

ELECTRICAL REVIEW

FOUNDED
1872

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AUGUST 30, 1946

9d. WEEKLY

*Let's
see...*



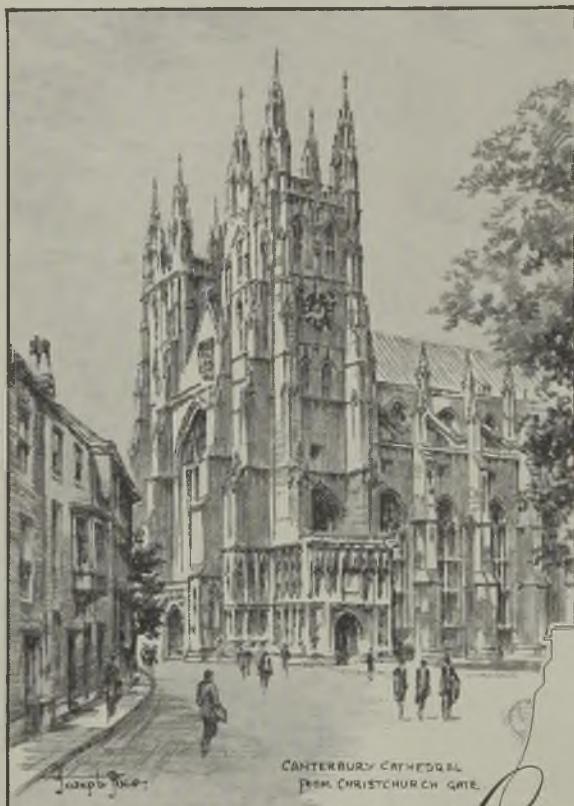
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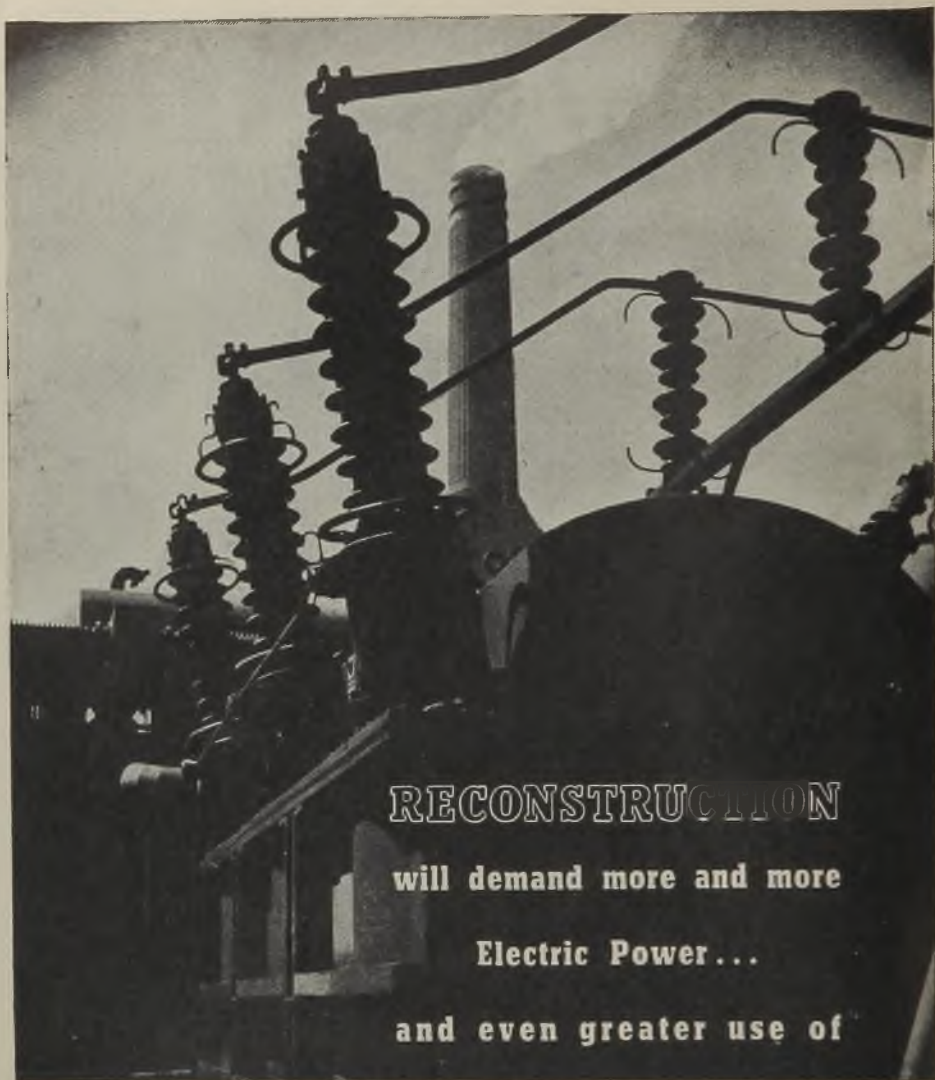
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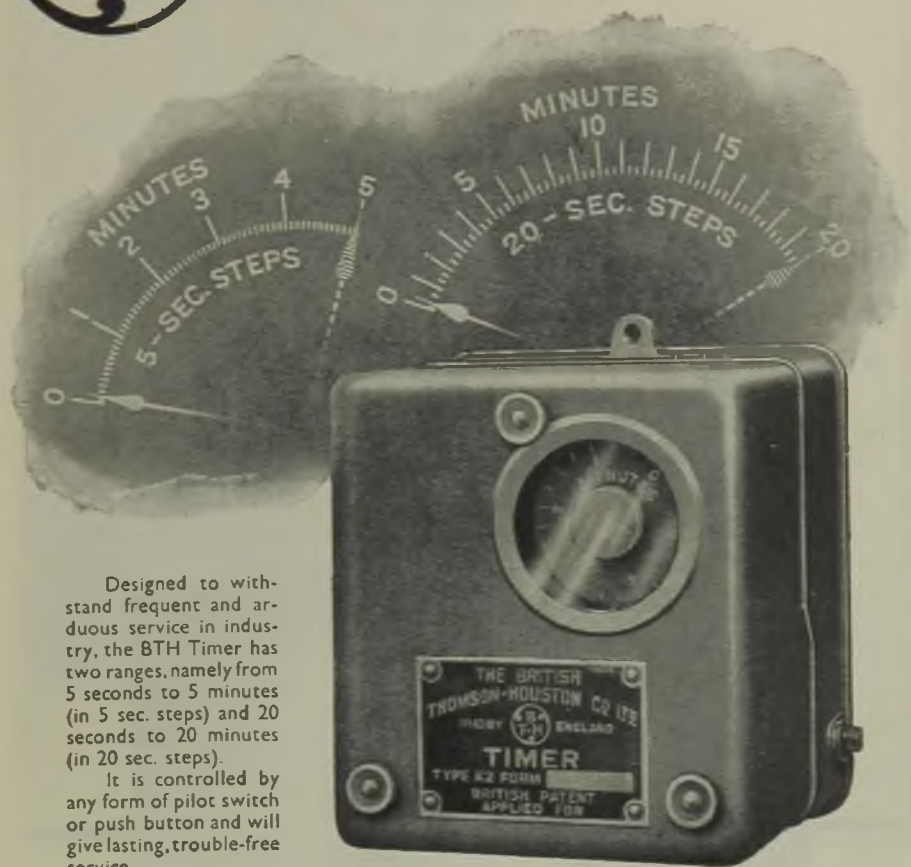
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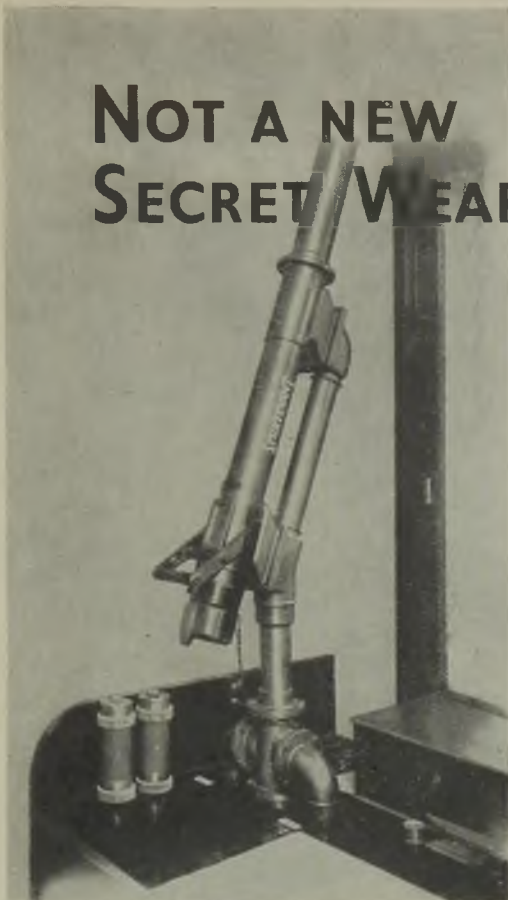
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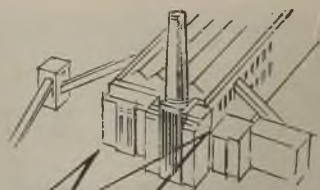
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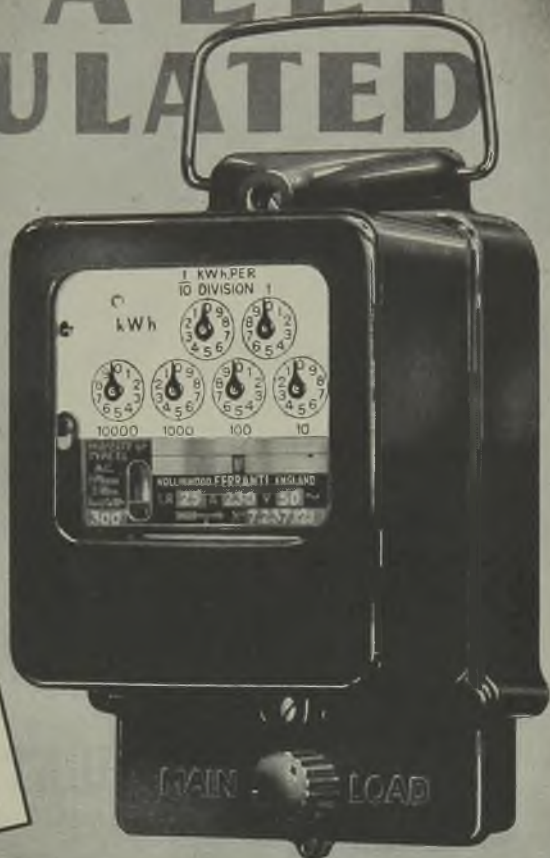
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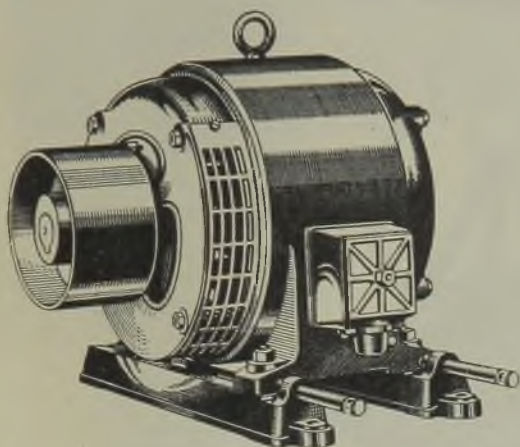
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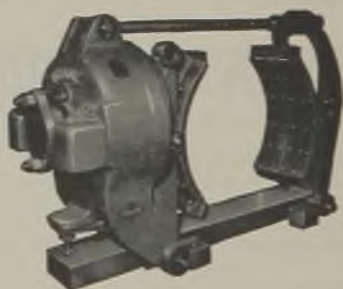


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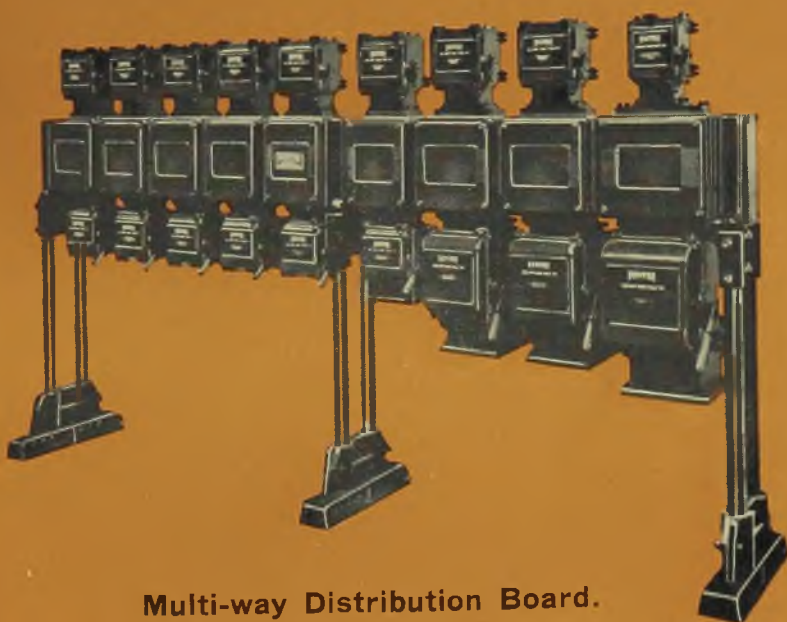


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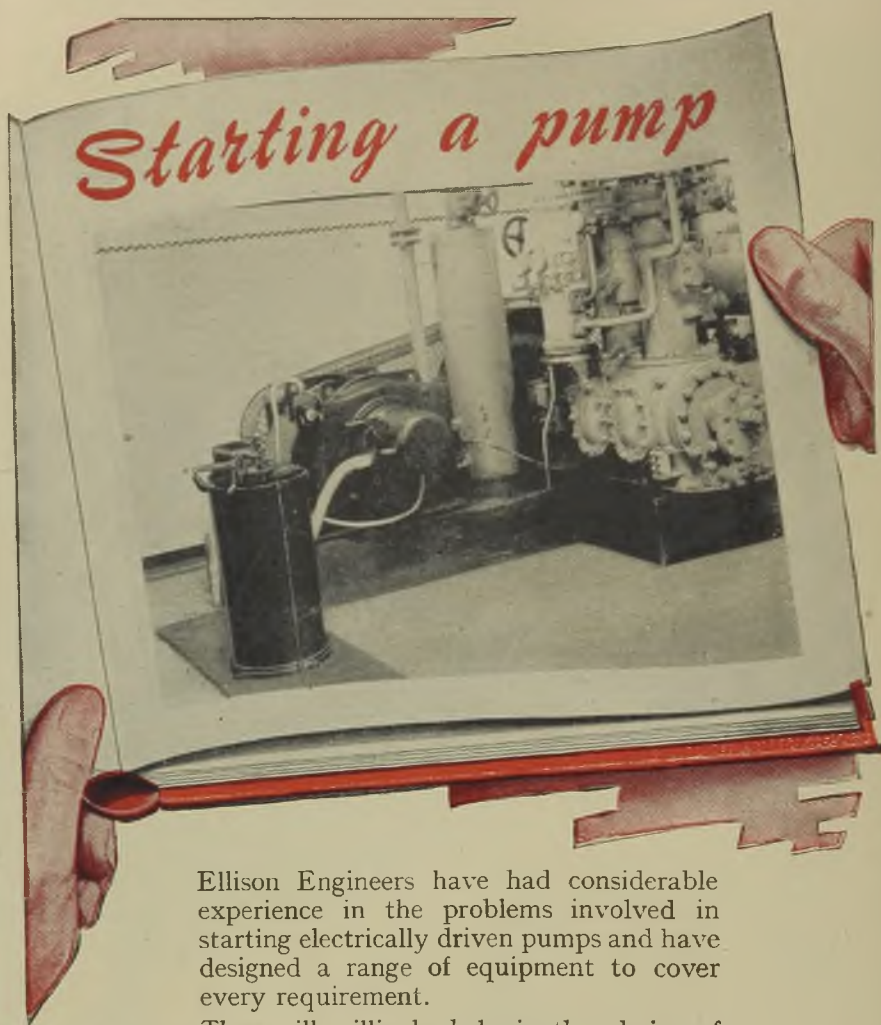
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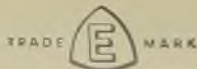


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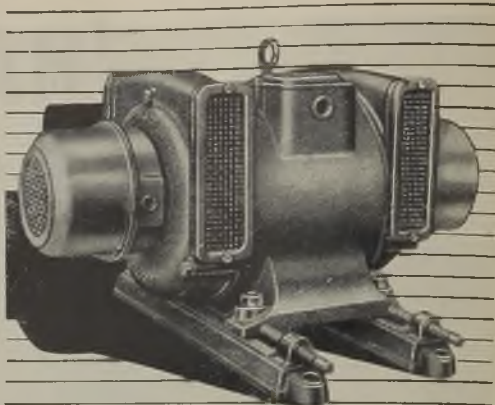
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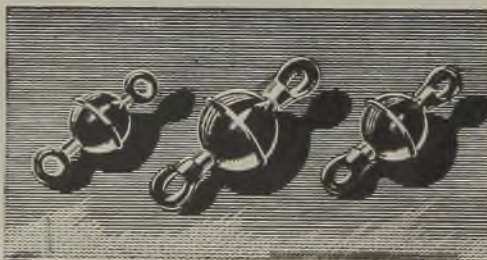
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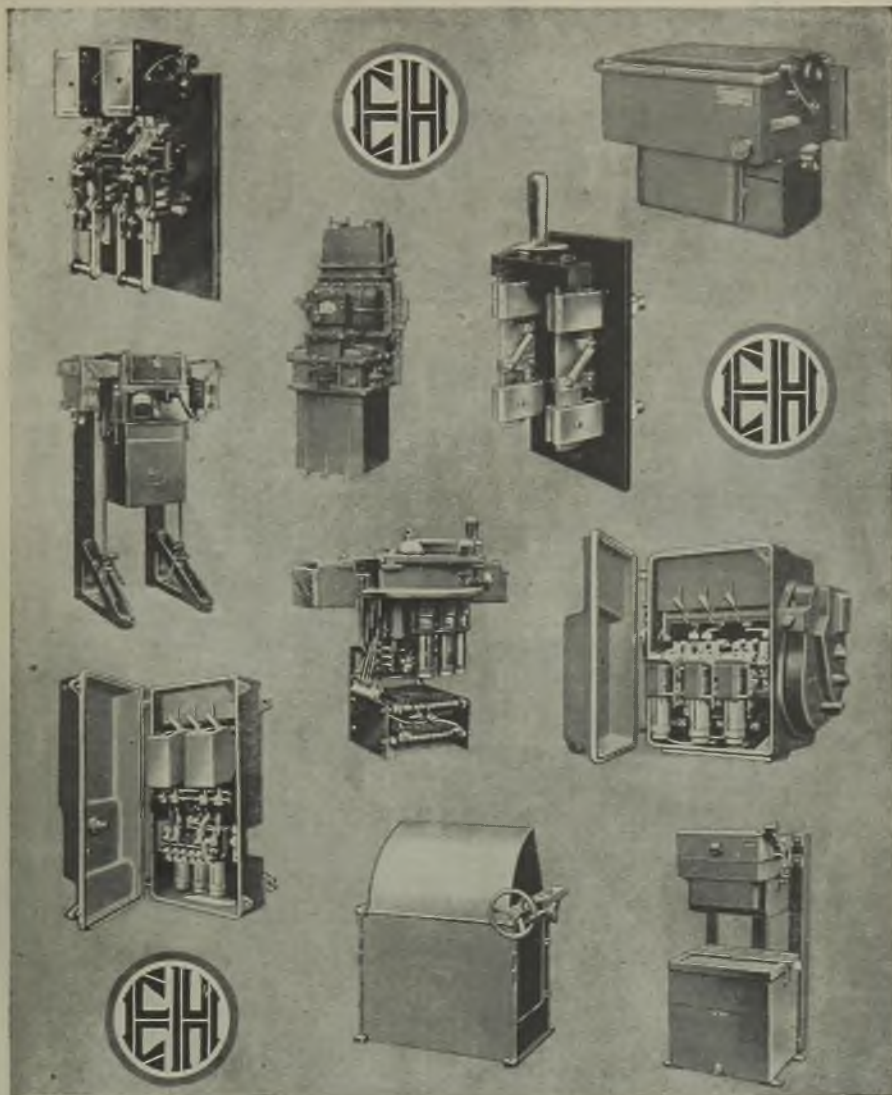
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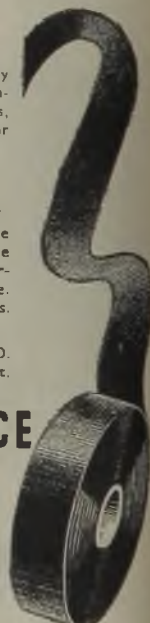
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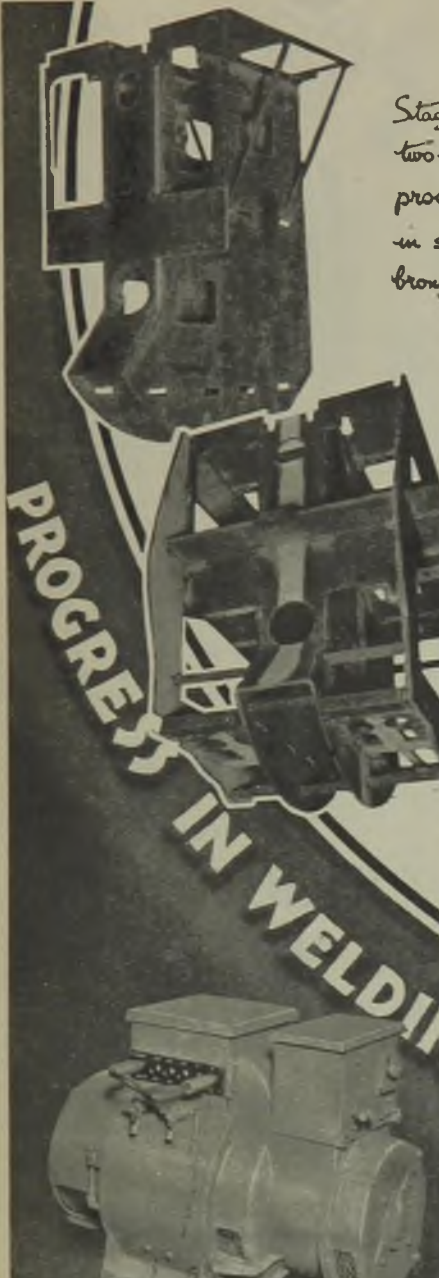
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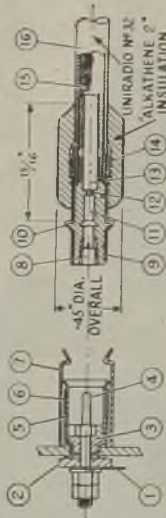
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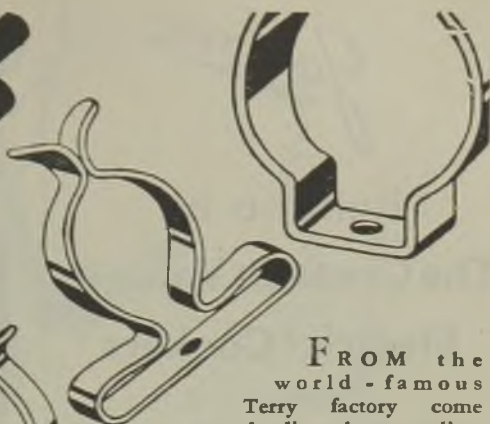
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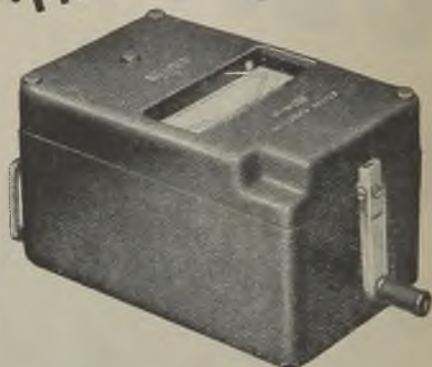
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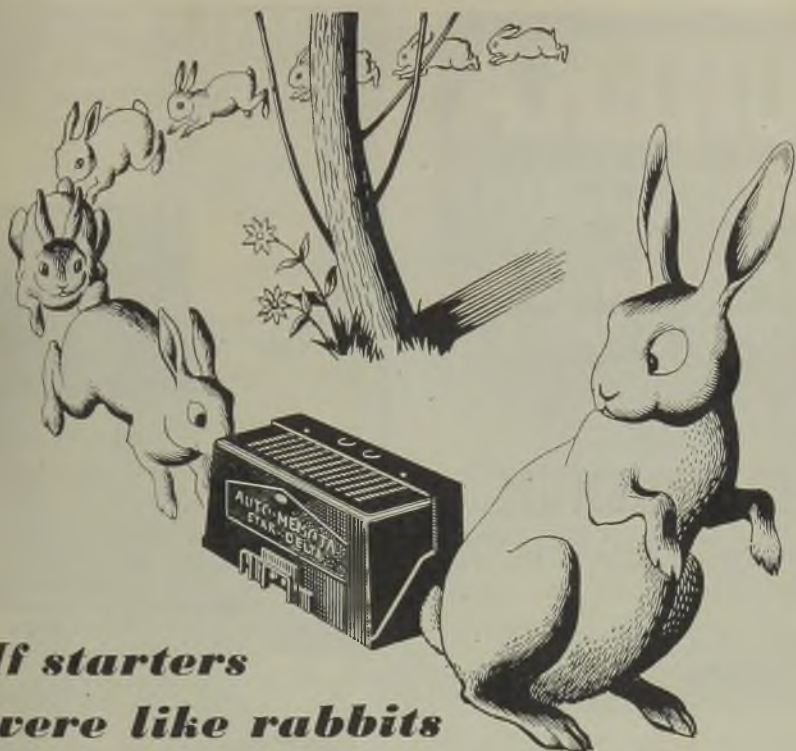
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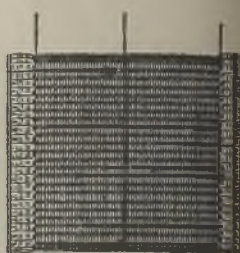


