W.C.1. 6846

LARGE quantity of Spares for 150-h.p. Ricardo Engines, including a complete engine.—Frye, Wilson & Co. Ltd., Bishop's Stortford. 1091

KEEPALITE Equipment, with 26 chloride 90 ampere hours batteries, almost new condition. Can be seen in operation, offers invited.—E. Powell Ltd., 39, High Street, Tunbridge Wells. 6552

LESLIE Dixon & Co. for Dynamos, Motors, Switchgear, Chargers and Telephones.—214, Queenstown Road, Battersea, S.W.8. Telephone, Macaulay 2159. Nearest Rly. Sta.: Queen's Road, Battersea (S.K.). 18

MONOMARK. Permanent London address. Letters re-directed. 5s. p.a. Write—EM/MONOS5, W.C.1. 44

MOTOR Generator Sets and Converters, all sizes and voltages from 3 kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, City Road, London, N.1. Telephone, Clerkenwell 5512. 5513 & 5514. 28

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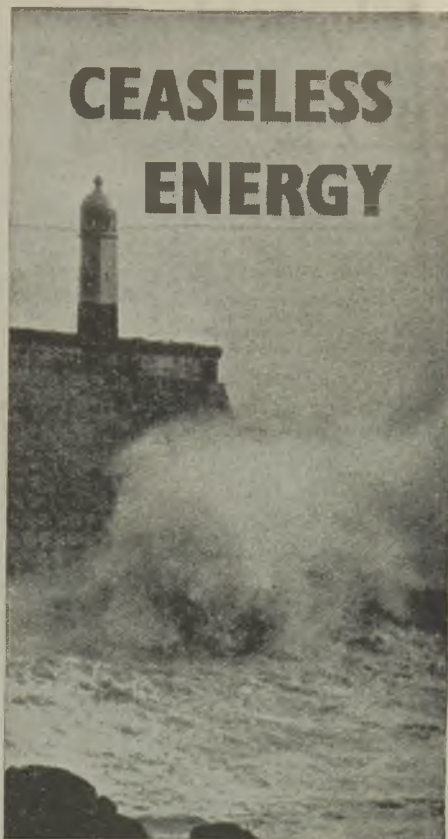
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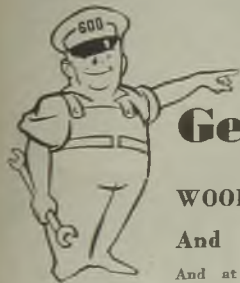
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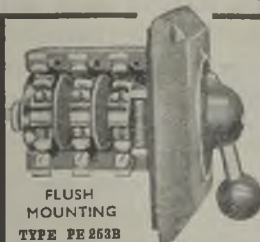
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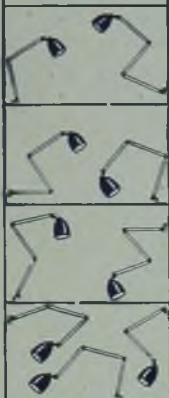
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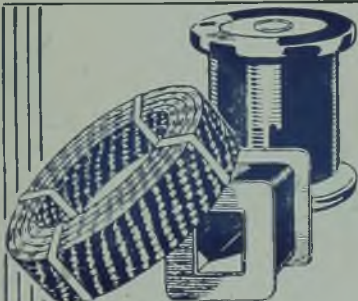


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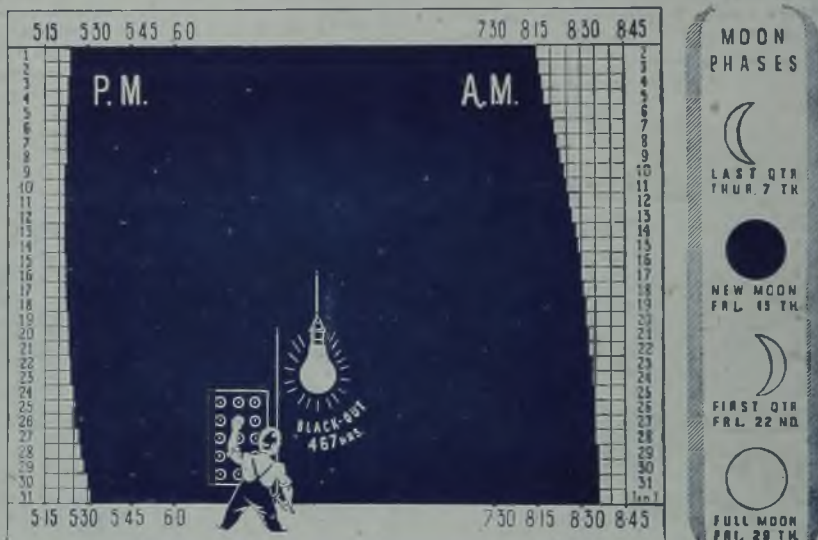
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