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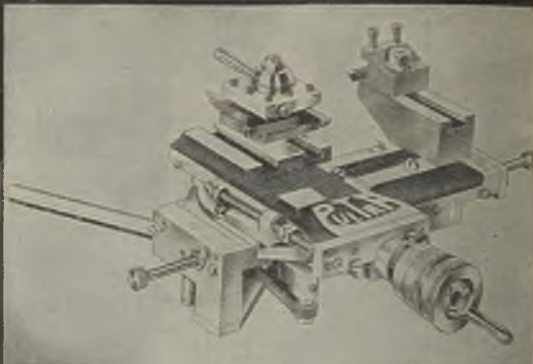
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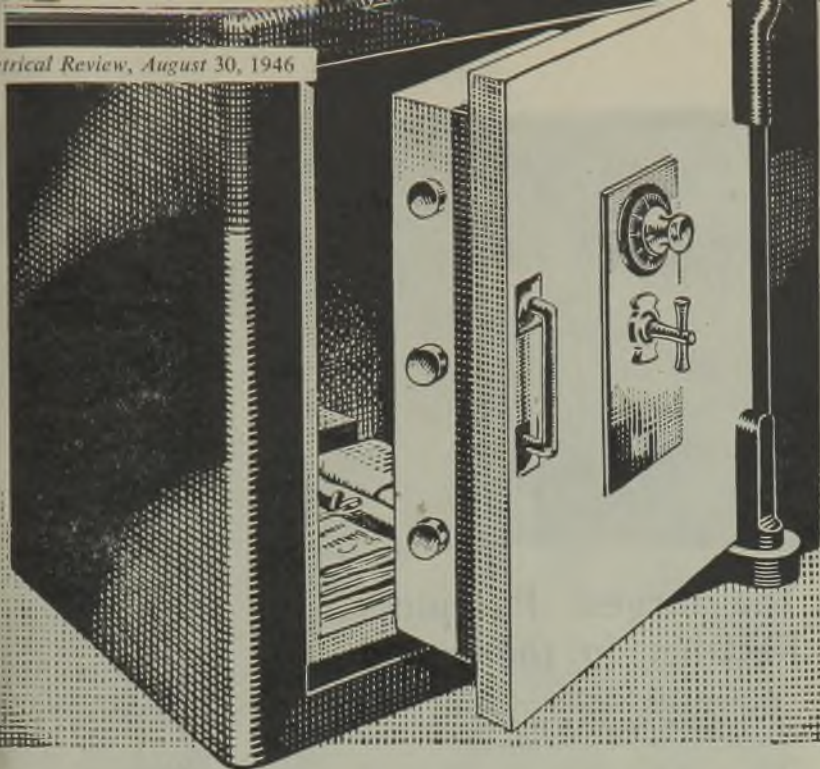
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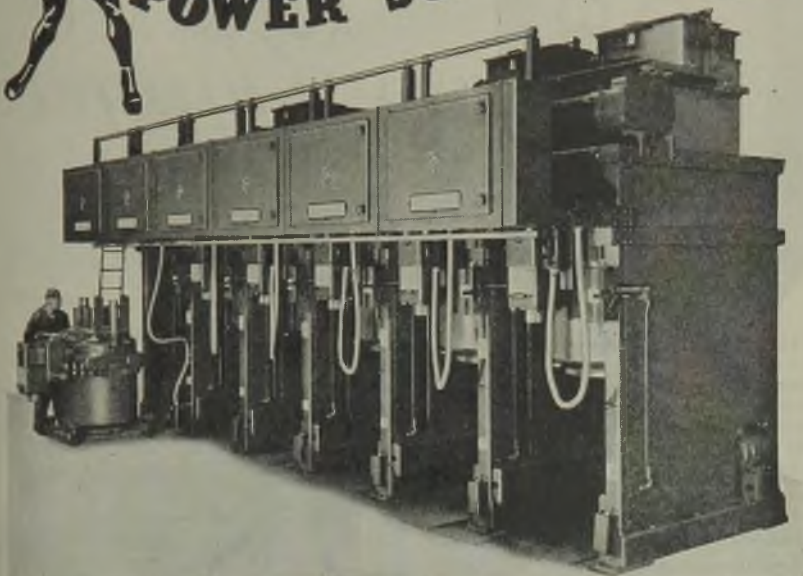
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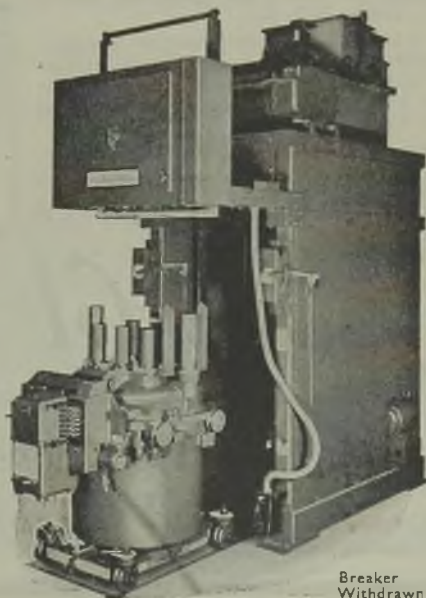
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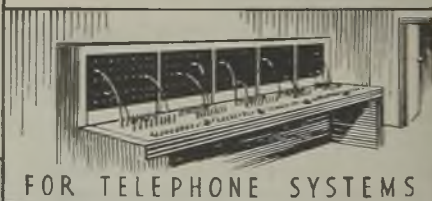
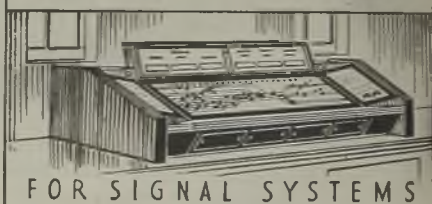
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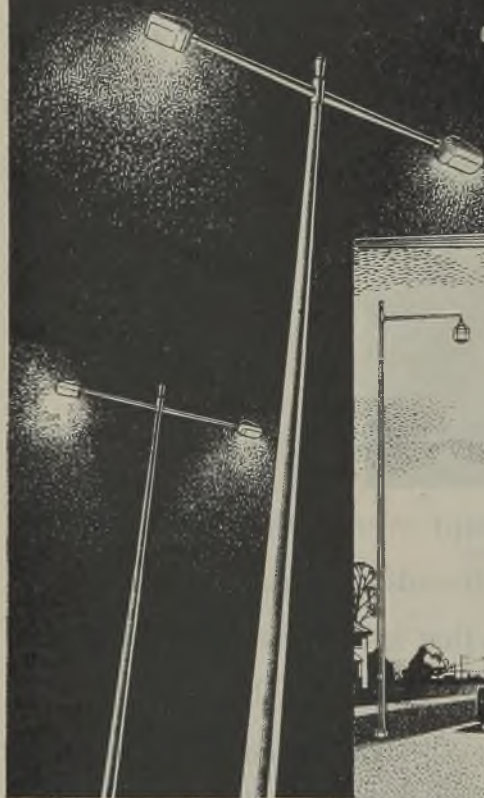
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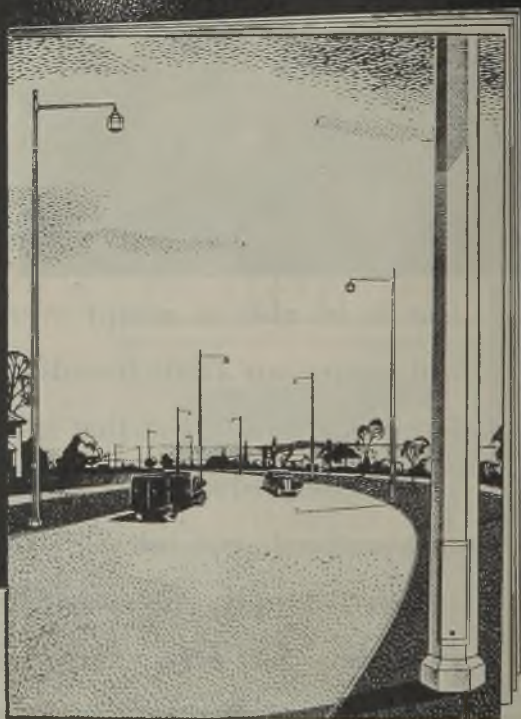
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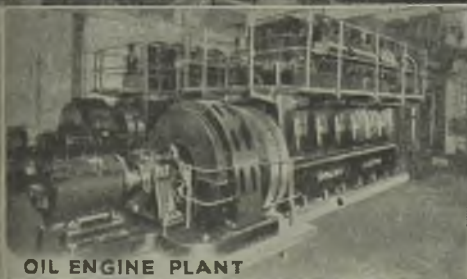
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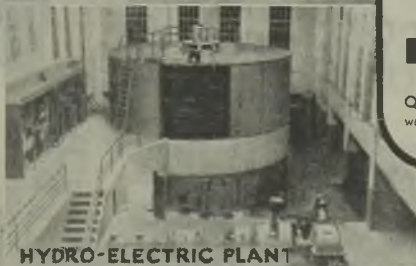
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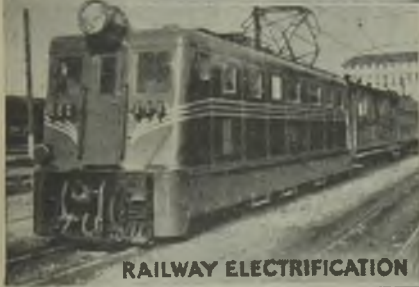
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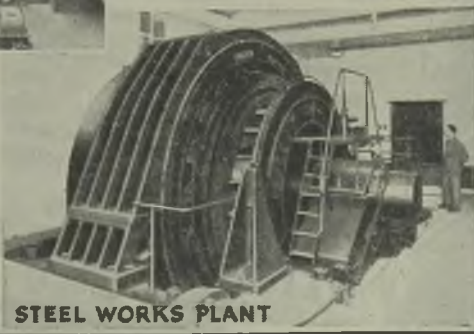
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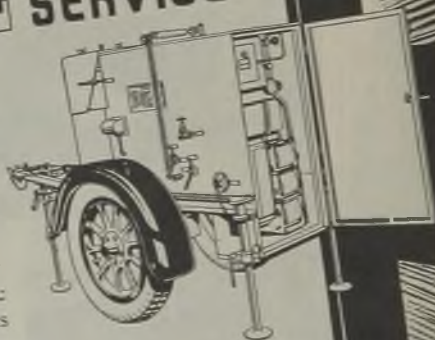
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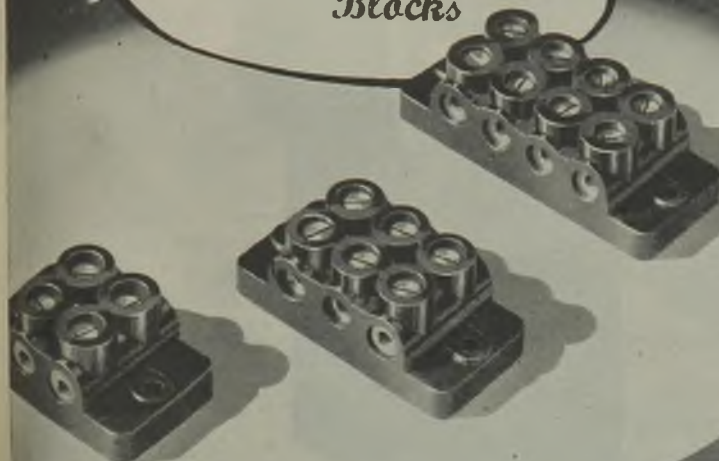
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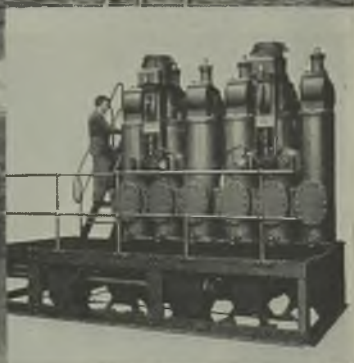
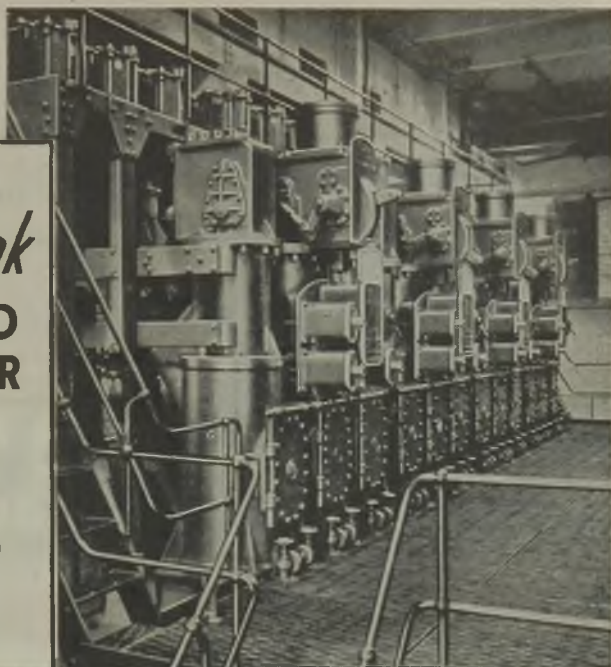
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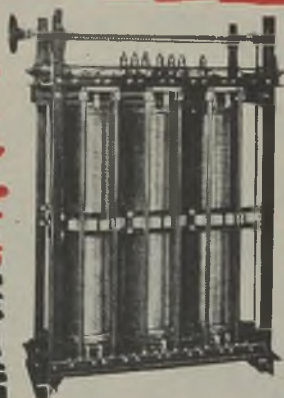
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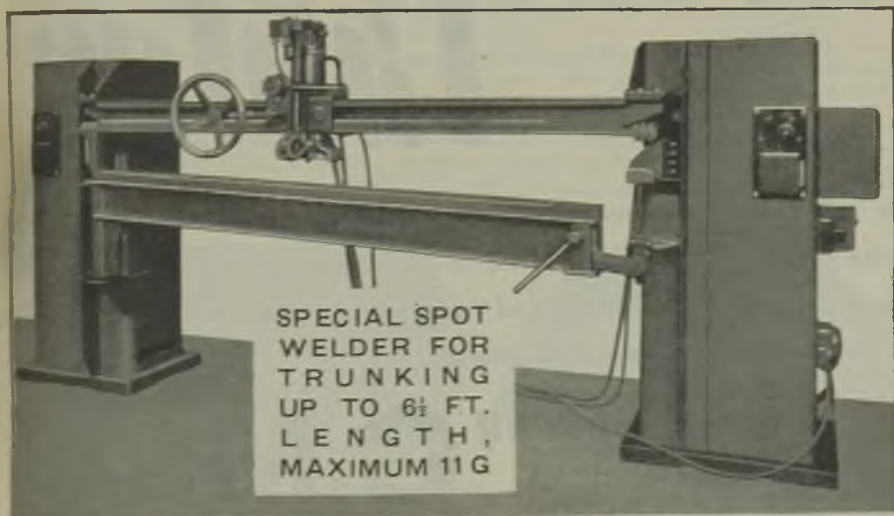
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ELECTRICAL REVIEW

August 30, 1946

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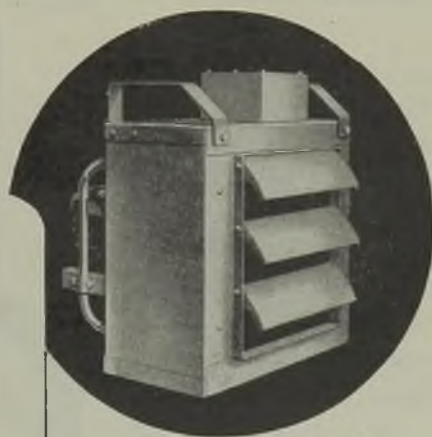
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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXIX. No. 3588.

AUGUST 30, 1946

9d. WEEKLY



Nationalization Proposals

Example of the Steel Industry

FACED with a situation roughly parallel with that confronting the electricity supply companies, the Iron and Steel Federation has agreed to participate in the Board which is to be set up for "the general control and supervision of the iron and steel industry."

A statement issued by the Ministry of Supply says that the Government has decided that the Board should concentrate, under the Minister, on the supervision of the development and reconstruction of the industry and on "the exercise of such continued direct control functions as may be necessary in such matters as production, distribution and prices. It will not be part of the functions of the Board or of the members from the steel industry to advise the Government in connection with plans for public ownership."

Declined Invitation

It will be recalled that the electricity supply companies' associations recently told the Minister of Fuel and Power that they could not accede to his request that they should appoint a "small committee of persons with an expert knowledge of the electricity supply industry whom the Minister could consult." Their reason for declining to agree to this course was that such consultations would be directed towards the framing of the Bill for nationalizing the industry.

It is at this point that the parallel with the iron and steel industry ceases to apply. The power companies said that they had at all times been ready and willing to co-operate and give the benefit of their

wide experience in such work of organization and co-ordination of the industry as would be "in the national interest and in the future interests of the electricity industry and its employees" (using the Minister's own words). But they expressed their conviction that to nationalize the industry by transferring it to Government ownership was contrary to all these interests.

Obvious Decision

They were not given the option, as were the iron and steel companies, of serving on a body designed purely to bring about improvements, independently of the question of ownership. They were forced to choose between contributing to their own extinction or declining to have anything to do with the scheme. Their decision was such as might have been expected by the Minister (and probably was) and they were thus placed in an "unpatriotic" light.

This has just been accentuated by the "practically unanimous" decision of the I.M.E.A. to support the Government in its nationalization policy. It will not be generally appreciated by the public that the cases of the municipalities and the companies are very different (as we pointed out last week) and the companies are likely to suffer the odium of "intransigence."

What, then, should be their next move, seeing that the Government is clearly not to be deflected from its course? While we must regret the inevitability of nationalization, because we have seen no evidence

that improvement will result, yet we should regret still more a disunity in the industry which might well impair its service to the nation. We hope it may yet be possible for all sections to come together in the broad interests of public service.

Street Lighting

THE announcement by the Minister of Transport that he is taking over the responsibility for street lighting comes appropriately just before the annual conference of the Association of Public Lighting Engineers. Members will thus be given another topic for discussion and their views will be of value. Mr. Barnes hopes that lighting authorities will adopt, as soon as they can, the recommendations of the Departmental Committee on Street Lighting (1937) of which Sir Clifford Paterson, Mr. J. F. Colquhoun and Dr. J. W. T. Walsh were members. While it is most important to raise the standard of illumination of main roads such improvement if carried out only in certain areas is likely to prove troublesome to road users, and the Minister is wise in stressing the need for uniformity, which of course should be at the higher level. The Minister made it clear that economy of fuel should be obtained by switching off at midnight rather than by reducing standards of lighting.

Loan Sanctions

STATISTICS just issued by the Electricity Commissioners show that during the past eight years they have sanctioned the borrowing by electricity supply undertakers of about £167 million, including £20 million by the Central Electricity Board. The bulk of the money was required for generating plant and the necessary buildings; it is noteworthy that applications in respect of wiring installations and apparatus rapidly declined during the war period, but an upward trend has now set in. During 1944-45 the total amount of sanctions rose above the pre-war figure and in 1945-46 was about a third higher at £37.7 million.

Commissioners' Statistics

ARISING out of the summary of domestic consumption of electricity in Switzerland given in this issue, it is to be hoped that with the resumption of publication of the Electricity Commissioners' statistics, the opportunity can be taken to differentiate between the kWh used in (if not the revenue from)

residences and in shops and other commercial premises. The omnibus heading of "lighting, heating and cooking" is inadequate for present-day developments, and the figures under it are usually, but incorrectly, identified with domestic consumption which amounts to less than two-thirds of the total in this category. The incomplete returns in Table 37 provide the only indication of cost per kWh as an overall figure.

Design for Industry

A GREAT deal is being thought and said nowadays on the subject of industrial design. Everybody seems to be agreed that mere utility in apparatus and equipment is not enough and the idea of William Morris and his disciples that even the commonplace may be made attractive is taking a firm hold. Practical expression of this idea is to be provided by the "Britain Can Make It" exhibition at the Victoria and Albert Museum opening on September 24th. In connection with this a number of conferences are being held: the first is being organized jointly by the Council of Industrial Design and the Federation of British Industries on September 26th and 27th. Among the speakers we notice the names of Mr. A. Whitaker, O.B.E., M.A., M.I.E.E., whose subject is "Design Training," and Mr. Leslie Gamage, M.C., who will stress the importance of good design in fostering export trade.

Fuel in the U.S.A.

IN many ways the fuel situation in the United States during the war years resembled our own. A report published by the World Power Conference refers to insufficiency of labour in mines and the lowering of boiler house and turbine-room efficiencies through the running of all kinds of plant for long hours. There were similar problems due to the widespread use of coal of high ash content. Although alternative fuels were not adopted to any great extent, the position must have been greatly eased through an increase in the output of hydro-electric stations from 44,000 million to 80,000 million kWh at the end of the period, when it probably reached about 60 per cent of the total. Price, there as here, had little effect on the choice of fuels, since availability was the determining factor. Now, however, the use of fuel in the United States is said to be on an economic basis.

33-kV Switch-House



Scheme at Blackburn in Connection with New Station

ASSOCIATED with the new power station of the Blackburn electricity undertaking, which was described in the *Electrical Review* of April 26th, is a new 33-kV switch-house which appears to us to represent probably the latest word in the expression of modern ideas regarding the segregation of equipment. It will be recalled that generation in the new station is at 33 kV

direct, while generation at 6.6 kV is still continued in the old station. There are separate main transmission systems at both these voltages at Blackburn and, of course, links with the grid. Taking the broader viewpoint, then, of "electricity supply" at Blackburn, the importance of the new switch-house will be better appreciated by visualizing the part it plays in the essential link up, as an integral scheme of the grid, of both systems of generation and the primary transmission systems.

The principle of segregation is at first manifest by the isolation of the new switch-house from the power station, in line with an earlier development which embraced a 6.6-kV switch-house similarly isolated. Actually the new switch-house runs parallel to and about 75 ft from the 6.6-kV switch-house which is adjacent to the C.E.B. substation, and it lies, in common with the older switch-house, at right angles to the new turbine house on the south side, with a spacing of about 65 ft from the turbine house.

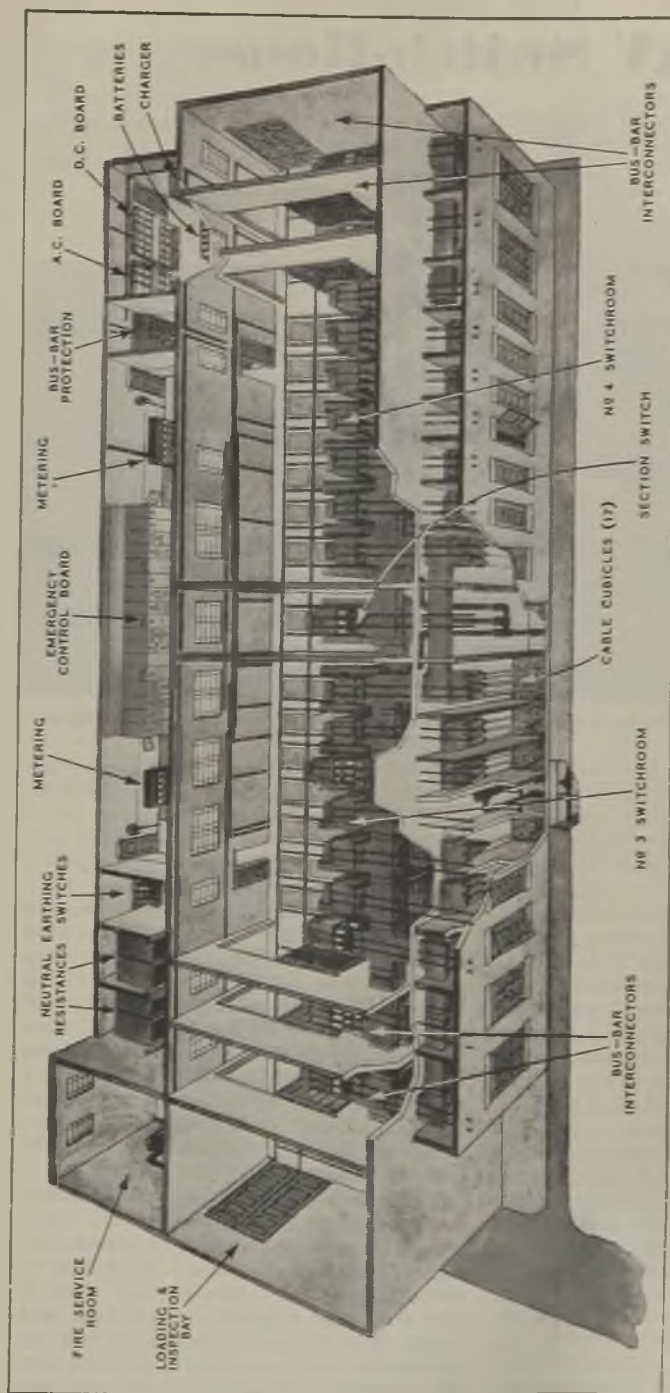
The building is a brick and concrete structure measuring overall about 164 ft long, 46 ft wide and 26 ft high. Regarded longitudinally the building is in three sections,



The new switch-house (left) runs parallel to the 6.6-kV switch-house right; interconnecting transformers between buildings

with the main switch rooms in the centre bay which is about 24 ft wide and occupies the whole length of the building except for a loading and inspection bay about 20 ft wide at the north end. On the east side of the main switch rooms is a bay about 14 ft wide in which the 76-ft long control room is centrally disposed. Flanking the control room at the south end are busbar zone protection and battery rooms, and at the north end a neutral earthing resistance and switch room and a fire service room. On the west side of the main switch rooms is an annexe which comprises cable cubicles which afford separation of the main cables from the main switch rooms, a separate compartment being devoted to the termination of the cables for each circuit.

The main switchgear is of the metal-clad, compound-filled, duplicate busbar, horizontal-draw-out type, with provision for busbar selection by means of removable plugs. The circuit breakers are solenoid operated, and adequate interlocking and safety features are provided to prevent inadvertent and unauthorized operation. The switchgear is fitted with turbulators and



The new 33-kV switch-house probably represents the latest word on the segregation of switchgear, etc. (From drawing supplied by Mr. Harrell)

has a rupturing capacity of 1,000 MVA. There are at present fourteen switch units installed, five of 1,200-A carrying capacity and nine of 800-A carrying capacity. With the exception of one unit, namely, a 1,200-A busbar section switch, these are situated in the two switch rooms, seven in one room and six in the other. In one of the switch-house sections there are a 1,200-A unit controlling the l.v. side of a C.E.B. 30,000-kVA transformer; an 800-A, 40,000-kW turbo-alternator unit; an 800-A ring-main unit; an 800-A C.E.B. feeder unit; an 800-A interconnector unit; an 800-A skeleton unit for a future tie-reactor circuit; and a 1,200-A busbar coupler.

This equipment is duplicated in the other switch-house section, except that there are only six equipments in this case, there being no C.E.B. feeder unit, while the turbo-alternator switch in the second room controls, of course, the 30,000-kW turbo-alternator, i.e., the first of the two h.p. generating equipments installed in the new power station. The two interconnector switches provide the link with the 6.6-kV switchgear via two 20,000-kVA

outdoor transformers which are located between the two switch-houses and segregated on the cubicle principle, not only between themselves, but also between each transformer and its associated cooling equipment. The English Electric transformers are of the natural air cooled oil type, with remote electrically controlled on-load tap changing gear on the 33-kV side. The busbar section switch is arranged between the two switch-rooms in a compartment of its own. The bottom (running) busbar is sectionalized by means of this switch, and the top (transfer) busbar is solid throughout the length of the switchboard. There is provision for the future installation of four additional switch units which will provide the necessary interconnection with a similar switch-house which will become

future interconnectors, one for the top busbar and one for the bottom busbar,



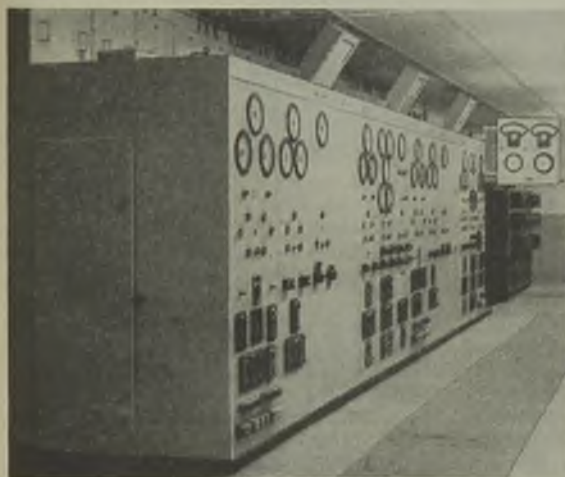
Between the two main switchrooms is the busbar section switch ; note rail track, truck, and fire-proof doors

and each in its own separate compartment, shall be installed at each end of the main switchroom bay.

There is a wide gangway in the switch-room bay, in front of the actual switchgear, and running from end to end of the building is a light rail track flush with the floor, with branches to each switch unit. By means of this and a special switch-lifting truck any unit can be withdrawn and run to the loading and inspection bay or to any other position for interchanging purposes. The railway runs right through the aligned doorways of the segregating walls, each of which is served by a sliding fire-proof door. An efficient oil draining system is provided by pebble-filled pits under each switch unit, with communicating ducts to an oil sump.

The switchgear is normally controlled from a main control board in the power station, but there is an emergency control board in the new switch-house.

The main control board has the control and indicating devices associated with the operation of the alternator, transformer, feeder and other circuit breakers interposed



There is an emergency control board in the new switch-house

necessary when the new power station is extended back on the site of the existing old station. It is intended that two of these

in a system diagram. Each feeder circuit breaker control switch is fitted with an indicating lamp which lights when the position of the control switch varies from that of the circuit breaker. The operating handle of the control switch is in the form of a semaphore indicator, and it can be turned either to the "open" or the "closed" position, so that circuit pre-selection is possible. The alternator circuit breaker control switches are similar to the feeder circuit breaker control switches. They operate interposing contactors which, in turn, complete the circuits to the motor-operating gear of the regulators and other apparatus.

The indicating instruments are of the moving-iron, flush-mounted, rectangular-dial type, with 6-in. vertical shadow scales. Each instrument is self-contained and can be with-

brown. The emergency control board is generally similar to the main control board, except that it is of sheet-steel and that it has standard flush-mounted instruments and carries all the relays for the various circuits. It is finished in semi-glass lavender grey, and the instrument and relay cases are black.

The busbar zone protection relay board is a "Dualock" cubicle-type equipment, and the protection is arranged in one unit for the whole of the switchgear, including the three sections of busbars, but each busbar run is discriminatively protected, so that a fault in any one section isolates that section alone. The s.p. switchgear for controlling the alternator neutrals is of the single busbar metal-clad horizontal-draw-out type, with turbulator circuit breakers, and is generally similar to the main 33-kV switchgear. The

earthing resistors are of the splayed-grid type, consisting of a number of alloy-steel banks which are mounted on micanite-insulated steel rods, with suitable spacing, etc., all housed in a mild-steel frame.

The neutral earthing resistor of the alternator is rated at 1,000 A for 30 seconds, and the interconnector transformer neutral resistors are rated at 1,750 A for 30 seconds. The 230-V, 750-Ah "Nife" station battery is operated automatically, a separate cabinet

being provided for a selenium rectifier and the associated equipment for both normal and trickle charging. Distribution from the battery is effected by metal-clad unit-type interlocked switch-fuse gear, and contactors are provided for changing over automatically from the station a.c. supply to the battery supply in the event of mains failure. There is a similar distribution board in the battery room on the a.c. side.

The switchgear throughout is protected by a comprehensive "Mulsifyre" fire-fighting installation emanating from the fire service room, and an interesting feature of this installation is the absence of the usual service pump. Instead, the installation is fed from and is constantly under the head of a trough



The main control board is in the power station

drawn separately from its panel. An alarm panel is equipped with electro-magnetic superimposed dual-movement indicators for fire-alarm, Buchholz indication and protective relay operation, etc., and indication is given by non-coincidence between the two parts of an indicator which then form a cross. The board is surmounted by two swinging frames under hand-wheel control, each accommodating two 12-in. circular flush-mounted voltmeters and a 12-in. synchroscope. It has a matt finish, with the main panels in light green and the label panels and equipment in medium green. All the control switches and other operating controls are black. The busbar lines are black and red, and the neutral connections for the 6.6-kV transformers are

of water around the interior wall of each of the "Davenport" cooling towers. This trough is normally filled with water as the result of condensation, but a pump is provided for emergency use.

"Pyrotenax" fire-proof cable is used throughout the installation for the controls and for all the battery, lighting and power supplies. All the major equipment throughout the switch-house is of Reyrolle production.

Mr. R. H. Harral, engineer and manager of the Blackburn electricity undertaking, acted as consulting engineer for the design, erection and equipment of the switch-house, and we are indebted to him for permission to view the installation and to publish this article. Our thanks are also due to Mr. A. N. Duffett, deputy engineer and manager, and to Mr. H. Parker, station superintendent, for their help in collecting the information and taking the photographs for this article.

Guidance for Contractors

Position Under W.B.A. Scheme

IN July, Mr. L. C. Penwill, Director of the Electrical Contractors' Association, outlined the position of the Association's members under the W.B.A. priority scheme for building materials. This is amplified in another letter which he has circulated containing notes based on rulings by the Ministry of Works.

It is stressed that the scheme relates only to materials and components required in building work. A schedule of the electrical goods within the scheme has already been sent to members. No concise definition of "building work" is available, but in general it covers work in connection with buildings (not in connection with industrial plant or machinery installed in buildings) and upon the water, light, heating and other services to buildings. Generally speaking, a broad interpretation will be given in considering applications for retrospective priorities as it is realized that in many cases it will be impossible to distinguish between "building" and "non-building" work. The necessary forms must not be used in respect of materials which are required for work which is clearly not "building work."

Non-Building Supplies

Local authorities are empowered to grant priority certificates only in connection with housing. Building priorities other than for housing are a matter for the Ministry of Works regional officers. With regard to materials for other than "building work," the Ministry of Works has stated:—"Attention is drawn to the fact that certain materials are used for purposes other than building and it is stated that the priority distribution scheme is intended to apply only to that part of total production which is normally used in building. . . . It is not designed to apply to or interfere with that proportion of the output of materials and components used for purposes other than building. Non-building industries should, therefore, continue to be able to obtain their requirements from their usual sources subject only to the exigencies of the general supply situation, and cases of difficulty arising from

shortage of materials and components for purposes other than building should be taken up with the production authority for the material and component in question by the Department interested in the consumer of the material."

Wages and Output

Clause I of the wages agreement of April 6th last reads as follows:—"That in return for a fair wage paid by the employer it is incumbent upon the worker to give his maximum skill and service to the industry, this being the accepted obligation of the industry to the public which it serves. In consideration thereof the Electrical Trades Union undertakes to urge its members to respond to the urgent necessity of increasing output."

In this connection it has been decided by the N.J.I.C. that a statement signed by both the N.F.E.A. and the Electrical Trades Union, shall be prepared. Copies are being printed in two forms, viz., as a poster for display on notice boards and as a slip for insertion in wage packets. The statement is in the following terms:—"Attention is drawn to Clause (1) of the agreement between the Electrical Trades Union and the National Federated Electrical Association, dated the 6th April, 1946. It is the responsibility of the National Joint Industrial Council for the Electrical Contracting Industry to bring to the notice of all concerned that in return for a fair wage it is incumbent upon the worker to give his maximum skill and service to the industry, this being the accepted obligation of the industry to the public which it serves." It is signed by Mr. E. W. Bussey for the Electrical Trades Union and by Mr. L. C. Penwill for the National Federated Electrical Association.

Selfridges Electrical Exhibition

Selfridges, Ltd., inform us that the electrical exhibition to be held at their Oxford Street store, mentioned in our last issue, is now to open on October 2nd, not October 7th as originally arranged.

Views on the News

Reflections on Current Topics

AS I have mentioned on one or two previous occasions, amid the uncertainties which surround it the Incorporated Municipal Electrical Association was further embarrassed by the termination of the lease of its Wellington House offices. The task of finding a new home in the present state of accommodation in London was quite formidable but I am glad to learn that there has been a successful issue and from last Monday Mr. J. W. Simpson, the secretary, and his staff have been housed in temporary quarters in Earls Court Road, S.W.5.

Another electrical organization which has been forced to seek new premises is the Electrical Association for Women. Miss Caroline Haslett, the director, has also succeeded in her quest and will soon move her staff to offices in Grosvenor Place.

During the past week the newspapers have carried announcements by the Electricity Supply Companies' Public Relations Committee reminding the public that in the ten years before the war the companies more than halved the price of electricity to the domestic consumer. Advocates of nationalization have succeeded in convincing many people that these companies are hard-bitten monopolists who have been grinding the faces of the poor for many years so there was a need for a counterblast of this sort. The companies ask if any nationalized industry could do as much for the public and call for freedom to continue their service.

Last week from the summit of Ben Vorlich, the Minister of Fuel and Power told a Scottish audience:—"I am going to nationalize electricity in spite of all opposition. I do not say it arrogantly but it will be done." This was certainly going one better than proclaiming it from the housetops. Mr. Shinwell went on to say that although the Scottish scheme might be uneconomical in some parts, when it was associated with the national scheme it would prove solvent.

Regarding the differentiation made in the new B.S. 1320 (reported in last week's *Electrical Review*) between imported and home-grown timber for poles, the lowering of the factor of safety to 2.5 in the first case seems to me fully justified by half a century of reliable service. Equally consistent performance can hardly be expected from native wood used during the war, when sufficient attention could not always be paid to selection, time of year of felling, seasoning and

creosoting. Nevertheless the better examples should be good for a life of twenty years or more. In view of the mixed nature of the whole, the wisdom of the decision to retain a factor of safety of 3.5 for British poles (equal to that for the much more costly reinforced-concrete) can hardly be questioned until more extended experience warrants reconsideration of their claims.

What may be regarded as a triumph of "trade unionism" is reported from Bury, although I prefer to regard it as a triumph of common sense over parochial prejudice. The Corporation has decided to offer the full scale salary for the post of electrical engineer which has been vacant since the retirement of Mr. J. G. Potts. When the post was first advertised at a salary £200 or so below the scale figure there was a very poor response as the A.M.E.E.-E.P.E.A. Joint Committee banned the job. In spite of this the Council re-advertised on the same terms with an equally disappointing result. The trouble seemed to be not so much reluctance to pay "the rate for the job" as resentment at "dictation" by outside bodies. I hope that Bury will now secure more satisfactory results.

"Squatters" are very much in the news to-day. It is interesting to see that a number of electricity supply authorities are winking at the illegal seizure of Government premises by providing supplies to some of these camps, a startling departure by an industry which has a record of a sometimes too-strict conformity with the law. I hope that due regard is being paid to the nature of the electrical installations in the buildings which have been taken over. Some of those which I have seen have been very "temporary" and unless care is exercised there may be trouble.

Some time ago I referred to the sale by Finchley Electricity Department of goldfish which have been bred in the artificial pond at the electricity works to reduce the mosquito nuisance. From reports reaching me it seems that the Finchley "fishing industry" is still going strong and the total sales are now more than £375. It is not anticipated, however, that sales will reach such dimensions that the profits therefrom will justify passing on the benefit to consumers in the form of reduced charges. There is accordingly no prospect of electricity supply becoming a mere sideline.—REFLECTOR.

Diesel-Electric Ship

Equipment of a Former German Vessel

THE electrical installation of the captured German Diesel-

electric ship, *Empire Welland* (formerly the *Patricia*), in which I recently became chief electrician, embodies many interesting features. Power is obtained from six three-phase, 50-cycle, 250-r.p.m., 3-3-kV alternators, five of which, at 2,160 kW, are direct-coupled to eight-cylinder Diesel engines and one of 1,600 kW to a six-cylinder Diesel. These are installed in two engine rooms amidships, separated by a water-tight bulkhead with an electro-hydraulically operated door between them.

In the forward engine room are the controls of the starboard propulsion motor and, in an isolated compartment, the high-voltage switchgear and reactors for paralleling the alternators, a 700-kVA, 3-3-kV/400-V transformer, a 100-kVA, 3-3-kV/380-V automatic voltage-regulating transformer and a motor-driven exciter, which supplies the field of the starboard propulsion motor as well as of the three alternators. The contents of the aft engine room, which is associated with the port propulsion motor, are similar, except that the regulating transformer is of 600-kVA capacity and there are two exciters, one being standby. Either of the exciters can supply d.c. to the cargo winches and cranes.

The two 5,680-kW, 3-3-kV synchronous motors for propulsion are located in the stern. Motors and shafting run on roller and ball races and the stern tubes are of the "Cedarval" type. All machines and switch rooms are cooled on the closed-air system, each machine having its own fan motor and built-in cooler. Temperatures at various points are shown on a pyrometer with a multi-way selector switch which is mounted on the switchboard.

For providing supplies in emergency, two 130-kW, 380-V Diesel-alternators are housed with the main lower-voltage switchboard on the deck above the forward engine room.

By F. E. Little

Each of their direct-coupled exciters can provide half the fields for the main alternators supplying the power network. These sets are automatically started from 48-V batteries, one by means of two electric motors geared to the flywheel; power failure or fire-alarm operation causes the set to run up, in the former case relays closing its circuit-breaker on to the "lighting only" busbars and also starting a cooling-water pump. The second unit is started through a solenoid opening a valve from the compressed-air system, but is not switched in until after the operator has cleared any excessive load.

The 380-V switchboard is split up into four busbar sections (Fig. 1) which can be linked together through two-way switches; the section controlling the emergency alternators is also coupled to the one adjacent by an automatic coupler, which is interconnected with the breaker of the first emergency alternator so that when one is in the other is out.

All the main alternators can be used for propulsion, but the "No. 3" sets, namely, the 1,600-kW machine in the forward engine room and one of the 2,160-kW machines in the aft room, or both in parallel, can also supply the ship's network. Machine breakers

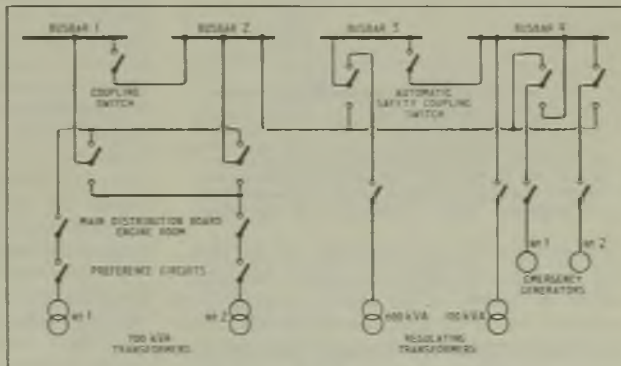


Fig. 1.—Connections to ship's network switchboard

on the other alternators and the synchronous motors are compressed-air operated, either locally or remotely by means of solenoids. Air pressure is about 150 lb per sq in.

Control of the main motors is from desks in the engine rooms, which are each fitted with duplicate instruments to enable conditions in one engine room to be observed in the other. The controller barrel is in three steps and is moved clockwise for ahead running and counter-clockwise for astern. It is interconnected with the electric telegraph from the bridge and incorrect compliance with an order puts a feed into the out-of-balance relay of the motor, opening the d.c. excitation breaker and thus necessitating the return of the control to the "stop" position.

On starting, the main alternators are run up to an idling speed of 100 r.p.m. and the appropriate high-voltage and excitation switches are closed. The control barrel is rotated until the pointer is at the first step in the desired direction, which at the same time operates cams that close the direction contactors of the motor and the contactors for over-exciting the alternators. The motor

excitation" position is reached, at which the hand-wheel is left until the field has discharged itself through resistances. On moving it to the "off" position a contactor closes and puts approximately 50 per cent of the excitation current on to the motor field, which acts as a brake to the motor. If, however, it is to remain at the stop position for any appreciable time the braking contactor may be opened by means of a rotary switch at the main control wheel. In the original design the full motor field was left on; the resistances were installed later, presumably in order to lessen the shock to the motors and shafting on braking.

When the pilot has disembarked and the voyage has started, all the alternators and motors may be paralleled together with the ship's network. This enables the machines to be run at maximum load and efficiency at all speeds because at low speeds machines may be switched out and shut down. The busbar coupling and paralleling switches are foolproof, because should the operator in an emergency manoeuvre forget to open them by means of the push-buttons, the moving of the main control hand-wheel from the third position automatically opens them.

Paralleling Methods

Alternators are paralleled from a central control point in the forward engine room. The push-buttons operating the compressed-air switches and coupling ammeters and two "reed"-type frequency meters are all on one panel. A selector switch has four ways for paralleling port and starboard power networks, propulsion system and networks, network alternators and "off." When this switch is in the required position, the couplers PC and NC (Fig. 2) are closed, bringing into circuit the two reactors, and when the two networks are synchronized a switch "S" (Fig. 2) is closed to couple the two busbars. When the circulating currents through the reactors have died down to zero, the compressed-air switch is closed, and the switch "S" and switches may be opened. If the operator fails to open the last two switches, moving the selector switch to the off position does so. All circuit breakers are blast-operated through push-button control of magnetically-operated valves. Earth protection of the main alternators, switchgear and propulsion motors is on the Merz-Price system.

On starting from dead ship, the emergency machines are run up to the normal speed.

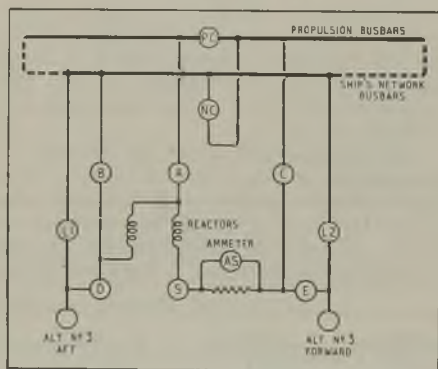


Fig. 2.—Main alternator paralleling system

PC.—Port and starboard propulsion busbar coupler.
NC.—Ship's network busbar coupler. LI and L2.—
Alternator circuit-breakers. A, C and S.—Switches
for connecting port and starboard propulsion busbars.
B, C and S.—Switches for connecting propulsion
system and ship's network. E, D and S.—Switches
for connecting "No. 3" forward and aft alternators.

now revolves as an induction motor until, on reaching synchronous speed, the hand-wheel is turned to the second position for exciting the motor field and then to the third position at which the alternator field currents drop to their normal value of 210 A. Engine governors are regulated by motor-operated speed devices, either by push-buttons individually or simultaneously from a dual-control.

To stop the motor the hand-wheel is rotated in the opposite direction until the "de-

No. 1 will automatically switch itself on to No. 4 busbars supplying the lighting for all the ship. No. 2 machine may now be switched on and the busbar linking switches closed, so as to supply power to the preference circuits in the engine rooms. The exciter set in the selected engine room is then started by means of a star-delta oil switch which is left temporarily in the "star" position to obviate damage to the machine should a fault occur during the first stages of starting.

All high-voltage switches may now be closed for the machine selected and the transformers and the distribution switches for the pumps. The selected network machine No. 3 is now

run up to full speed and, after closing the excitation switch, the main compressed-air-operated switch is closed, feeding the high-voltage busbars. A 700-kVA transformer may now be switched in but, as it cannot be paralleled with No. 2 emergency machine, the latter must first be switched out by means of a remote-control switch, which is fitted with a pilot light adjacent to the transformer lower-voltage switch. The exciter oil switch is then moved to "delta" and either of the voltage-regulating transformers is switched in, the closing of its lower-voltage switch automatically opening the circuit-breaker of No. 1 emergency machine.

Auxiliary machinery, except that used for cargo handling, is driven by three-phase 50-cycle 300-V direct-on-line-started induction motors. Winches and cranes are driven by d.c. 250-V motors supplied from the exciters and using an earth-return system. The cranes are fitted with three motors, one for lifting and lowering the jib, one for slewing and the other for the cargo runner. Boat winches are driven by three-phase motors.

Lighting is at 220 V with earth return. All three phases have been taken into the distribution boxes where the load is balanced evenly. "Stutz" circuit-breakers are used

exclusively on these circuits. For portable and cargo lighting 220 V is stepped down to a 40-V earth-return system.

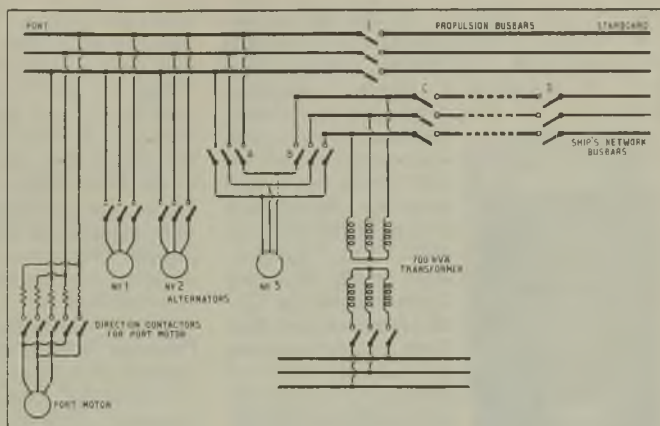


Fig. 3.—Propulsion supply connections (port side)

A.—Selector switch for propulsion. B.—Selector switch for ship's network. C and D.—Isolating switches in forward and aft engine rooms. E.—Propulsion busbar coupler.

The rudder is electro-hydraulically operated having two motors driving two "Hele-Shaw" type pumps. The wheel is mechanically coupled to a potentiometer, a duplicate of which is installed in the rudder machine room. Deviation of the wheel from the centre position unbalances a Wheatstone bridge which starts a servo-motor, which is permitted to run until the rudder potentiometer assumes the position of its counterpart. The d.c. supply for the separately excited field of the servo-motor is obtained from metal rectifiers, many of which are used in the ship, mostly in contactor coil circuits.

My observations have satisfied me that this vessel represents a step in the right direction in shipping and confirms my experience that for flexibility electric propulsion cannot be surpassed. Its efficiency is high, and both running and maintenance costs are low.

Training Course for Cable Jointers

LUTON Corporation electricity undertaking is holding its second training course for cable jointers, the first having been held during last winter. The course consists of six weeks' full-time instruction and practice in l.v. cable jointing. In addition to trainees from the Luton undertaking, five trainees from three neighbouring undertakings are attending the present course.

I.E.E. Section Chairmen

Biographies of New Officers

THE new chairman of the Installations Section of the Institution of Electrical Engineers is **Mr. J. F. Shipley**, partner in the firm of Mackness & Shipley, consulting engineers. Mr. Shipley received his technical training at Finsbury Technical College, and from 1903 to 1914



Mr. J. F. Shipley

was a member of the staff of the Power and Mining Department of the Electrical Company, Ltd., London, after which he joined Graham Rowe & Co., of Liverpool and New York, as chief engineer, and advised them on technical problems connected with mining, agriculture and industrial projects in Chile, Peru and Bolivia, in

which work the supply of power played an important part.

On his return to this country in 1924, Mr. Shipley joined the late Mr. C. F. Mackness, first as his assistant and later as his partner, when the firm of Mackness & Shipley was founded. The firm has been retained for advice, investigation and procedure by public supply companies at home and abroad, and has advised electrical manufacturers, civil engineers, naval architects, engine builders, mining companies, and other industrial concerns on problems of a technical nature. From 1934 to 1940, Mr. Shipley was a director of Central European Mines, Ltd., an English company operating the Mezica lead mine near Klagenfurt, which possessed several small hydro-electric stations. He has made a detailed study of the design, manufacture and use of banded pipes for very high pressures.

Mr. L. J. Matthews, who has been elected chairman of the Measurements Section for the 1946-47 Session, received his training under Prof. Silvanus Thompson at Finsbury



Mr. L. J. Matthews

Technical College. He joined the Electrical Apparatus Co., Ltd., in 1909 as test engineer, and three years later went to the Board of Trade in the Standards Laboratory. He returned to the Electrical Apparatus Co., however, in 1914 where he became chief of the Meter Test Department, chief engineer of the Meter Department and sales engineer. He is now a director of the company and sales manager of the Meter, Instrument and Export Department. He is a member of technical committees of the B.S.I., E.R.A., and B.E.A.M.A.

The new chairman of the Radio Section, **Professor Willis Jackson**, D.Sc., D.Phil., was recently appointed to the University Chair of Electrical Engineering, tenable at the Imperial College of Science, a position which he is taking up on October 1st next.

He was educated at Manchester and Oxford Universities, and was a college apprentice with the Metropolitan-Vickers Electrical Co., Ltd. After holding appointments as lecturer in electrical engineering at Bradford Technical College and the Manchester College of Technology he joined the Metropolitan-Vickers Co. in 1936 as research engineer. Two years later he became Professor of Electrotechnics, Manchester University. Professor Willis Jackson is a member of the Radio Research Board. He is on the Executive Committee of the N.P.L., and of the Central Advisory Council for England of the Ministry of Education.

The chairman of the Transmission Section is **Mr. J. A. Lee**, who is construction engineer at the headquarters of the Central Electricity Board in London.

I.E.E. Benevolent Fund

THE annual dinner dance of the Mersey and North Wales Centre of the I.E.E., held on March 8th was attended by 300 members and friends, while the annual golf competition held on May 23rd attracted 75 competitors. As a result of these functions the Committee has been able to hand over to the Institution Benevolent Fund the sum of £250.



Prof. Willis Jackson

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Central Electricity Board has appointed Mr. P. Gordon Hieatt, A.M.I.E.E., to be operation engineer for the Mid-East England and North-East England grid scheme areas. Before joining the Board's staff in July, 1931, Mr. Hieatt served in the Electricity Departments of the Hackney, Croydon, Derby, Rotherham and York Corporations and with the Northmet Power Co. In recent years he has been senior assistant operation engineer for Mid-East England.

Bolton (Lancs) Corporation Electricity Committee is to advertise for a borough electrical engineer in succession to Mr. H. E. Annett, M.I.E.E., who is due to retire next January. Subject to approval by the Establishment Committee the position will be advertised at a basic salary of £1,600. Mr. T. Jack, A.M.I.E.E., deputy electrical engineer, who was to have retired at the end of this month, has been re-engaged for a further three months.

The following staff appointments have recently been made by the Westinghouse Brake & Signal Co., Ltd.:—Mr. M. W. Shorter has been appointed deputy general sales manager. Mr. C. F. D. Venning, commercial manager (Signal and Colliery Department), and Messrs. F. G. Hathaway and F. T. Tresize, sales engineers (Signal and Colliery Department) at the London

Taylor, M.C. (Rhokana Corporation, Ltd.), have been appointed to the Management Committee of the Copper Development Association.

Mr. E. A. Logan, M.Sc., who as reported last week is shortly taking up the position of engineer and manager in the Electricity Supply Division of the Government of Burma, was born at Newcastle-upon-Tyne in 1901 and received his education at Rutherford and Armstrong Colleges. After two years in the Civil Section of the Admiralty at H.M. Signal School, Portsmouth, he joined Merz & McLellan as assistant engineer in 1923, remaining with them until 1929 when he was appointed chief assistant



Mr. E. A. Logan

mains superintendent with the Yorkshire Electric Power Co. He became resident engineer with the Mid-Cumberland Electricity Co., Ltd., in 1932 (being first engineer to the new company) and left in 1936 to join the Erith Electricity Department of which he is engineer and manager. While at Erith he has been responsible for intensive domestic development and at the outbreak of the war one house in every three had an electric cooker. Mr. Logan is a member of the Institutions of Civil and Electrical Engineers. He was awarded an I.E.E. Students' Premium in 1929 for a paper on "Economic Electric Transmission."

Members of the Research Committee of Associated Electrical Industries, Ltd., recently met at Lydbrook when the accompanying photograph was taken. This shows (standing, left to right): Mr. V. L. H. Plascott (general works manager, Edison Swan Cables), Mr. J. T. Kendall, Mr. E. P. Grimsdick (managing director, A.E.I., Ltd.), Dr. J. M. Dodds (M.V. Research Laboratories) and Mr. T. Wadsworth (B.T.H. Laboratories). Seated: Mr. B. G. Churcher, Mr. J. S. A. Bunting (managing director, Edison Swan Cables) and Mr. J. L. Davies.

Mr. R. G. Parrott, who is with the Metropolitan-Vickers Electrical Export Co., Ltd., in Buenos Aires, and is hon. secretary of the Argentine Branch of the I.E.E., informs us that he has changed his address, which now is Avenida Pte. R. Sáenz Peña 636, Buenos Aires.



Members of the A.E.I. Research Committee during a recent visit to Lydbrook

office. Mr. P. Cruse has been appointed deputy general works manager at the Chippenham factory.

Sir William Griffiths, D.Sc., F.R.I.C., F.I.P., (Mond Nickel Co., Ltd.), Mr. H. J. Alcock, M.Sc., M.I.Mech.E., M.I.E.E. (British Insulated Callender's Cables, Ltd.) and Mr. C. F. S.

The N.E.S.C.O.E. Association is to hold a special dinner at the Royal Station Hotel, Newcastle-upon-Tyne, on Wednesday, October 2nd (not October 1st as originally announced), for the purpose of welcoming Lt. Col. S. E. Monkhouse, M.I.E.E., as a new member of the Association on the occasion of his retirement from the managing directorship of the North-Eastern Electric Supply Co. Mr. J. R. Beard, M.Sc., M.I.E.E., vice-president of the Association, will be in the chair.

Sir Edwin Herbert has been appointed a director of the Broadcast Relay Service, Ltd.

Major W. Lewthwaite, M.C., who has been in charge of the Buying Department of the Witton group of engineering works of the General Electric Co., Ltd., for the past thirty-five years,



Major W. Lewthwaite



Mr. A. J. D. Krause

retired on July 31st. He will, however, continue to act as chairman of the G.E.C. Buyers' Conference, which is attended by representatives of the various factories of the G.E.C. and its associated companies. He is a past-president of the Purchasing Officers' Association of Great Britain. Major Lewthwaite served from 1914 to 1918 in the Machine Gun Corps, being awarded the M.C. and mentioned in dispatches (he was severely wounded), and from 1939 to 1942 he was second-in-command of the 11th Warwicks.

Mr. A. J. D. Krause retired from the G.E.C. on July 31st, after fifty-one years' service of which the greater part was spent as works manager of the company's switchgear works at Witton. Mr. Krause joined the company in 1895 and was transferred to the Peel Works (then the main G.E.C. factory) at Salford; at this period the consumers' supply voltage was being changed over from 100/125 to 200/250 volts, and the consequent redesign of electrical accessories was Mr. Krause's main concern. In 1905 he started a new department for the manufacture of house service cut-outs, switches, fans, searchlights, etc., and four years later this department was transferred to Witton. Expansion was rapid, and in 1911 Mr. Krause took charge of the house service cut-outs and switch section, which became the new Switchgear Department. To mark his resignation,

the workpeople have presented him with a suitably engraved cigarette box and his staff colleagues have given him a wireless set. Mr. Krause has been succeeded by Mr. J. Donkin, B.Sc., A.M.I.E.E., A.M.I.Mech.E., who has been an assistant works manager at the switchgear works for the past ten years.

Mr. R. P. Wingate, who has recently been demobilized from the R.A.F. after six years' service, has resigned his position as assistant public lighting engineer to the North Eastern Electric Supply Co., Ltd., to join the Advisory Lighting Service of the British Thomson-Houston Co., Ltd., as lighting engineer at the Newcastle office.

Mr. F. D. Sarjeant, for forty-three years shift engineer at the St. Peter's power station of the Isle of Thanet Electric Supply Co., Ltd., has retired. He joined the company in 1903 when it was purely a traction company, operating the Thanet tramways which were scrapped in 1937.

Mr. Alexander Maxwell has retired from the position of director of engineering of the Edison Electric Institute after fifty years' association with the electrical utility industry in the United States. He is succeeded by his principal assistant, Mr. Harry Kent, who has been with the Institute and its predecessor, the National Electric Light Association, since 1924.

Lt. Col. S. Mortimer, R.E., has been appointed municipal electrical engineer and transport manager, Penang, Malaya, and is now being released from the service. In 1924 Col. Mortimer, who was with the Yorkshire Electric Power Co., went to Malaya to take up his first appointment with the Penang Municipality, with whom he served until the war came to Malaya, when he was commissioned in the Royal Engineers. Returning to Malaya early in September, 1945, he was appointed C.R.E. 136 Works (Malaya) and was responsible for the early rehabilitation and operation of electrical undertakings throughout Malaya under the British Military Administration.



Lt. Col. S. Mortimer

Mr. J. Chadwick, A.M.C.T., A.R.I.C., has resigned his position as manager and chief chemist to the Lloyd Chromium Plating Co., Failsworth, Lancs, to take up an appointment as technical representative with R. Cruickshank, Ltd., electroplating engineers, Birmingham.

About 3,000 people attended the seventh annual sports day held by the sports and social organization of Automatic Telephone & Electric

Co., Ltd., at Liverpool on August 17th. The weather was kind for this meeting, the first the company has held since 1939, and the presence of many of the employees' wives and families made it as much a social affair as a sporting occasion. The A.T.M. Silver Band played selections throughout the afternoon. The organizing officials had almost as strenuous a time as the competitors in ensuring the smooth running of an extensive programme. Inter-departmental competition was keen for the "Gann" trophy, which was won by Department 01 (Tools and Methods). A baby show and an ankle contest were popular events. The prizes were presented by Lady Eades, wife of Sir Thomas Eades, vice-chairman and managing director of the company.

Vice-Admiral C. Holland, C.B., who commanded H.M.S. *Ark Royal* during the war, has joined A. C. Cossor, Ltd.

Sir Claude Gibb, chairman of C. A. Parsons & Co., Ltd., has left for Australia on a business expedition.

Mr. A. G. W. Goulding has resigned his appointment as director of the General Lighting Equipment Co., Ltd., and has been appointed manager of the electrical department of Smith & Son (Stoke Newington), Ltd.

Councillor Mrs. S. Buckley, J.P., of Blackburn, who has been selected as Blackburn's new mayoress for 1946-7 is the mother of Mr. W. Buckley, mains superintendent in the Luton Corporation Electricity Department. Mrs. Buckley is a member of the Electrical Association for Women.

Glasgow Corporation Transport Committee has reported the resignation of **Mr. W. M. Hall**, automobile engineer, on his appointment as deputy general manager of the Liverpool Corporation Transport Department which we reported in a recent issue.

Mr. C. E. Dryden, formerly of Scarthoe, Grimsby, who has been with the Huddersfield Corporation Electricity Department for some years, has been appointed electrical inspector with the Bedford Corporation, Electricity Department.

Appointments Vacant.—Among the vacant positions advertised in this issue are the following:—Burgh electrical engineer for Oban; electrical engineer and manager for Leek Urban District Council; mains superintendent for

King's Lynn; two assistant engineers for the Middlesex County Architect's Department (salary £545, plus bonus of £60); cable engineer (£750-£850), and transformer engineer (£750-£850) for the Central Electricity Board;



Lady Eades, accompanied by Sir Thomas Eades, vice-chairman and managing director of the Automatic Telephone Co., Ltd., presenting the prizes at the company's annual sports

Chair of Electrical Engineering at the University of Birmingham (£1,650).

Obituary

Mr. Matthew Stevenson, who has died at Kilmarnock, was the senior partner in the firm of Messrs. R. Stevenson & Sons, electrical engineers.

Mr. Arthur Grocott, representative of the Edison Swan Electric Co., Ltd., in the Leeds area, died on August 22nd. He had served with the British Thomson-Houston & Ediswan companies for twenty-eight years in the West Riding area.

Will.—**Mr. Francis Joseph Clayton**, electrical engineer, Keighley, left £3,337, with net personalty £3,288.

Electrical Benevolence

DURING the year ended December 31st last the Electrical Industries Benevolent Association received many substantial gifts from firms and individuals in the industry and these are set out in the Year Book just published by the Association. It is seen that the total income rose from £21,355 to £23,051. At the same time the expenditure increased from £15,056 to £16,779, leaving a balance of £6,272, against £6,299. A curve included in the Year Book shows how the amounts paid out yearly to beneficiaries have risen since 1932: the 1945 total was £12,151.

The sympathetic and practical way in which the Association renders assistance is again demonstrated by the stories of actual cases which have arisen during the year.

Correspondence

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

Fluorescent Lighting Effects

RECURRING headache, with its concomitant ill-health due to eye strain by the use of fluorescent lighting, is mostly attributed to the low lighting intensity and wrongly placed or designed fittings, a defect common to all forms of illumination.

The short wave-lengths of ultra-violet radiation generated in these tubes are regarded as a further cause of distress. The frequency alternations, of fifty cycles, flash distinctly to the eye in a cold gas tube. The hot wire of a filament lamp retains its heat and damps out the effect of periodicity. This flashing would seem to be the real cause of strain to the muscles of the eyes, focusing to rapid pulsations of extreme light intensity. This adverse effect is multiplied when the vision is trained on some object revolving at synchronous speed or oscillating at certain functions of the periodicity.

Sheffield.

H. H.

Shortage of Supplies

VARIOUS reasons and excuses have been put forward for the extreme shortage of electrical accessories, cables and apparatus, none of which is satisfactory to harassed contractors.

It is also very strange that while multiple stores, ironmongers, drysalters, and even pawnbrokers, are able to make a good display of electrical goods, when contractors appeal to manufacturers and wholesalers for a share of these things, they are unsuccessful.

Contractors are already having to dispense with staff due to the continued delay in deliveries and if something is not done to improve this position very quickly, mass unemployment will be inevitable.

Glasgow.

ALEX. MILNE, SENR.

Electricity Supply Loans

Eight Years' Sanctions Reviewed

STATISTICS have been issued by the Electricity Commissioners of the loans sanctioned by them on the application of electricity supply authorities from 1938-39 to 1945-46 inclusive. The first table relates to public authorities excluding the Central Electricity Board. It shows that in 1938-39 the total amount sanctioned was £25,288,803, the principal items being £8,107,154 for mains and services and £6,125,393 for generating plant.

There was a drastic reduction in expenditure during the war, the totals being as follows:—1939-40, £18,900,815; 1940-41, £17,760,500; 1941-42, £6,998,291; 1942-43, £9,184,592; 1943-44, £3,113,953. In 1944-45, however, the pre-war figure was exceeded, the total being £28,337,818, of which loans for generating plant accounted for £20,323,383. The 1945-46 total of £37,652,375 was swollen by sanctions to loans applied for by the North of Scotland Hydro-Electric Board to the extent of £8,931,760, which included £6,300,000 for buildings (generation) and £2,450,000 for generating plant.

A separate table shows sanctions to borrowing by the Central Electricity Board, the annual amounts being as follows:—1938-39, nil; 1939-40, £1,000,000; 1940-41, £1,000,000; 1941-42, £4,000,000; 1942-43, £9,700,000; 1943-44, £2,250,000; 1944-45, £2,025,000; and 1945-46, £100,000. The 1941-42 figure relates to the loan advanced by the Treasury in respect of war emergency extensions. The high total shown for 1942-43 was mainly in respect of expenditure on the grid system incurred substantially before the war and it also included a sum of £900,000 covering the extension of the Earley station. The original instalment for this station was included in the sanction to the borrowing of £4,000,000 for war emergency stations, but the extension is not included in the Treasury advance. A further extension of the Earley station was provided for to the extent of £1,075,000 in 1944-45.

A third table shows the total amounts sanctioned each quarter during the eight years.

ASLIB Conference

THE 1946 conference of the Association of Special Libraries and Information Bureaux will be held from September 13th to 15th, 1946, at the Fyvie Hall, of the Regent Street Polytechnic, London, W.1. A conversazione and tea for members will take place on Friday, September 13th, at 4 p.m., followed by the annual general meeting at 6 p.m. Formal proceedings will open on the following morning at 10.30 with an opening address by Sir Reginald Stradling, C.B., M.C., D.Sc., F.R.S., president-elect of Aslib. The afternoon proceedings will include two papers on information services in relation to industry, one by Sir Arthur Fleming and Miss B. M. Dent, of the Metropolitan-Vickers Electrical Co., Ltd., and the other by Professor R. S. Hutton. In the evening a paper on machines and tables will be given by Dr. L. J. Comrie of the Scientific Computing Service.

Sunday's discussions will be on documentation in Europe, technical dictionaries and glossaries, and the setting up of a film library.

Most of the papers will be circulated in advance to those who apply for them, at a cost of 5s. per set. The inclusive fee will be £1 10s. for members and £2 for non-members. Full details can be obtained from the Aslib Office, 52 Bloomsbury Street, W.C.1.

Overseas Electrical Trade

Recovery During July

IN June last, in common with most other classes, exports of electrical goods, apparatus and machinery were halted in their upward movement mainly because of the loss of four working days. Last month the trend was resumed and electrical exports went up by about £1½ million as compared with June; the total was nearly £3 million above the monthly average of 1938.

Reference to Table I discloses that the rise in the total to £4,795,283 was contributed

pre-war monthly average of £242,716 to £449,052. British India was an outstanding customer for radio equipment (£99,571); South Africa's share was valued at £69,730 and that of Sweden at £52,530. South Africa took the largest quantity of telegraph and telephone apparatus (£57,599), Australia (£51,518) being second.

The cable group as a whole showed an advance from the 1938 monthly average of £359,881 to £1,187,631 in July, the most

TABLE I.—ELECTRICAL EXPORTS AND IMPORTS

Class	Exports			Imports		
	July, 1946	July, 1945	Monthly Av., 1938	July, 1946	July, 1945	Monthly Av., 1938
	£	£	£	£	£	£
Telegraph and telephone wires and cables, submarine	66,286	45,746	17,289			
Ditto, not submarine	373,758	40,515	71,803			
Wires and cables other than telephone and telegraph, rubber insulated	267,230	417,727	117,533	2,608	52,436	31,246
Ditto, insulation other than rubber	480,357	168,949	153,256			
Radio apparatus	670,768	131,828	149,593	332,587	1,249,838	75,160
Telegraph and telephone apparatus other than radio	449,052	125,268	242,716	1,248	33,854	9,243
Electric carbons, furnace	"	"	"	6,718	53	4,054
Other electric carbons	"	"	"	6,333	6,495	2,301
Electric lamps	132,290	75,325	49,440	80	788	10,265
Other lighting apparatus	192,480	41,319	48,565	911	49,455	38,662
Primary batteries	39,748	12,046	13,572	16	16,790	3,549
Accumulators, portable	132,800	41,183	28,874	"	"	"
Ditto, stationary	20,652	3,591	19,773	"	"	"
Ditto, parts and accessories	60,506	19,561	"	"	"	"
Electric cooking and heating apparatus	101,756	22,000	30,664	"	"	"
Commercial electrical instruments, including ammeters, voltmeters, etc., and parts	49,147	17,974	15,878			
House service meters	49,690	12,835	15,791	9,471	26,247	32,057
Other electrical instruments	44,729	5,254	9,612	"	"	"
X-ray apparatus, vacuum tubes and parts	83,229	8,963	4,881	23,406	11,844	9,734
Insulating materials, not elsewhere specified	113,022	28,883	19,343	"	"	"
Unclassified electrical goods and apparatus	322,045	113,791	110,615	10,539	464,401	42,630
Generators, complete, up to 200 kW	86,391	25,572	38,071	"	"	"
Ditto, over 200 kW	154,468	12,571	119,079	"	"	"
Ditto, parts	47,221	"	"	"	"	"
Motors	269,752	93,253	145,045	5,484	16,542	26,033
Converters and transformers	151,810	88,097	101,304	"	"	"
Rectifiers for power-house use	11,994	1,934	3,463	"	"	"
Motor starting and controlling gear	88,805	39,168	50,866	"	"	"
Switchgear and switchboards other than telegraph or telephone	171,810	121,963	184,533	"	"	"
Other electrical machinery	14,381	5,035	15,497	3,000	263,023	14,455
Electric vacuum cleaners	99,532	7,513	26,662	85	20	7,519
Other electrically-operated appliances	49,574	3,742	10,394	3,840	2,066	17,108
Total	4,795,283	1,731,606	1,814,112	406,326	2,193,852	324,016

* Not classified separately.

to by most of the individual items. The most noteworthy increase was in radio apparatus which by rising from a 1938 monthly average of £149,593 to £670,768 became the largest specified item. At the same time the allied class, telegraph and telephone apparatus, also rose from the

outstanding rises having occurred in the submarine and non-rubber-insulated sections. South Africa appears to have been the leading importer of British cables with India a close second. Argentina took non-rubber-insulated cables to the value of £47,332.

There were several other noteworthy

increases and reference may be made particularly to cooking and heating apparatus (from £30,664 pre-war monthly average to £101,756); X-ray apparatus (from £4,881 to £83,229); electric lamps (from £49,440 to £132,290); and insulating materials (from £19,343 to £113,022).

In the machinery section the increase in value was not so pronounced; the total rose

TABLE II.—DISTRIBUTION OF EXPORTS OF ELECTRICAL GOODS AND APPARATUS

Destination	July, 1946	July, 1945	Monthly Av., 1938
	£	£	£
Eire	51,123	44,864	37,562
Channel Islands	44,800	11,184	11,965
Palestine	101,202	19,852	8,371
British West Africa	43,988	24,819	12,864
Union of South Africa	483,771	94,653	157,602
Southern Rhodesia	21,532	8,275	9,574
British East Africa	18,690	42,472	7,830
British India	412,523	229,104	122,928
British Malaya	117,420	—	32,280
Ceylon	26,347	6,112	14,931
Hong Kong	38,461	—	12,874
Australia	161,198	165,838	196,823
New Zealand	124,419	79,485	95,851
Canada	9,618	38,154	12,482
British West Indies	11,668	5,230	12,887
Other British Countries	84,114	28,307	26,336
Soviet Union	41,517	342,000	36,780
Finland	42,758	—	5,824
Sweden	92,161	1,856	13,735
Norway	66,497	2,573	12,582
Denmark	138,390	—	18,282
Poland	19,727	—	9,626
Netherlands	84,085	—	20,190
Belgium	117,483	12,073	10,874
France	60,666	3,249	15,674
French West and Equatorial Africa	1,059	3,049	400
Switzerland	17,748	—	3,572
Portugal	78,328	3,320	6,498
Portuguese East Africa	4,422	—	6,924
Spain	117,494	11,095	3,808
Italy	2,113	2,996	5,659
Czechoslovakia	9,743	1,067	7,205
Yugoslavia	20,131	—	1,471
Greece	24,822	214	4,888
Roumania	—	—	13,350
Turkey	51,905	708	7,633
Egypt	114,741	46,298	12,872
Iraq	79,072	2,651	5,456
Iran	99,015	26,575	16,330
China	113,849	—	4,042
United States of America	9,196	7,209	5,546
Chile	18,830	364	6,635
Brazil	26,915	2,879	11,123
Argentine Republic	99,916	26,863	45,387
Other Foreign Countries	346,088	37,370	33,672
Total	3,649,545	1,332,758	1,119,200

from £657,858 to £1,096,622, the principal advance being in motors—from £145,045 to £269,752.

Actually the exports of this class were less in volume than pre-war, the figures being 3,514 tons in July against 3,720 tons as the 1938 monthly average, generators being the only item showing an increase. Shipments of generators to India were up (from £23,626

to £82,509) but this was offset by falls in exports to South Africa from £39,992 to £5,908 and to Australia from £28,606 to £16,536. Exports of generators to foreign countries made a good advance—from £25,112 to £138,677.

As regards motors, India was the principal customer taking £67,470 in July, against a 1938 monthly average of £17,920. New Zealand's share amounted to £21,039 (against £6,061). Shipments to Australia declined but against this there was a rise from £44,725 to £94,983 in exports of motors to foreign countries.

Taking electrical goods as a whole, South Africa was the leading buyer (£483,771), followed by India (£412,523) and (some way behind) by Australia, Denmark, New Zealand, Spain, Belgium, British Malaya, Egypt, China and Palestine—all over £100,000.

Although imports shrank considerably as compared with July last year, the total of £397,842 was still above the pre-war monthly average, due to heavier purchases of radio apparatus. The only other substantial item was X-ray apparatus.

Street Lighting

Ministry of Transport Assumes Control

IN a circular to public lighting authorities the Minister of Transport announces that his Ministry has become the central authority for street lighting and has taken over from the Home Office the allocation of iron, steel and timber for street lighting equipment. The Minister asks the authorities to give special consideration to the securing of reasonable uniformity in lighting standards as a means of removing a source of danger and inconvenience to road users. In this connection Mr. Barnes urges the adoption as soon as practicable of the recommendations which were made by the 1937 Departmental Committee on Street Lighting.

Necessary authorization of street lighting schemes under Defence Regulation 56A will be issued by the Ministry of Transport, except for schemes on new housing sites or streets other than public highways which will be dealt with by the Minister of Health and the Secretary of State for Scotland.

The Minister stresses the need for continued economy in street lighting, pointing out that the measurements taken last winter resulted in the halving of the pre-war rate of fuel consumption. It is thought that this economy should be achieved by turning out street lights at midnight wherever practicable, rather than by reducing reasonable standards of lighting.

COMMERCE and INDUSTRY

Fuel Economy Conference.

Mr. Shinwell in Scotland.

Model Engineer Exhibition

ADDED skill and greater scope of activities resulting from wartime experiences are conspicuous at the first Model Engineer Exhibition held since 1938. Organized jointly by Percival Marshall & Co., Ltd. (proprietors of the *Model Engineer*), the Society of Model and Experimental Engineers and the Society of Model Aeronautical Engineers, this is the twenty-first exhibition of its kind and the first to benefit by the additional space made available by a change from the old to the new Horticultural Hall, Westminster. Probably the most spectacular exhibits from the electrical point of view are a replica of a modern cinema, complete with coloured stage lighting and screen showing 16 mm films, and a model of a London Passenger Transport escalator. In addition to a profusion of electrically operated trains, trams, trolley-buses, ships, etc., electrical items include a minute mains-driven electric motor measuring only about $\frac{1}{4}$ in. across, a vertical steam-driven dynamo set, an electric clock and a table lamp. Apart from the association and private exhibits there are about fifty trade stands on which may be seen not only complete models but also their various components, tools and other workshop materials, drawing office equipment, etc. The exhibition closes to-morrow, August 31st.

New Broadcast Transmitters

A new 100-kW broadcasting station has recently been opened in Ceylon by the Army Welfare Service. The contract was placed during the latter period of the war with Marconi's Wireless Telegraph Co., Ltd., and the company's 100-kW short-wave broadcast transmitter, Type TBS.801, was installed on a site near Colombo.

Marconi's have also received a contract (valued at £40,000) from the South African Broadcasting Corporation for six additional transmitters. The equipment will consist of the company's standard 5-kW medium-wave broadcasting equipments, Type TBM.671. The first two equipments, which are now under construction at the Marconi Works at Chelmsford, are due for dispatch by the end of September, and will be installed by the South African Broadcasting Corporation's engineers on sites near Johannesburg. The remaining four, to be dispatched in the spring of 1947, are destined for Cape Town and other sites.

World Fuel Conference

By invitation of the Netherlands National Committee, the Fuel Economy Conference of the World Power Conference will be held at The Hague, Holland, from September 2nd to 10th, 1947. A two-days' visit is to be made to the Netherlands State Coal Mines at Lutterade. Further particulars may be obtained from the British National Committee, World Power Conference, 36, Kingsway, London, W.C.2.

The first of a series of reports on fuel economy

since 1939 in the United States has been prepared by the National Committee of that country and is obtainable at 6d. net from the address given above.

"Electrical Review" Index

Readers who require the index to Vol. CXXXVIII (January-June, 1946) should apply for copies to the Publisher, *Electrical Review*, Dorset House, Stamford Street, London, S.E.1.

Bristol Electricity Headquarters

Development of the Bristol Corporation Electricity Department's future headquarters in Colston Avenue is to begin in the autumn. Except for part of the top floor, which is used by the department as a meter and test room, the building is at present occupied by the Bristol Aeroplane Co., for workshops. The company, however, is expected to vacate the building at the end of September or October. It is anticipated that the transfer of the main offices and showrooms from Dorset House, Clifton, will take place piecemeal, and will occupy eighteen months to two years altogether.

New I.M.E.A. Address

Having been unable to secure a renewal of the lease of its headquarter offices at Wellington House, Strand, the I.M.E.A. has taken temporary offices at 254-260, Earl's Court Road, London, S.W.5. The telephone number is Frobisher 2232, Ext. 12.

Communications in Wartime

In the modern world speed of communication is of the first importance; in wartime it becomes vital. Proof of this is provided by the story of Cable & Wireless, Ltd., told in a book entitled "The Thin Red Lines," by Charles Graves, published by the Standard Art Book Co., Ltd., 10, Great Queen Street, W.C.2 (184 pp., 27 illustrations, 5s.). This follows the course of the war from beginning to end, showing how the company's services entered into practically every phase and operation.

Hospital Electrification

In our article on the Queen Elizabeth Hospital on August 16th some of the equipment of the Physiotherapy Department was described as being supplied by "Sollux, Ltd." Actually it was made by Hanovia, Ltd., whose registered trade mark for infra-red lamps is "Sollux."

Imports into Ceylon

The Government of Ceylon has inserted the following items, among others, in Open General Licence No. 4 (applicable to the British Empire except Canada and Newfoundland):—Electric telegraph and telephone instruments and apparatus (except batteries) other than wireless apparatus; electric control and switchgear; electric generators, alternators, dynamos and

exciters; electric motors; electric transformers and convertors; and machinery falling under the heading "Electrical machinery not elsewhere specified" in Class III, Group G, of the classification in the Ceylon Customs Tariff.

Radio Newspaper

When the *Queen Elizabeth* sails from Southampton on October 16th on her first "civilian" voyage her passengers will have the benefit of the latest news picked up by radio and printed in the *Ocean Times*. This newspaper will be the first to reappear among the newspapers which were published at sea on a number of the larger vessels before the war. The *Ocean Times* is published by Wireless Press, Ltd., one of the Associated Iliffe group.

Welding Light Alloys

A symposium on the welding of light alloys is being organized by the British Welding Research Association on October 16th and 17th in the Henry Jarvis Hall of the Royal Institute of British Architects, 66, Portland Place, London, W.1. The four sessions will deal with (1) development of high strength aluminium alloys for welding; (2) pressure welding and flash welding of light alloys; (3) spot welding of light alloys; and (4) the welding of magnesium alloys. There will be demonstrations and exhibits at the offices of the Association, 29, Park Crescent, W.1. Although accommodation is limited a certain number of tickets will be available upon application to the Association.

New Simplex Bristol Premises

Among the many Bristol buildings destroyed during the war was the Victoria Street branch of the Simplex Electric Co., Ltd. The company has since occupied temporary quarters at Bedminster Parade, but has now opened new offices and stores at Nos. 1, 3 and 5, Lawrence Hill, Bristol, 5 (telephone: 57811-12; telegrams: "Simplex, Bristol"). Fully comprehensive stocks will be laid down as soon as supplies permit.

Coil Winder—Correction

An inaccuracy in our description of the "Quickway" coil winder (*Electrical Review*, August 16th, p. 276) is pointed out by the Midland Dynamo Co., Ltd. The two uprights which support the shafts of the rotor to be wound are not clamped to the bench, as stated, but are part of the machine itself, the whole of which is self-contained and suitable for mounting on any existing bench.

Mr. Shinwell's Scottish Tour

On August 19th Mr. Shinwell, Minister of Fuel and Power, inspecting the power and heat plant at the Kirkcaldy works of Michael Nairn & Co., Ltd., said that he thought that if a similar process for heating and power could be adopted throughout industry they could estimate a saving of 30,000,000 tons of coal a year. The combined power and heating plant thermal efficiency average is claimed to be 67 per cent.

Continuing his Scottish tour Mr. Shinwell visited Dumfries-shire on August 22nd, when

in company with Mr. W. M. Bell Macdonald, the convener of the Electricity Committee, Mr. J. S. Pickles, county electrical engineer, and other officials he made a survey of the county's electricity scheme by which 9,000 homes are receiving supply and 751 farms were, using electricity. Later he described the Dumfries-shire scheme as the most perfect example of electricity distribution there was in the country, and said the cost to the consumer seemed extremely reasonable. From what he had seen of the Dumfries-shire scheme he was convinced that electricity generated and distributed on a national scale, with the provision of autonomy in the areas, and with due regard to the need for maintaining local and personal contact, was going to be a most profitable undertaking for the State.

London Factory in Wartime

An attractively produced and illustrated book of 76 pages entitled "Morgans at War" records the production of a variety of equipment, much needed in wartime, in spite of constant evening attack from the air. It is the story of one of many factories in London's several target areas when the workers had to be convinced that the making of "bits and pieces," seemingly so insignificant, helped to form the thread which completed the grand pattern. This vignette of the war as seen from the riverside factory of the Morgan Crucible Co., Ltd., includes charts which throw interesting sidelights on the volume and variety of production.

Reports on German Industry

Among the latest reports by investigating teams upon various departments of German industry are the following. A few copies are available from the Stationery Office at the prices shown and the reports may also be seen at a number of the principal libraries:—B.I.O.S. 567, "Resistors and Fixed Capacitors Produced in Germany" (7s. 6d.); C.I.O.S.I-1, "Radar and Controlled Missiles" (5s. 6d.); F.I.A.T. 224, "Survey of Electrical Control Devices in Germany" (2s. 6d.); F.I.A.T. 670, "Survey of a New Storage Battery" (6d.).

Trade Publications

British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, London, W.C.2.

—Illustrated brochure (No. 205) on capacitors for power factor correction above and below ground in coal mines.

Aerialite, Ltd., Castle Works, Stalybridge, Cheshire.—Price list of cables and flexibles of many varieties.

British Diamix, Ltd., Metrum Works, Beatty Street, Camden Town, London, N.W.1.—Illustrated leaflet on domestic irons, fires and boiling rings; also wholesale and retail price lists.

Imperial Chemical Industries, Ltd., Metals Division, Kynoch Works, Witton, Birmingham, 6.—Brochure classifying and summarizing the physical properties of "Kynal" and "Kynal-core" wrought aluminium alloys, tabulated in eight schedules, to enable constructional engineers and designers to select those alloys most suitable for specific requirements compared with other metals. Also a brochure on "Kumanol," a new copper base electrical

resistance alloy of very low temperature coefficient available as tape, strip and wire which can be readily jointed by welding without special precautions.

Applicants for copies of these publications should write on their firms' business notepaper.

British Trade Mission to Russia

A Reuter message from Moscow states that a group of British electrical engineering experts, headed by Sir George Nelson, chairman of the English Electric Co., Ltd., was due to arrive in Moscow on Sunday last and is, according to British sources in Moscow, prepared to discuss "substantial orders." The visit, made at the invitation of the Soviet Government, marks an important stage in the renewal and extension of Anglo-Soviet trade.

New Electricity Poster

The fact that while every other commodity has risen in price since 1931 electricity has

dropped by 40 per cent is stressed in a striking coloured poster issued by the Electricity Supply Companies' Public Relations Committee. A graph, printed in nine colours, shows the trend of costs for the last fifteen years of coal, materials, wages, cost of living, and electricity. At the foot appears the message "Don't Nationalize Sound Enterprise." Copies may be obtained from the Electricity Supply Companies' Public Relations Committee, c/o Mr. Hubert Williams, 32, Great Ormond Street, W.C.1.

Trade Announcement

The Agro Electrical Co., Ltd., informs us that the arrangement by which its sales were conducted by T.M.C.-Harwell (Sales), Ltd., has now ceased and it has established its own sales organization under the management of Mr. C. J. Abercrombie. As from September 2nd, the company's London offices will be at 7, Maddox Street, Regent Street, W.1 (telephone: Mayfair 4068'9).

Municipal Reports

Sheffield

FOR the third successive year the accounts of the Sheffield Electricity Department show a loss, which on this occasion has reached the substantial figure of £181,314. In view of this adverse trend the City Council last March raised the charges. During the war, with a large increase in the power load, the average price received per kWh sold fell as low as 0.55d. (in 1940-41), since when it has risen to 0.66d., a figure which, however, is not much higher than in the last pre-war year—0.615d.—and compares with 0.707d. ten years ago. Revenue from electricity supply in 1945-46 amounted to £2,140,205 (against £2,113,452 in the previous year) and the aggregate income (including that from the motor and installation sections) was £2,222,079 (£2,173,469). Working costs totalled £1,903,659 (£1,821,816) and loan charges £499,735 (£498,109). Against the deficiency of £181,314 is set special income of £99,086, reducing the amount to be transferred from the reserve fund to £82,228.

The report of the undertaking, of which Mr. J. R. Struthers is general manager and engineer, includes a number of graphs comparing the financial and operating figures for the war years. A curve of electricity sold indicates that the peak was reached in 1943-44, the subsequent fall being due to the decrease in the power load. Last year 775.8 million kWh was sold against 835.0 million in the previous year, a decrease of 59.2 million kWh (7 per cent). The number of consumers increased by 1,511 to 166,814.

As regards generation, the maximum demand on the stations rose from 226,400 kW to 233,610 kW, although production fell from 1,187.3 million to 1,077.8 million kWh. The total plant in commission during the year was 292,000 kW. The installation of a new 50,000-

kW set at Neepsend is proceeding and three 190,000 lb per hr boilers are also to be installed at the station, two other boilers at Blackburn Meadows being nearly completed at the date of the report.

Sunderland

The past year is described by the borough electrical engineer and general manager at Sunderland (Mr. W. A. Royle) as the most successful since the inception of the undertaking fifty-one years ago. New records were set up for total sales, 97.2 million kWh; revenue (electricity supply), £413,337; net trading surplus, £47,194; and contribution to the rates, £12,500. The quantity of electricity sold was 3.6 million kWh (3.9 per cent) more than in 1944-45, this being accounted for principally by increases of 1.6 million kWh in domestic supplies and 1.2 million for public lighting. Since 1939 sales have risen by 44.2 per cent although, owing to wartime restrictions, the number of consumers has only increased from 26,682 to 28,434. Against a rise of 130 per cent in the cost of coal the average price obtained per kWh sold by the undertaking has advanced by only 13.6 per cent (from 0.899d. to 1.021d. per kWh).

Last year the undertaking generated 150.9 million kWh against 148.5 million kWh in 1944-45. As the maximum demand on kWh sent out fell from 38,850 to 36,980 kW, the load factor improved from 40.66 to 43.24 per cent. The total revenue was £466,367 (compared with £422,787 in the previous year) and working costs amounted to £354,102 (£320,156). After providing for loan charges, income tax, etc., £34,322, (£28,782) there was a net surplus on the year's working of £47,194 (£40,887).

Electricity in Switzerland

Consumption for Domestic Purposes

By "Electricus"

THE Union of Swiss Electricity Undertakings recently published statistical returns of domestic electricity consumption for 1943, which covered about 85 per cent of the total population of $4\frac{1}{2}$ millions.¹ As in Switzerland the bulk of the domestic supplies is metered and billed according

low rates per kWh, so that the revenue from water-heating supplies accounts for only about 15 per cent of the total. Lighting in turn is responsible for about 16 per cent of the total consumption and 56 per cent of the total revenue.

The overall average of 1,155 kWh per consumer equals the contemporary United States level, though the composition² differs; less than 10 per cent of the consumption there being attributed to water-heating, with about 20 per cent to refrigerators, and 40 per cent to lighting and radio.

As, so far, no reliable information is available in respect of this country, it is difficult

to the use made (different charges for lighting, including small appliances, and for cooking, water-heating, etc.), reliable average consumptions per consumer and per appliance can be worked out for the various uses. Incidentally, present trends are towards abandoning the multiple-tariff system in favour of two-part or block tariffs, with perhaps only one separate meter for the water-heater circuit.

The accompanying tables are based on the data given in the source referred to. The total number of households involved is 922,000 with an average of 3.9 persons each.

to make comparisons. For 1937-38, the Electricity Commissioners' Returns gave an average of 572 kWh per domestic consumer, and it is to be hoped that detailed statistical data for subsequent years will be published before long. The figure for 1943 may be expected to be substantially higher, but a large proportion is used for space-heating. In a recent analysis³ of the load conditions on the system of the Northmet Power Company, for instance, it is estimated that in 1938-39 over 40 per cent of the total domestic consumption was for space-heating. Detailed statistical information, comparable

TABLE 1—DOMESTIC APPLIANCES

Appliance	Number per 100 consumers	Average kW rating	Average annual consumption, kWh
Cookers	20.2	5.5	1240
Storage water-heaters	23.7	1.7	2350
Miscellaneous thermal appliances	157.0	0.6	93
Small motors	25.1	0.22	36
Refrigerators	2.7	0.29	390

TABLE 2—TOTAL CONSUMPTION AND REVENUE†

Application	Annual consumption			Revenue	
	Total	Per consumer	Proportion	Proportion	Average
	kWh × 10 ⁶	kWh	Per cent	Per cent	Pence per kWh
Cooking	231.0	250	21.7	14.1	0.9
Water-heating	512.0	555	48.0	14.7	0.4
Miscellaneous thermal	135.0	146	12.7	12.9	1.4
Small motors	8.3	9	0.8	1.3	2.3
Refrigeration	9.6	10	0.9	0.9	1.5
Lighting	170.0	185	15.9	56.1	4.9
Total	1,065.9	1,155	100.0	100.0	1.5

† Converted at the rate £1 = 17.4 fr.

The number of water-heaters installed, as shown in Table 1, is remarkable and is shown in Table 2 to account for nearly half the total domestic consumption. On the other hand, the extensive use of load control and time-of-day tariffs for this purpose makes it possible to quote relatively

to that reproduced above, may be expected to emerge from the sampling survey organized by the E.R.A. and referred to in the *Electrical Review* of July 12th, page 52.

- (1) Bulletin A.S.E., 1946, No. 10, p. 263.
- (2) Edison Electric Institute Bulletin, August, 1945, p.227.
- (3) E.R.A. Report Ref. K/T108.

All-Electric Dairy Farming

Comprehensive Pembrokeshire Installation

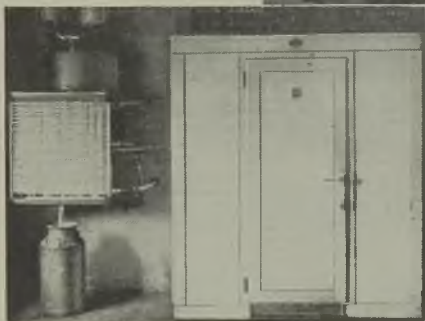
THERE can be few farms with a more complete and up-to-date electrical installation than that to be seen at Mr. W. L. Davies's farm at Pantyderi, near Cardigan. Keeping a herd of fifty-five Friesian and Guernsey cows (thirty-five now in milk) Mr. Davies has succeeded by electrical methods in reducing manual work to the bare minimum, improving the quality and cleanliness of his milk, and incidentally winning the prize last year for the highest yield in the county for a herd of under twenty full year cows, the Friesian and Guernsey herds being treated as separate herds for the competition.

The layout of the milking parlour, which is equipped with a good fluorescent lighting installation, is systematically designed to ensure that the milking is carried out hygienically, without any handling and in the shortest time possible. The six-unit combine milker, driven by a 3-H.P., 1,430 r.p.m. motor, milking six cows at a time and simultaneously recording the yield. Six more cows await their turn in adjoining stalls, while a similar number is being cleaned in the washing stalls.

For cooling the milk, brine from a 350-cu ft "Frozt-ed-Aer" refrigerator (with a compressor driven by a 2-H.P. motor) is passed by a pump ($\frac{1}{4}$ -H.P., 1,425 r.p.m. motor) through a cooler, the refrigeration space being utilized for storing the milk awaiting dispatch. A 20-kW G.E.C. electrode boiler provides steam for both sterilizing chest and jets for can sterilizing.

For the purpose of providing the hot water required for washing the dairy utensils there is a 35-gal copper cylinder fitted with three

4-kW immersion heaters, while for heating water required for mixing the calves' food there is a Burco washboiler. Preparation of the cattle food is undertaken with the aid of a



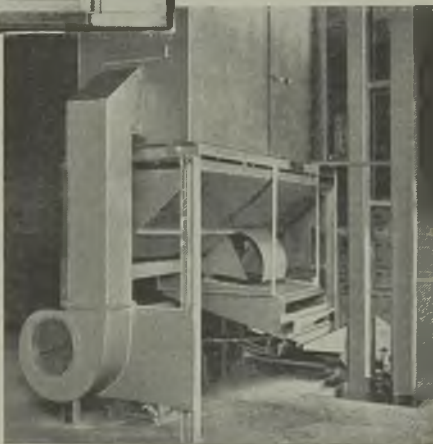
Top : Fluorescent lighting is installed in the milking parlour which is equipped with a six-unit combine milker

Centre : Cooler and 350-cu ft refrigerator for storing milk awaiting dispatch

Right : One-ton-an-hour grain dryer

hammer mill (driven by a 15-H.P., 2,500 r.p.m. motor) and a pulping machine (5-H.P., 1,400 r.p.m. motor).

In addition to dairy farming, over 800 acres of arable land are under



cultivation. Combine harvesting is adopted, working in conjunction with a 1-ton-an-hour Mather & Platt grain dryer (5-H.P. motor).

An electric lift is shortly to be installed in the granary. A room used for potato sprouting is warmed during frosty periods by six 2½-kW G.E.C. fan-heater units.

The main metal-clad switchboards used to control all this plant has been built up from G.E.C. equipment by the West Cambrian Power Co., Ltd., which has been responsible for installing the apparatus. The total con-



is approximately 50 kW. Last year the consumption of electricity for all purposes was 57,040 kWh, the cost being in the neighbourhood of £267.

Royal Agricultural Show, 1947

PLANS are in hand for the next Show of the Royal Agricultural Society of England to be held at Lincoln from July 1st-4th, 1947. Although the Show will have to be on "austerity" lines compared with pre-war Royal Shows, the Society will do its utmost to provide a worthy representation of livestock and displays of the new machinery which made possible the advance of British agriculture during the war. Special emphasis will be laid on the educational aspects of the Show and the results of recent agricultural research. The show-ground, which has been placed at the Society's disposal by the City of Lincoln, will occupy 100 acres. The last Royal Show took place in Windsor Great Park in 1939.

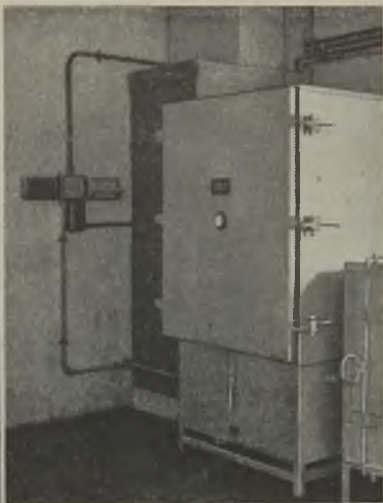
"Britain Can Make It"

EFFICIENCY, economy and appearance have all been taken into consideration in the selection of the electrical items which are to be included in the "Britain Can Make It" Exhibition which will be opened by the King at the Victoria and Albert Museum on September 24th. A pre-view of selected exhibits revealed a remarkably high standard of design in all types of apparatus, with manufacturers in many cases showing a tendency not to adhere too closely to conventional ideas and practices.

Ease of cleaning, neat appearance, more even distribution of oven heat, and better control of both oven and hot-plates, particularly at the lower temperatures, are features upon which cooker designers have concentrated mainly. The drop-down oven door appears to be favoured; also the high-level oven which obviates stooping. Kettles are probably the item in which the makers have displayed the most originality and while there many "stream-lined" versions of the more or less generally accepted designs, among apparatus selected are a model incorporating special steam-guard handles and an upright type intended for use on the table as a hot-water jug. Among toasters is a horizontal model suitable for toasting sandwiches.

Practically all the irons have thermostatic control. Streamlining is in evidence and other noteworthy features are pleasing coloured finishes, improved heat distribution over the sole-plate, more rapid heating up, grooved sole-plates which facilitate ironing under buttons, double thumb-rests to help left-handed users, handles specially designed to prevent wrist strain, improved connectors, a swivel device which makes it impossible for the flexible-lead to get knotted or tangled, and a light to illuminate the work. Improved appearance, more efficient and convenient operation, and the incorporation of water pumps are characteristics of the washing machines which are to be displayed.

Among fires there seems a strong preference for the reflector type with rod-type elements and the many attractive designs include several models for wall-mounting in bathrooms, etc. Among the latter is one with an ingenious handle which serves both as a switch and for tilting. Both bakelite and tubular steel have been utilized to good effect in some instances. The appeal of the modern convector with illuminated grilles has also not been overlooked. A refrigerator priced at only £16 will be another attraction.



Above: In the cupboard behind this sterilizing chest is a 35-gal copper cylinder fitted with three 4-kW immersion heaters to provide hot water for washing dairy utensils. Left: Electrode boiler (20 kW) providing steam for sterilizing

nected load is about 80 kW and the maximum demand

ELECTRICITY SUPPLY

Revised Glasgow Estimates. New Poplar Power Station.

Colchester.—VILLAGERS PRESS FOR ELECTRICITY.—The Electricity Supply Committee has had to refuse a supply of electricity to eight villages because, it is stated, in present circumstances it is not possible to embark on development schemes. Supplies will be given when it is economic to do so, as soon as the position improves with regard to materials, and the mains generally have been reinforced to carry the additional loads. In reply to further representations regarding the difficulty of carrying on farming with oil lamps and candles it is stated that new houses take precedence for materials.

Glasgow.—REVISED ESTIMATE FOR NEW STATION.—Based on tender prices received for the principal contracts the capital expenditure on the construction of the first section of the new Braehead generating station is estimated at £5,279,000. This is made up as follows: Buildings, £1,110,200; generating plant, £692,000; boiler plant, £2,008,600; coal and ash handling plant, £261,300; circulating water system, £343,500; switchgear, £178,000; general electrical works, £166,500; other works, £39,000; and contingencies, etc., £479,900. The earlier estimate was £4,672,800.

With reference to the decision to accept the tender amounting to £1,180,240 by John Mowlem & Co., Ltd., for the civil engineering and building works the consulting engineers, Merz & McLellan, have reported that it has not been possible to obtain a definite decision from the Clyde Trust on the design of the quay wall incorporating the inlet and outlet works of the station on account of restrictions likely to be imposed by the Ministry of Civil Aviation on the development of the Clyde Trust lands at Braehead. Consequently it is proposed to delete the river works from the contract and after making allowance for this the amount of the contract is now £1,009,112.

EXTENSION OF STATION.

—The Central Electricity Board has directed the Corporation to extend the Braehead station by the installation, ready for commercial operation in September, 1949, of one 50,000-kW (m.c.r.) turbo-alternator set, and two boiler units each of 300,000 lb of steam per hr maximum continuous evaporative capacity. The town clerk has been instructed to make application to the Electricity Commissioners for their consent to the extension and for authority to borrow £2,098,000. The general manager and the

consulting engineers are to obtain tenders from C. A. Parsons & Co., Ltd., for the turbo-alternator, Babcock & Wilcox, Ltd., for the two boiler units, and John Mowlem & Co., Ltd., for the construction of any necessary building and civil engineering work.

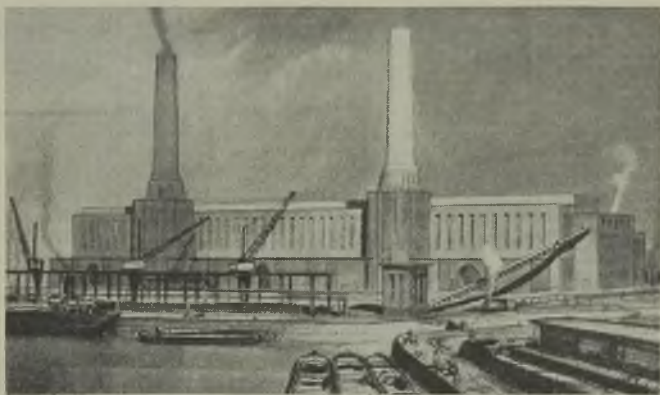
Hull.—STORE BUILDING.—The Electricity Committee has approved a revised estimate of £30,000 for the erection of central stores in Ryde Avenue.

Mansfield.—LOAN APPLICATION.—The Electricity Committee is to apply to the Electricity Commissioners for sanction to borrow £17,750 for laying 11,000-V cables and £2,650 for switchgear and metering equipment in connection with a supply of electricity to the Mansfield Colliery of the Bolsover Colliery Co.

Middlesbrough.—LOAN FOR METERS.—The Town Council has applied to the Electricity Commissioners for sanction to borrow £5,000 for electricity meters.

Oldham.—LOANS.—The Electricity Committee has received sanction to borrow £147,841 in connection with the extensions to the 33-kV ring system. The Committee has applied for sanction to borrow £2,644 for erecting and equipping of an electricity substation at Royton.

Poplar.—NEW GENERATING STATION.—Mr. Robert Illingworth, O.B.E., the borough electrical engineer and general manager at



Artist's impression of the new Poplar power station

Poplar, has sent us an impression by Mr. J. D. M. Harvey of the borough's new generating station which is to be situated on the site of the present Export Dock of the East India Docks, Port of London Authority. The consulting architects for the exterior are Farmer & Dark, F.R.I.B.A., and the architect is Mr. D. Hubert Lewis. John Bruce & Staff, Swansea, are the consulting engineers, and the civil consultants are L. G. Mouchel & Partners.

Scotland.—SUBMARINE CABLE-LAYING.—The laying of 11-kV submarine cables under the narrows of the Kyles of Bute and in the Firth of Clyde from Kerrylamont Bay, Bute, north of Kilchattan, to a point on the Great Cumbrae west of Millport, has now been completed. This operation is part of the North of Scotland Hydro-Electric Board's distribution scheme for Buteshire and South Cowal. One new area in Bute has for the past fortnight been supplied with current from an overhead transmission service. Other sections will be served before winter. The Distribution Scheme was authorized in January of this year.

Stirling.—CHANGE-OVER.—The Town Council has approved an expenditure of £18,870 in connection with the change-over from d.c. to a.c. supply.

Torquay.—SUPPLY EXTENSION.—The Electricity Committee is to extend the distribution system at Watcombe, including the provision of a substation, at a cost of £8,607.

Tottenham.—ELECTRIC COOKERS.—The Housing Committee has authorized the purchase of 180 electric cookers from the Northmet Power Co.

Overseas

Belgium.—EMERGENCY FLOATING POWER STATIONS.—In the annual report of the Belgian electrical financing company, "Sofina," it is mentioned that two emergency floating power stations, of American construction, have been in use in Belgium for some time, one at the power station at Schelle and the other at Langerbrugge. The generating plants are mounted on barges measuring about 314 ft in length and 49 ft in width and having a draft of 12 ft. Each

barge is provided with oil-fired boilers producing steam at a pressure of 829 lb per sq in., a land-type turbine and a 13,800-V alternator. By means of a 37,500-kVA transformer the power can be stepped up for distribution purposes to either 69, 115 or 138 kV.

New Zealand.—POWER PROJECTS.—Mr. R. Semple, Minister of Works, told the House of Representatives recently that investigations were now being carried out at Coal Creek on the upper part of the Clutha River where it was proposed to build a 300,000-kW power station—the largest single station of its kind in New Zealand. A general survey had revealed that the potential hydro-electric resources of the South Island were three times as great as those of the North Island, and it would ultimately be a question of taking the factory life of the country to where the power was. When the Waikato River had been harnessed, there would be very few other major schemes that could be tackled in the North Island. New Zealand, the Minister pointed out, was depending more and more each year on hydro-electric power.—*Reuter's Trade Service* (Wellington).

Spain.—POWER PRODUCTION.—During recent years, largely due to the great industrial expansion in the country, there has been a marked increase in electric power output, a total of 4,775 million kWh, having been attained in 1944 as compared with 3,111 million kWh in 1939, notwithstanding coal supply difficulties during the war. During both 1944 and 1945 exceptional droughts caused a big drop in the output of the country's hydro-electric installations, but in spite of this the production during last year is estimated to have amounted to 4,067 million kWh.

Street Lighting in Manchester

Plans for Conversion to Electricity

LAST April the Manchester General and Parliamentary Committee submitted a report to the City Council on the street lighting system in which it contended that the case for changing over to electricity was unanswerable. It has now approved a scheme suggested by the Electricity Committee embodying a programme for the conversion of the gas street lighting system to electricity.

The Electricity Committee considers that the initial work should be confined to roads with street traction poles, these for the most part being main roads which are likely to be undisturbed for a number of years. With adequate labour and materials, the lighting of these roads can be converted easily and rapidly by using overhead conductors supported on the poles. The number of lighting points is considerable, but it is estimated that these sections can be completed in about two years. This scheme has the advantage that those units consuming considerable quantities of gas will be dealt with first, thus ensuring early achievement of the maximum fuel economy at a relatively low cost.

It is proposed that the first one or two roads should be dealt with by direct labour so that accurate cost figures may be available, after which consideration could be given to the employment of contractors to accelerate the rate of progress.

Due regard must be paid to the redevelopment proposals so that any road scheduled for widening or closing within the next five to seven years should not be included in the programme, conversion being postponed until the alterations have actually been initiated. Where road excavators are required for additions or alterations to electric cables, the opportunity should be taken to install electric street lighting conductors at low cost, either as a preliminary step or as part of an immediate conversion.

By this scheme the Electricity Committee considers it should be possible to convert the main road lighting to electricity comparatively quickly, leaving the conversion of side roads—particularly in residential areas—to be dealt with progressively in consultation with the other committees concerned.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

High-frequency Heater

A HIGH-FREQUENCY generator for the eddy current heating of metals and dielectric heating is announced by the GENERAL ELECTRIC Co., LTD., Magnet House, Kingsway, London, W.C.2. The cabinet is self-contained, requiring only connection to power mains, three-phase at 360 to 440 V; an electrical filter minimizes radio-frequency leakage into the mains. The output is 25 kW continuous rating at from 2 to 15 Mc/s, the input approximating to 40 kW at full load.

The one-piece dust-proof body of welded steel has a base-plate fitted with four hoisting



Single unit dielectric and eddy current heating generator of 25 kW continuous rating

bollards. All controls are on the front panel and the interior is partitioned into two sections, the larger containing the power and high-voltage rectifier equipment, while the smaller houses the high-frequency oscillator gear. Access to the former is by a door in the front panel and to the latter through two removable panels on each side of the output terminals, which are recessed on the right-hand side of the cabinet. Both door and panels have "card-door" handles with Yale type locks; in addition, the door has an interlocking key which must be inserted in a socket on the switch panel before the set can be used and, as a further safeguard, the door and panels have electrical safety switches which automatically disconnect the high voltage if they are opened.

The self-oscillator employs two ACT16 "Osram" valves in push-pull, with crossed capacity feed-back, while the power supply to the oscillator anodes is taken from a three-phase full-wave rectifier employing six GU21 "Osram" mercury vapour valves. Separate transformers

energize the filaments and furnish 240 V for operating contactors and auxiliaries with a voltage stabilizing transformer for the oscillator filaments.

The circuit is fully protected; the large contactor panel also carries an overload protection relay and a cut-out in case of failure of the cooling air supply. The anode circuits of the rectifier valves are fitted with special high-voltage fuses. Controls comprise a rotary "on-off" switch, high-voltage "start-stop" contactor push-buttons and the output power control. Subsidiary controls, also on the front panel, consist of an interlock key switch and contactor buttons for overload trip resetting. A pre-set "high power—low power" switch is situated inside the power compartment door. A Chamberlain & Hookham process timer can be very simply incorporated and the set can be remotely actuated from the working position by means of a control box connected by a flexible lead to a socket on the front panel of the set. The oscillator valves are air cooled by a motor-driven fan, the air intake being through a series of filters and the exhaust passes out through a duct. The G.E.C. is also marketing 5-kW and 1-kW generators of a similar type.

Terminal Blocks

The multi-way terminal blocks for 15 and 30 A offered by the PRECISION COMPONENTS Co., Aller, Langport, Somerset, are made of moulded bakelite with plated brass terminals and screws. Holes for fixing screws are provided between every two terminal segments so that each block can be cut into several sections for twelve one-way, six two-way or four three-way connections.

Telephone Cable

Cable insulated with materials that are more readily obtainable just now than cotton, wax and lead is announced by AERIALITE, LTD., Castle Works, Stalybridge, Cheshire, for internally wiring buildings for private telephone and call-bell communication systems.

This cable is made up of 0.064 in. (central battery) wires, two pairs and one single, insulated with a single layer of vulcanized rubber with a left-hand lay. Around this core are wrapped, with a right-hand lay, twelve pairs of 12.5 lb conductors which are also rubber insulated. One layer of proofed tape is then applied and the whole finally p.v.c. sheathed.

The identification colour code normally used for this class of cable is strictly adhered to by a provisionally patented method, which consists of applying the rubber compound in two different colours, for dual coloured wires; thus a red-green wire will be covered for half

its circumference with red and the other half with green compound. The insulation resistance between pairs, layers and earth averages 1,650 megohms per 1,000 yards at 60 deg F. Other sizes of the same type of cable are to be developed.

Starting Fluorescent Lamps

The interval that elapses between the switching on of a tubular fluorescent lamp and the commencement of its glow represents the time which must be allowed for the anodes to reach their emitting temperature; hence the use of bi-metallic delay switches. The need for the latter can be avoided by the employment of an instantaneous - start ballasting assembly made by BARLITE LAMPS, LTD., Bath Street Works, Hanley, Stoke-on-Trent, whose London distributors are ENGINES & ELECTRICS, LTD., 22, Stafford Place, Westminster, S.W.1.

A patented resonant circuit is utilized to apply voltage high enough to ionize the gas within the tube sufficiently to start a glow discharge between the anode plates at both ends of the low-voltage tube. To favour the immediate change-over of the discharge from a glow to an arc with initially cold cathodes, a special surface structure is given to the latter which prevents uniform electronic emission so that, by self multiplication, a hot spot of low-voltage drop is formed on the cathode.

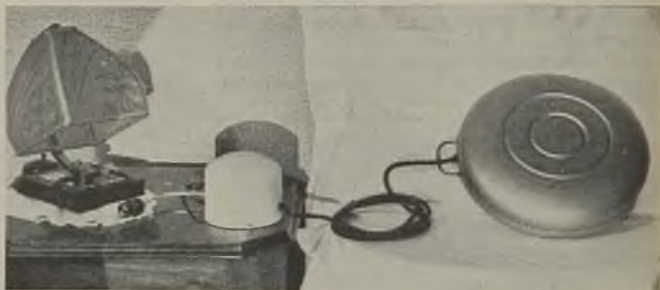
Bed Warmers

Two thermostats are provided for regulating the temperature of the "Bedcomfort" now being made by S. B. JACKSON, LTD., Windsor

House, Victoria Street, London, S.W.1, for household and medical uses. The pad is rated at 35 W and is 12 in. square, having a glass-silk cover bag which may be washed in cold soapy water. A flat push-bar switch is fitted 5 ft away from the pad along the flexible connecting cable, an unusually generous length of which is provided—18 feet.

A sheet aluminium bed warmer of large heating area, which is energized at low voltage, is announced under the trade name of "Welec" by FRANK WESTERMAN (WHOLESALE), LTD., 94, Dale End, Birmingham, 4.

The associated step-down transformer, which is plug connected to an ordinary socket outlet,



Low-voltage bed warmer, showing transformer on bedside table

is totally enclosed in a small domed case that can conveniently stand on the bedside table so that the cable lead entering the bed does not have to withstand more than 25 V, the loading being 35 W.

The dissipation area of the metal "cushion" is claimed to be so related to the position of the heating element as to prevent the generation of excessive temperatures. For this reason it is considered that thermostatic control is unnecessary.

Control Relay

A small magnetic relay of the general purpose type E is being produced by ELECTRO METHODS, LTD., 220, The Vale, Hendon, London, N.W.11, for operating alarms and audible signals, small single-phase motors and lighting circuits, actuated by two-wire push buttons, pressure, float, thermostatic and toggle switches.

The relay's overall dimensions are 2.75 by 2 by 1.5 in., so that it can be mounted in confined space. It is available for d.c. from 1 to 70 V and a.c. from 3 to 250 V, coil consumption being 1 W and 2.75 VA respectively with 2-A rating. The self-aligning solid armature with simplified hinge design has double-pole, double-throw silver contacts; all steel parts are plated. Double purpose solder/screw terminals are provided and in the base there are two fixing holes.

Various modifications include terminal studs for panel mounting and a plug-in model to fit into "international octal" valve holders.



Thermostatic "Bedcomfort" warming pad

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Richardsons, Westgarth & Co., Ltd.—Presiding at the annual meeting held on Monday last Col. H. M. Stobart (chairman) said that while land work at the Hartlepool works was necessarily subordinated to marine during the war a considerable output was achieved. In all, thirteen sets of turbines, one 30,000-kW alternator, ten turbo-blowers and compressors, six gas exhausters and boosters, twelve condensing plants and 196 pressure chargers were completed, and in addition a large volume of work was carried out in the supply of spares and maintenance of existing plants. Contacts with their Swiss associates, Brown Boveri & Co., Baden, curtailed during the war, had now been resumed. Since the end of the war, the Land Department had reverted to its original function, and substantial orders had been received for turbo-alternators, condensing plant, compressors and other auxiliary plant, as well as complete boiler house installations, and before the end of hostilities in Europe provision was made for the urgent restoration of electric power by means of a number of transportable power stations for the Ministry of Supply.

Newton Brothers (Derby), Ltd.—Presiding at the annual general meeting on August 22nd, Mr. P. C. Cooper-Parry, chairman, said that the reduction in the trading profit from £100,367 to £59,558 was to be expected on the cancellation of many Government contracts following the end of hostilities. The adverse effects of such cancellations would be felt more in the current year. During the year considerable progress had been made in bringing plant and machinery up to the latest standards and £16,017 had been spent on new plant. The re-equipment was continuing. Trading was difficult at the moment. The specialized equipment supplied in large quantities during the war was generally of the type required for post-war needs though on a much reduced scale. Their customers for this class of equipment were in process of developing new designs needing in turn new patterns and types which the company's technical staff had to develop through the experimental stages before quantity manufacture could be reached.

J. Stone & Co., Ltd.—In his speech at the annual meeting the chairman (Mr. K. H. Preston) referred to developments on the light metal side of the company's business, which had included the establishment, in conjunction with Fry's Diecastings, Ltd., of Stone-Fry, Ltd., for the manufacture of pressure diecastings in magnesium. An important branch of their work was the production of electrical equipment for railways. Deferred replacement programmes were now being put into effect by the railways and it was expected that this department of their business would be kept busy for some time to come.

Veritys, Ltd., report a net profit, after taxation, of £18,550 for the past year, against £21,658

for 1944. Provision is made for obsolescence, contingencies and deferred repairs, but the directors state that owing to reduction in output, with consequent effect upon earning capacity, they do not propose to recommend a further dividend for the year. (An interim of 7½ per cent has been paid.) A balance of £16,534 (£14,799) is carried forward. Reference is made in the report to the shortage of materials which is handicapping the company's efforts to attain full production.

The Kalgoorlie Electric Power & Lighting Corporation, Ltd., reports a net profit for 1945, before taxation, of £24,090, as compared with £25,500 for 1944. To this is added £11,000 taxation reserve not required. Depreciation reserve receives £14,000, general reserve £9,000, and U.K. taxation absorbs £4,327. As we have already announced, the dividend for the year is raised from 5 per cent to 7 per cent less tax. The balance carried forward is £9,950 (against £9,406 brought in).

Lisbon Electric Tramways, Ltd.—After providing for taxation and transferring £55,000 (same) to general and depreciation reserve the net profit for 1945 was £54,240 (against £78,827 for 1944). Revenue rose by £124,996 but there was a greater increase in working expenses—£149,583—due to higher wages, etc. The final ordinary dividend of 2½ per cent tax free maintains the year's distribution at 5 per cent free of tax, and £35,371 (£41,449) is carried forward.

Aron Electricity Meter, Ltd., announces a trading loss of £33,471 for the year ended March 31st last. In the preceding year there was a profit of £19,266. After allowing for an estimated E.P.T. repayment of £62,576 there is a surplus of £12,563 and it is proposed to pay an ordinary dividend of 10 per cent, against 15 per cent.

Berry's Electric, Ltd., is raising its dividend from 10 to 12½ per cent for the past year.

London Associated Electricity Undertakings, Ltd., is paying an interim dividend of 2½ per cent. No interim was paid last year but the final distribution was 6 per cent.

The Nigerian Electricity Supply Corporation, Ltd., has announced a final dividend of 7 per cent and a bonus of 2½ per cent, making 12½ per cent for the year (against 10 per cent).

The Clyde Valley Electrical Power Co. has declared an interim ordinary dividend of 3 per cent (unchanged).

Telephone Rentals, Ltd., is paying a final dividend of 6 per cent, maintaining the distribution for the year at 10 per cent.

The British Power & Light Corporation, Ltd., is paying an interim ordinary dividend of 3 per cent (against 2 per cent).

The British Oxygen Co., Ltd., is again paying an interim dividend of 8 per cent on the ordinary stock.

The North Eastern Electric Supply Co., Ltd., is maintaining its interim ordinary dividend at 2½ per cent.

The West London & Provincial Electric & General Trust, Ltd., has declared an interim dividend of 2 per cent (unchanged).

The Madras Electric Tramways, Ltd., is again paying a dividend of 10 per cent free of tax.

W. Canning & Co., Ltd., are again paying an interim dividend of 5 per cent.

New Companies

Gudlite, Ltd.—Registered July 15th. Capital, £1,000. To acquire the business of an electrical engineer carried on by J. T. Gullett at Club Buildings, Fair Road, Wibsey, Bradford. Directors: J. T. Gullett and Edith A. Gullett. Regd. office: 14, Fair Road, Wibsey, Bradford.

Electradio Services, Ltd.—Registered July 15th. Capital, £1,000. Manufacturers of, and dealers in, artificial lighting apparatus, electrical plant, wireless, etc. Directors: H. P. L. Langmead, R. R. S. Tiley, and R. J. Y. Tiley. Regd. office: 1, Barrack Road, Exeter.

Jack Lever, Ltd.—Registered July 18th. Capital, £400. Manufacturers, buyers and sellers of radio, television, electronic and sound equipment and electrical appliances, domestic and commercial heating and lighting, etc. Directors: R. Lever, D. Sefton and E. G. Warland. Regd. office: 156, North End Road, West Kensington, W.14.

Allen-Harris, Ltd.—Registered July 23rd. Capital, £1,000. Electrical, radio and television engineers, etc. Directors: W. G. Allen and J. B. Harris. Regd. office: Station Approach, Radlett, Herts.

D. R. Gray, Ltd.—Registered July 24th. Capital, £1,500. Electrical, radio, public works and engineering contractors, floodlighting, stage and theatre lighting engineers, etc. Joint managing directors: D. R. Gray and J. Darling. Regd. office: 25, Oldfield Circus, Greenford, Middlesex.

Grantham Electrical Engineering Co., Ltd.—Registered July 26th. Capital, £1,000. To carry on business as indicated by the title. Directors: J. S. Stokes, Eileen E. Stokes, S. Pask and Monica H. Pask. Regd. office: 21, Watergate, Grantham, Lincs.

Bernard Installations (Electrical), Ltd.—Registered July 30th. Capital, £1,000. To acquire the business of the Bernard Electric Co. carried on by Bernard Schapiro at 265, Cheetham Hill Road, Manchester, and to carry on the business of manufacturers, sellers, hirers, installers and maintainers of electrical goods, etc. Directors: B. Schapiro and S. Rubinstein. Regd. office: 32, Cheetham Hill Road, Manchester.

Phillips Transmission, Ltd.—Registered August 14th. Capital, £25,000. To conduct research into, design, manufacture and maintain apparatus and equipment for radiolocation and aiding navigation, etc. Directors: N. Gunn and T. E. Goldup. Regd. office: Spencer House, South Place, E.C.2.

Standard Wholesale Electrical (Supplies) Co., Ltd.—Registered August 8th. Capital, £8,000. To acquire the business carried on by D. M.

Mason at 6a, George Street, Croydon, Surrey, as the Standard Wholesale Electrical Co. Directors: D. K. Mason (permanent managing director) and K. D. Mason. Regd. office: 6a, George Street, Croydon, Surrey.

Electrowares, Ltd.—Registered August 14th. Capital, £1,000. Wholesalers and distributors of electrical equipment, manufacturers and distributors of, and dealers in, electric lamps and fittings, etc. Directors: W. E. F. Tipper, A. L. Storey and F. W. Coel. Regd. office: 231, Waterloo Road, S.E.1.

Hackston & Heywood Electric Co., Ltd.—Registered August 13th. Capital, £200. To carry on business as indicated by the title. Directors: E. Hackston and J. H. Heywood. Regd. office: 14, Links Avenue, Failsworth, Manchester.

Laurence Electrical Products, Ltd.—Registered August 7th. Capital, £1,000. Inventors, designers and manufacturers of, agents for, and dealers in, hair waving, drying and dressing machinery and equipment, etc. Directors: S. S. Levy and Marie Windsor. Regd. office: 55, Humberstone Gate, Leicester.

Harry Marsh & Company (Electricians), Ltd.—Registered August 6th. Capital, £1,000. To acquire the business of an electrician heretofore carried on by Harry Marsh at 49, Abbeydale Road, Sheffield. Directors: H. Marsh (permanent) and P. J. Marsh. Regd. office: 49, Abbeydale Road, Sheffield.

Mayor Smith, Ltd.—Registered August 6th. Capital, £1,000. To carry on the business of electricians, electrical contractors, radio engineers, etc. Directors: C. P. Smith and D. R. Mayor. Regd. office: 323, Claughton Road, Birkenhead.

Shaws (Coalville), Ltd.—Registered July 23rd. Capital, £2,000. Electrical and mechanical engineers, manufacturers of, and dealers in, electrical goods, fittings and accessories, etc. Directors: S. W. C. Shaw and R. T. Humphrey. Regd. office: 52, Silver Street, Whitwick, Coalville, Leicester.

Fred Wood (Electrical), Ltd.—Registered August 16th. Capital, £1,200. To acquire the business of electrical contractors and radio engineers carried on by F. J. Wood and P. F. Wood as "Fred Wood & Son" at 295a, Vicarage Road, King's Heath, Birmingham. Directors: F. J. Wood, P. F. Wood and A. J. Slater. Regd. office: 295a, Vicarage Road, King's Heath, Birmingham.

Bland Bros. (Electrical), Ltd.—Registered August 2nd. Capital, £4,000. Electrical engineers and general electrical installation contractors, etc. Directors: H. P. Bland, J. P. R. Bland and G. C. St. G. Bland. Regd. office: 8, Castle Gates, Shrewsbury.

Gillies & Irving, Ltd.—Registered August 3rd. Capital, £1,000. Electrical engineers and contractors, mechanical engineers, etc. Directors: S. H. Gillies and H. Irving. Regd. office: 93, The Albany, Old Hall Street, Liverpool, 3.

Terrett (Engineers), Ltd.—Registered July 31st. Capital, £500. Electrical engineers and contractors, etc. Directors: W. G. Terrett, Doris M. Allison, H. L. Rink and H. Freer. Regd. office: 196, Dawes Road, Fulham, S.W.6.

STOCKS AND SHARES

THE feature in the Stock Exchange markets is the steadiness with which prices are maintained in the face of a pronounced quietude of business in most departments. The cheap money policy of the Government serves to fortify gilt-edged securities, and the effect of the holiday season does not entirely prevent a good deal of money being employed in the purchase of front rank ordinary shares. Nationalization as a cause for nervousness is exercising no particular influence for the time being.

Companies' reports and their dividends are mostly satisfactory. With the re-institution of Stock Exchange fortnightly settlements at the end of November, it is thought that activity will be encouraged.

Electricity Supply

The market in electricity supply shares showed little appreciable reaction to the disclosure of a 6.7 per cent increase in the electricity generated during the first seven months of this year, as compared with the same period of 1945. Investment still requires a return of between 4 and 4½ per cent from the ordinary stocks of the leading supply companies. The lower of those two limits is the yield on Electrical Distribution of Yorkshire, Midland Electric Power, and Yorkshire Electric Power which are all quoted at about 44s. 6d. and receive 9 per cent dividend.

A 4½ per cent return is offered by the three London companies—"Counties" at 44s., "City Lights" at 31s., and London Electrics at 26s. 6d. North Easterns, at 31s., give a similar yield. London Associated Electric have resumed the payment of interim dividends with a distribution of 2½ per cent, which compares with the regular pre-war rate of 3 per cent. The British Power & Light Corporation has raised its interim distribution from 2 to 3 per cent. For last year the company paid a total of 8 per cent (against 7 per cent for the previous year).

Communications

In the Home Railway market, London Passenger Transport "C" has been changing hands at 60, an improvement on the month. Southern Railway stocks have gone back, the preferred being 1 down at 70½, the 5 per cent preference 4 lower at 110½. Cable & Wireless preference shows a gain of 2½ at 117, but Globe Telegraph ordinary reacted 1s. 6d. to 42s. 6d. Marconi Marine Communications and Oriental Telephones are both down, the latter losing 2s. 9d. at 58s. 9d.

Gilt-Edged Ordinary

The market for manufacturing and equipment companies has assumed a position of being almost entirely an investment area. People who put money into British Insulated Callenders and W. T. Henley's ordinary shares, do so with the intention of holding the shares more

or less permanently. They are content to accept the modest yield which present prices afford, for the sake of obtaining security and conservation of their capital. The yield on British Insulated Callenders cannot be calculated because, so far, the company has declared only an interim dividend of 4 per cent for the eighteen months ending with this year.

Cable Makers' Shares

British Insulated Callender's financial year ends with the calendar, and it is not expected that the final dividend for 1946 will be announced until next June. Anticipation looks for 7½ per cent, and if this should be realized the yield at 49s., the present price, would be £3 1s. 3d. per cent. Henley's at 28s. 6d. afford 3½ per cent—from which it is evident that hopefulness budgets for a higher dividend on British Insulated than the 7½ per cent just mentioned. Telegraph Constructions at 58s. 9d.—shares are available at that price—give £3 8s. 0d. Johnson & Phillips at 85s. 6d. pay 3½ per cent. A higher yield is obtainable from Siemens, the return in this case being £4 3s. 4d. at 36s.

Metal Industries

Metal Industries have raised the final dividend from 6 to 7 per cent, making 10 per cent for the year. According to the preliminary figures, the year's profits advanced by £28,000 to £295,000. Among the company's interests are all the ordinary stock of Electrical Switchgear & Associated Manufacturers, and nearly one million ordinary stock of the British Oxygen Company. The latter investment appears in the balance sheet at a figure equal to 54s. 8d. per stock unit. The market value is nearer £5 per unit. Igranic Electric is another subsidiary of Metal Industries.

British Thermostat Capital

Dealings began last week in the 4½ per cent preference shares offered at 21s. to ordinary shareholders of the British Thermostat Co. At the premium of 1s. 6d. at which the new shares are changing hands, the yield works out at exactly 4 per cent. The ordinary capital of the company is £150,000, and it has received annual dividends of 18½ per cent for the last eight years. The new preference capital is the only prior charge.

Manufacturing and Equipment

In the higher-priced shares of the equipment group, International Combustion at 9½ are 5s. down since a month ago. Midland Manufacturing put on ½, rising to 8½. Hopkinsons at 5½ are the fraction lower. General Electrics show a fall of ½ at 5½, but the 6½ per cent preference at 37s. 6d. are up 1s. Ever Ready have been a dull market, easing off to 47s. 6d. English Electric at 63s. 6d. and Enfield Cable at 60s. 6d. are both up 1s. A sharp fall in Aron lowered

(Continued on Page 355)

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Dividend Previous Last	Middle Price Aug. 23	Month's Rise or Fall	Yield p.c.	Company	Dividend Previous Last	Middle Price Aug. 23	Month's Rise or Fall	Yield p.c.
Home Electricity Ordinary					Equipment and Manufacturing (Continued)				
Bournemouth and Poole 12½ 12½ 64/-				£ s. d. 3 18 2	Baldwin, H.J. (2/-) 10 20 13/3 +6d. 3 0 5				
British Power and Light 7 8 32/-				5 0 0	British Aluminium 10 8 43/6 +1/- 3 14 2				
City of London .. 6 7 31/- +6d. 4 10 4					British Insulated & Callender's 48/6 +1/-				
Clyde Valley .. 8 8 40/6 +6d. 3 19 0					British Rola (2/-) 15 15 6/6 -1/- 4 12 4				
County of London 8 10 43/- +1/- 4 13 0					British Thermostat (5/-) 18½ 18½ 23/9 -½ 3 18 0				
Edmundsons .. 6 6 27/6 .. 4 7 3					British Vac. Cleaner (5/-) 30 20 25/- -½ 4 0 0				
Elec. Dis. Yorkshire 9 9 44/- +1/- 4 1 9					Brush Ord. (5/-) .. 9 10 10/6 -1/- 4 15 3				
Elec. Fin. and Se- curities .. 13½ 15 60/- +1/- 5 0 0					Burco (5/-) .. 15 20 23/9 -½ 4 4 7				
Elec. Supply Cor- poration .. 10 10 44/- +6d. 4 11 0					Chloride El. Storage 15 15 98/9 -½ 3 1 0				
Lancs. Light and Power .. 7½ 7½ 31/6 .. 4 15 3					Christy Bros. .. 12½ 17½ 85/- .. 4 2 7				
Llanelli Elec. .. 6 6 26/- .. 4 12 4					Cole, E. K. (5/-) 20 20 33/9 -½ 2 19 2				
Lond. Assoc. Electric 4 6 25/6 .. 4 14 0					Cosson, A. C. (5/-) 10 12½ 34/6 -3/- 1 16 9				
London Electric 6 6 26/- .. 4 12 4					Crabtree (10/-) .. 17½ 17½ 52/- -6d. 3 7 4				
Metropolitan E.S. 8 9 42/- .. 4 5 9					Crompton Parkinson Ord. (5/-) .. 22½ 22½ 34/- -6d. 3 6 3				
Midland Counties 8 8 45/- .. 3 11 1					De La Rue .. 40 40 12½ -½ 3 5 4				
Mid. Elec. Power 9 9 44/- +6d. 4 1 9					Decoa (1/-) .. 100 112 58/9 +½ 1 18 6				
Newcastle Elec. 7 7 31/- +1/- 4 10 4					E.M.I. (10/-) .. 8 8 32/9 -1/6 2 8 9				
North Eastern Elec. 7 7 30/6 .. 4 11 10					Elec. Construction 10 12½ 67/6 .. 3 14 0				
Northampton .. 10 10 48/- .. 4 3 4					Enfield Cable Ord. 12½ 12½ 60/6 +1/- 4 2 8				
Northmet Power 7 9 41/- .. 4 7 10					English Electric 10 10 63/6 +1/- 3 3 3				
Scottish Power .. 8 9 40/- .. 4 10 0					Ericsson Tel. (5/-) 22½ 20½ 56/- -1/6 1 15 6				
Southern Areas .. 5 5½ 22/- .. 5 0 0					Ever Ready (5/-) 40 40 47/6 -2/6 4 4 2				
South London .. 7 7 31/- .. 4 10 4					Falk Stadelmann 7½ 10 48/9 -½ 4 2 0				
Yorkshire Elec. 9 9 44/- .. 4 1 10					Ferranti Pref. .. 7 7 31/6 .. 4 1 2				
Public Boards					G.E.O. :				
Central Electricity:					Pref. 6½ 6½ 37/6 +1/- 3 9 4				
1963-93 .. 3½ 3½ 108½ +½ 3 4 6					Ord. 17½ 17½ 5½ -½ 3 9 3				
1974-94 .. 3½ 3½ 107 .. 3 0 9					General Cable (5/-) 15 15 23/- .. 3 5 2				
London Elec. Trans. 2½ 2½ 100 .. 2 10 0					Greenwood & Batley 15 15 52/- +2/- 5 15 5				
Lond. Pass. Trans. Bd.					H.T.A. (10/-) .. 12½ 10 21/6 -6d. 4 13 0				
A .. 4½ 4½ 125½ +1 3 11 9					Heatrae (3/-) .. 12½ 12½ 8/- +6d. 4 14 0				
B .. 5 5 120½ .. 4 3 0					Henley's (5/-) .. 20 20 28/- -6d. 3 11 5				
C .. 3 3 60½ +2½ 4 19 2					4½% Pref. .. 4½ 4½ 25/- .. 3 12 0				
Overseas Electricity Companies					Hopkinsons .. 17½ 20 5½ -½ 3 18 2				
Atlas Elec. .. Nil Nil 9/- -9d. —					Intl. Combustion 30 32½ 9½ -½ 3 8 6				
Calcutta Elec. .. 6* 6* 62/6 -1/6 1 18 6					Johnson & Phillips 15 15 95/- .. 3 10 7				
Cawnpore Elec. 13 13 57/3 -2/- 4 10 10					Lancashire Dynamo 22½ 22½ 5½ -½ 3 18 2				
East African Power 7 7 45/6 +6d. 3 1 5					Laurence, Scott (5/-) 12½ 12½ 14/6 .. 4 6 2				
Jerusalem Elec. 5 5 23/6 -6d. 4 5 1					London Elec. Wire 7½ 7½ 43/6 .. 3 8 9				
Madras Elec. .. 4 6 41/3 -9d. 2 18 2					Mather & Platt .. 10 10 56/3 -½ 3 11 2				
Montreal Power 1½ 1½ 24½ -1 ..					Metal Industries (B) 9 10 61/3 +½ 2 18 6				
Nigerian Elec. .. 10 12½ 43/- .. 5 16 4					Mid. Elec. Mfg. .. 25 25 87/- +½ 2 16 1				
Palestine Elec. "A" 5* 6* 36/- -1/6 3 6 8					Murex .. 20 20 90/- -½ 4 9 0				
Perak Hydro-elec. 6 7 16/6 -6d. —					Newman Ind. (2/-) 22½ 22½ 9/- -6d. 4 5 6				
Tokyo Elec. 6% 6 6 38½ +1 ..					Plessey (5/-) .. 20 20 38/9 ..				
Victoria Falls Power 19 5½ .. 3 10 8					Power Securities 6 6 31/- +1/- 3 17 5				
Whitehall Inv. Pref. — 6 26/6 .. 4 10 7					Pye Deferred (5/-) 25 25 37/- -4/3 3 7 8				
Equipment and Manufacturing					Radio & Tel. (2/-) 25 15 10/- -1/6 3 0 0				
Aron Elec. Ord. 15 10 61/3 -7/6 3 5 6					Revo (10/-) .. 17½ 20 54/6 -1/- 3 13 3				
Assoc. Brit. Eng. 8 12 45/- -16/3 5 6 8					Reyrolle .. 12½ 12½ 80/- .. 3 2 6				
Assoc. Elec. :					Scophony (5/-) .. — 10/6 -6d. —				
Ord. 10 10 69/- -1/- 2 18 0					Siemens Ord. .. 7½ 7½ 37/- .. 4 1 1				
Pref. 8 8 44/3 .. 3 12 5					Strand Elec. (5/-) 10 12½ 13/- -3d. 4 16 4				
Automatic Tel. & El. 12½ 12½ 75/6 -1/- 3 6 2					Switchgear & Cow- ans (5/-) .. 20 20 27/- .. 3 14 0				
Babcock & Wilcox 12½ 12½ 65/6 .. 3 16 3					T.O.C. (10/-) .. 10 12½ 31/9 +6d. 3 18 8				

(Continued on next page)

* Dividends are paid free of Income Tax.

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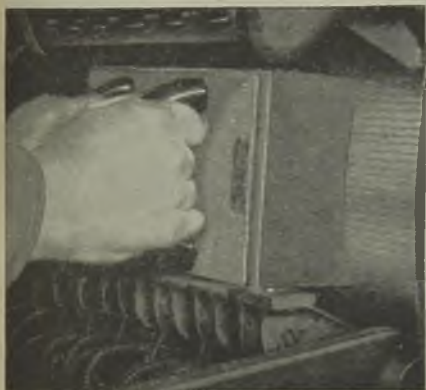
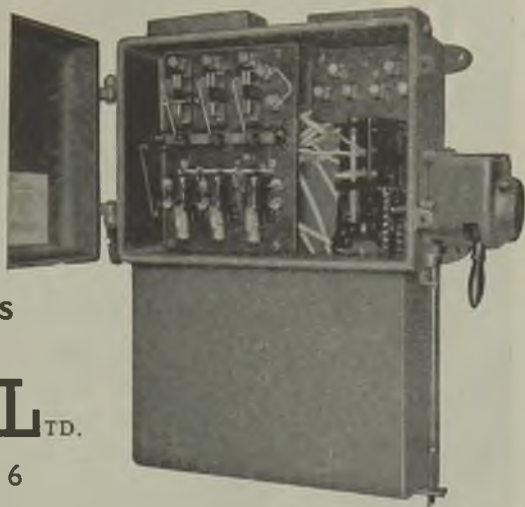
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**AUTOMOBILE
AIRCRAFT
ELECTRICAL
AND RADIO
INDUSTRIES**

WARD &
PENDLETON

GOLDSTONE LTD.
MANCHESTER 6

Company	Dividend		Middle Price Aug. 23	Month's Rise or Fall	Yield p.c.
	Pre- vious	Last			
Equipment and Manufacturing <i>(Continued)</i>					
T.C. & M.	10	10	58/3	-1 1/4	3 8 9
Telephone Mfg. (5/-)	9	9	14/6		3 2 1
Thorn Elec. (5/-)	20	20	31/3	-7/-	3 4 0
Tube Investments	20	22 1/2	6 3/8		3 12 10
Vactric (5/-)	22 1/2	Nil	18/9	-3d.	—
Veritys (5/-)	7 1/2	7 1/2	9/-		4 3 4
Walsall Conduits (4/-)	55	55	55/6	-4/-	3 19 4
Ward & Goldstone (5/-)	25	35	49/6	+1/6	3 11 0
Watford (2/-)	15	15	8/-	-3d.	3 15 0
Westinghouse Brake	14	14	78/-	-1/-	3 11 9
West, Allen (5/-)	7 1/2	7 1/2	8/-	-1/6	4 13 9

Traction and Transport

Brit. Elec. Traction :					
Def. Ord. . . 45	45	1125	-20	4 0 0	
Pref. Ord. . . 8	8	178	-4	4 10 0	
Calcutta Trams . . 6½	7½	70/-	-5/-	2 3 0	
Cape Elec. Trams 5	6	32/-	+6d.	3 15 0	
Southern Rly. :					
5% Prefd. . . 5	5	70½	-1	7 1 10	
5% Pref. . . 5	5	111	-4	4 10 2	

* Dividends are paid free of Income Tax.

Company	Dividend		Middle Month's Price Aug. 23	Rise or Fall	Yield p.c.
	Previous	Last			
T. Tilling . . 10	10	54/-	+6d.	3 14 0	
West Riding . . 10	10	43/9		4 11 4	

Telegraph and Telephone

Anglo-Am. Tel. :					
Pref. . . 6	6	136½	+3	4 8 0	
Def. . . 1½	1½	82½	-1	4 13 9	
Anglo-Portuguese 8	8	32/-	+6d.	5 0 0	
Cable & Wireless :					
5½ Pref. . . 5½	5½	117	+2½	4 14 0	
Ord. . . 4	4	113	+½	3 10 10	
Canadian Marconi \$1 Nil	4 cts.	15/-	-1½	—	
Globe Tel. & Tel. :					
Ord. . . 8½*	5*	42/6	-3/6	2 7 0	
Pref. . . 6	6	82/6	-1/-	3 13 10	
Great Northern Tel. (£10) . . . 20					
18	32			5 12 6	
Inter. Tel. & Tel. Nil	Nil	27½	-1½	—	
Marconi-Marine . . 7½	7½	36/-	-2/3	4 3 4	
Oriental Tel. Ord. 4	4	58/0	-2/9	—	
Telephone Props. Nil	6	22/6	+1/-	5 6 7	
Tele. Rentals (5/-) 10	10	14/6		3 9 0	

Stocks and Shares (Continued from p. 353)

the price on the month by 7s. 6d. to 61s. 3d. The dividend has been cut from 15 per cent to 10 per cent. This came unexpectedly, and the trading loss on the year, shown by the figures, caused disappointment. Thorn Electric and Associated British Engineering are, ex rights, the falls in prices being apparent rather than real. Veritys, Ltd., again announce that there is to be no addition to the interim dividend already paid. This is the third successive year in which this practice has been adopted. Previous reports have referred to delay in connection with the settling-up of Admiralty contracts.

Postscript Prices

Since this month's price lists were made up, Metal Industries "B," on the increased dividend, have risen to 62s. 6d. De la Rue at 12½ are 10s. lower on the month. British Vacuum put on 2s. 6d. to 27s. 6d. A. C. Cossor rallied to 35s. 6d. Decca Records rose to 61s. 3d. The Indian group is weak, with Calcutta Trams down to 67s. 6d. and Madras Electrics to 40s. 6d.

Fortnightly Accounts

By a decision of the Stock Exchange Council, the pre-war system of fortnightly settlements will be restored, within a few months, in place of the present rule by which all transactions are done for cash. The decision is welcomed by Stock Exchange firms, whose staff work will be simplified, and by the investing public, who should see a marked reduction in the delays which at present occur before transfers and stock certificates in respect of purchases are received. Pre-war aids to speculation in the

shape of contangoes, options and forward dealings are not to be re-introduced at the present time.

TRADE MARKS

APPLICATION has been made for the registration of the following trade marks. Objections may be entered within one month from August 21st:—

MICROMAC. No. 640,281, Class 9, and Micromatic. No. 640,282, Class 9. Electric switches and electric plug and socket connectors.—C. H. Parsons, Ltd., Britannia Works, Wharfedale Road, Tyseley, Birmingham. (To be associated with Nos. 640,282 (3569) and 640,281 (3569) ix, respectively.)

LEWVAN. No. 640,539, Class 9. Insulated wire, fuse wire and resistance wire, all for electrical purposes.—London Electric Wire Co. & Smiths, Ltd., 24, Queen Anne's Gate, S.W.1. (To be associated with No. 615,388 (3312) ix and others.)

SPENSTEAD. No. 640,877, Class 9. Electric dust-removal apparatus.—Spencer & Halstead, Ltd., Bridge Works, Wakefield Road, Ossett, Yorks. (To be associated with No. 496,231 (2654) and others.)

DECOLA (design). No. 641,330, Class 9. Radio apparatus, radio-gramophones, gramophones and records.—Decca Record Co., Ltd., 1 and 3, Brixton Road, S.W.9. (To be associated with No. 359,891 (1887) viii and others.)

BURNEAT. No. 637,477, Class 11, and FAYNEAT. No. 637,479, Class 9. Gas and electric cooking apparatus and water heaters.—Neat Gas Appliances, Ltd., 31-35, Belle Vue Road, Hendon, N.W.4.

CLECO. No. 639,659, Class 12. Motor land vehicles, trucks, caravans and trailers.—Cleco Electric Industries, Ltd., 7, Freeschool Lane, Leicester.

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.

J. L. BAIRD.—"Screens for television." 7978. April 28th, 1944. (579482.)

British Thomson-Houston Co., Ltd. (General Electric Co.)—"Magnetic core structures." 7040. April 17th, 1944. (579467.) "Impedance matching transformers." 17855. October 28th, 1943. (579665.)

British Thomson-Houston Co., Ltd., and F. J. Clark.—"Electric drum controllers." 10558. June 1st, 1944. (579603.)

Brookhirst Switchgear, Ltd., and J. T. Golothan.—"Electric switches and switchgear." 10716. June 3rd, 1944. (579608.)

R. P. S. Buckle.—"Combined electric tumbler switches and plug couplings." 8105. May 1st, 1944. (579488.)

Callender's Cable & Construction Co., Ltd., and E. Tunnickliff.—"Manufacture of insulated electric wires and cables." 17582. October 25th, 1943. (579662.)

Callender-Suchy Developments, Ltd., and C. T. Suchy.—"Filters." 4675. March 13th, 1944. (579571.)

Carlisle Electrical Manufacturing Co., Ltd., and H. V. Carlisle.—"Electrical service distribution arrangement." 2808. February 15th, 1944. (579569.)

C. J. Carter and Pye, Ltd.—"Arrangement for monitoring pulse modulation." 18031. December 18th, 1942. (579652.)

E. K. Cole, Ltd., and J. N. I. Evans.—"Production of an electrically conducting layer on the envelope of an electron discharge device or the like." 9635. May 19th, 1944. (579531.) "Manufacture of fluorescent material for fluorescent lamps." 9779. May 20th, 1944. (579534.)

Cosmocord, Ltd., and A. Schumann.—"Electrical devices employing piezo-electric crystals." 9356. May 16th, 1944. (579524.)

A. C. Cossor, Ltd., and D. A. Bell.—"Demodulating apparatus for pulse signalling systems." 15305. September 17th, 1943. (579565.)

A. C. Cossor, Ltd., and P. T. Hodgson.—"Electric discharge devices." 4500. March 19th, 1943. (579653.)

J. A. Crabtree & Co., Ltd., B. G. Harrison and W. E. Hill.—"Sockets of electric couplings." 10287. May 26th, 1944. (579546.)

N. Dixon, R. S. Robinson and W. T. Glover & Co., Ltd.—"Manufacture of insulated electric cables and wires." 17583. October 25th, 1943. (579663.)

English Electric Co., Ltd., and E. A. Binney.—"Dynamo electric machines." Cognate applications 3479/44 and 1038/45. February 24th, 1944. (579570.)

General Electric Co., Ltd., and A. Abbott.—"Protective arrangements for alternating-current systems." 9141. May 12th, 1944. (579520.)

General Electric Co., Ltd., and W. M. Michaelis.—"Apparatus for generating repeated electric pulses." 21943. December 31st, 1943. (579679.)

Hazeltine Corporation.—"Television signal-generating system." 5846/44. March 30th, 1943. (579600.)

Hoover, Ltd.—"Suction cleaners." 10533/44. May 12th, 1943. (579558.)

Igranic Electric Co., Ltd.—"Electric snap action switches of the multiple circuit controlling type." 10058/44. May 26th, 1943. (579542.)

W. H. H. Kelk and D. O. Burns.—"Electromagnetically operated timing mechanisms." 17047. October 18th, 1943. (579659.)

Marconi's Wireless Telegraph Co., Ltd.—"Diversity radio-receiving system." 8704/44. May 6th, 1943. (579507.)

Marconi's Wireless Telegraph Co., Ltd., and H. R. Cantelo.—"Frequency controlling and stabilizing means in radio apparatus and the like." 16450. October 7th, 1943. (579567.)

Marconi's Wireless Telegraph Co., Ltd., and H. J. Round.—"Magnetostrictive devices." 12533. September 26th, 1941. (579645.) "Devices for the transmission and reception of energy of the nature of sound energy." 12609. September 29th, 1941. (579646.)

B. J. Mayo and H. E. Holman.—"Electron discharge devices employing hollow resonators." 2122. February 17th, 1942. (579648.)

M-O Valve Co., Ltd., and J. A. Smyth.—"Electric discharge devices." 8678. June 24th, 1942. (579651.)

National Carbon Co., Inc.—"Electrical contact brushes." 8846/44. June 23rd, 1943. (579509.)

L. C. Olsen.—"Synchronizing devices for telegraphic receivers." 8439. May 4th, 1944. (579499.)

Ripault, Ltd., and G. A. Roberts.—"Stands for spools of cable and the like." 8371. May 3rd, 1944. (579495.)

J. Robinson.—"Wireless receiving and transmitting systems." 8788. June 1st, 1943. (579655.)

E. C. Rollason and Murex Welding Processes, Ltd.—"Manufacture of non-ferrous welding rods or electrodes." 11951. June 23rd, 1944. (579635.)

Standard Telephones & Cables, Ltd.—"High frequency amplifiers." 9880/44. January 30th, 1943. (579536.) "Demodulating arrangements for frequency modulated electric waves." 18911/43. November 13th, 1942. (579671.)

"Means for pulse radio frequency oscillators." 19414/43. November 23rd, 1942. (579673.) "Electric signal communications system." 20746/43. September 19th, 1942. (579677.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—"Moulded worm shaft." 10443. May 31st, 1944. (579577.)

Standard Telephones & Cables, Ltd., and R. H. Dunn.—"Generation of impulses." 8426. May 4th, 1944. (579498.)

Standard Telephones & Cables, Ltd., and B. Secker.—"Electric measuring apparatus." 9595. May 18th, 1944. (579530.)

Standard Telephones & Cables, Ltd., P. K. Chatterjee and C. T. Scully.—"Pulse generating systems." 19140. Nov. 16th, 1943. (579672.)

N. A. Tucker and Mallory Metallurgical Products, Ltd.—"Resistance welding apparatus." 9439. May 17th, 1944. (579527.)

United Insulator Co., Ltd., and P. A. Hammond.—"Electrical condensers." 9723. May 19th, 1944. (579576.)

C. L. Warburton, F. H. Wilshaw, Metropolitan-Vickers Electrical Co., Ltd., and W. Crosland, Ltd.—"Method and tools employed therewith for cutting articles out of sheet metal or plywood blanks." 9317. May 15th, 1944. (579523.)

Westinghouse Electric International Co.—"Vacuum tight seals." 7931/44. May 8th, 1943. (579515.)

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.

Ashton-under-Lyne.—September 9th. Housing Committee. Electrical wiring of 70 permanent houses. (August 16th.)

Australia.—**QUEENSLAND.**—October 17th. City Electric Light Co., Ltd., Brisbane. 15,000-kW steam turbine and accessories. (Specification 412, first copy 2 guineas, others 10s. 6d.) H. Baskerville, secretary, Boundary Street, Brisbane. (Tenders.)

Birkenhead.—September 13th. Electricity Department. Switchgear and transformers. (August 16th.)

Chesterfield.—September 12th. Electricity Department. Seven 250-kVA outdoor distribution transformers. H.v. and m.v. cables. (August 23rd.)

Chester-le-Street.—September 2nd. Rural District Council. Electrical installations in 80 permanent houses at Plawsworth Road, Sacriston, and 80 houses at Birtley. F. Bowman, housing architect, Great North Road, Birtley. (Deposit of £1 1s.)

Edmonton.—September 4th. Borough Council. Two vertical spindle centrifugal pumps, each complete with electric motors, switchgear, etc., for Cuckoo Hall sewerage scheme. (Deposit £3.) E. J. Willis, borough engineer, Town Hall, Edmonton, N.9.

Kingston-upon-Thames.—September 30th. Borough Council. Tower wagon for street lighting purposes. (August 23rd.)

Llandrindod Wells.—September 7th. Urban District Council. 400-kVA transformer, with h.v. and l.v. switchgear. (August 23rd.)

Manchester.—September 17th. Electricity Department. Battery and charging equipment at two substations; and 660-V d.c. traction switchgear at three substations. (See this issue.)

September 9th. Electricity Department. Accessories for use with domestic appliances. (See this issue.)

September 18th. Electricity Department. Mercury-arc rectifier equipment for trolley-bus supply. (See this issue.)

Newbiggin (Northumberland).—U.D.C. Electrical installations in 100 houses. Plans by the surveyor, Council Offices.

New Zealand.—September 24th. Public Works Department. Two 10,000-kVA,

110/11-kV transformer banks and two spare units. Specification can be seen at the New Zealand Government offices, 415, Strand, W.C.2. (Tenders.)

Stockport.—September 11th. Town Council. Electrically-driven borehole pump for the Gas Department. T. Reynolds, gas engineer, Portwood Gasworks.

Orders Placed

Australia.—Postmaster-General's Department. Automatic exchange equipments for Kew (Victoria) and Lindfield and Kensington (N.S.W.) (£127,871, plus exchange).—Standard Telephones & Cables Pty. (Tenders.)

Cardiff.—Electricity Committee. Accepted. Switchgear (£4,134).—South Wales Switchgear. Six transformers (£4,212).—Bryce. Transformer for Roath power station (£597).—British Electric Transformer Co.

Transport Committee. Accepted. 96 section pillars with switches, etc., for trolley-bus conversion scheme (£9,021).—B.I. Callender's Cables.

Felling (Durham).—Urban Council. Accepted. Electrical installations in 40 houses at Holly Hill and eight at Felling House.—J. F. H. Haugh.

Glasgow.—Housing Committee. Accepted. Electrical work at 1,548 houses.—R. J. Sinclair & Co. (Glasgow). At 202 houses.—Argyle Electrical Co. At 54 houses.—Stewart Brothers.

Manchester.—Education Committee. Accepted. Starter switchgear and regulators for college generating station.—Milne & Longbottom.

Middlesbrough.—Town Council. Accepted. Cable.—Crompton Parkinson (£643); Hackbridge Cable Co. (£620).

Southport.—Electricity Committee. Accepted. 500-kVA transformer (£536).—Electric Construction Co. Fuse pillars (three at £148 10s. each and three at £155 10s. each).—British Insulated Callender's Cables.

Highways Committee. Accepted. Electrically driven pump (£284).—Wallwin (Pumps), Ltd.

Stockton-on-Tees.—Corporation. Accepted. L.v. switchboard.—W. Lucy & Co. Switchgear.—A. Reyrolle & Co. Transformers.—C. A. Parsons & Co. Cables for electricity supply extensions on the Fairfield Estate and Newham Grange Estate.—Edison Swan Cables.

Contracts in Prospect

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

Altrincham.—Houses (52), Park Road, Timperley; E. S. Hodgson, acting borough surveyor, Town Hall.

Amersham.—Houses (92), Chalfont St. Peter and Prestwood; H. E. Buxton, clerk, Rural Council Offices, High Street.

Banstead.—Concrete houses (100) for U.D.C.; G. Wimpey & Co., Ltd.

Bath.—Houses (100), Moorlands estate; city engineer, Guildhall.

Berwick-upon-Tweed.—Permanent houses (40) at Tweedmouth; borough surveyor, Municipal Buildings.

Billingham-on-Tees.—Houses (76) at Billingham Junction for the U.D.C.; Stephen Coates, Ltd., builders, Langbaugh Place, Middlesbrough. Houses (62) and 12 bungalows on the Monk-seaton Estate; H. A. Dawson (Estates), Ltd., builders.

Bishop Auckland.—Houses (36), St. Helen's; Bell & Ridley, builders, Moorlands, Durham City.

Bolton.—Rebuilding Hill Fold Mills, Belmont Road; W. A. Openshaw, Ltd.

Houses (36), Moss Bank Way; A. S. Woods, builder, Easedale Road.

Brentwood.—Houses (300), Three Arch Bridge site, for U.D.C.; W. J. Hall, surveyor, 34, Victoria Street, Westminster, S.W.1.

Canterbury.—Houses (44), Martyrs' Field (£52,499); Ringmer Building Works, Ltd., Ringmer, East Sussex.

Carlisle.—Houses (200); city engineer.

Cheetham.—Warehouse and office, 135, Cheetham Hill Road; D. Elfin, 343, Deansgate, Manchester.

Connah's Quay.—Houses (94), Wepre estate, for U.D.C.; E. C. Evans, clerk, Council Offices.

Consett.—Permanent prefabricated houses (750) for U.D.C.; J. J. Eltringham, architect, Derwent Street, Blackhill.

Dalton-in-Furness.—Houses (34), Ireleth (£42,103) for U.D.C.; H. S. Pearce, builder, Barrow.

Darlington.—Kitchens and dining rooms at Eastbourne Boys' and Girls' Schools for the E.C.; E. Minors, borough engineer.

Ennerdale (Cumberland).—One hundred "Airey" type houses; R.D.C. surveyor.

Fairbairn.—Houses (146), Propps Hall site, for U.D.C.; H. S. Fairhurst & Son, architects, 55, Brown Street, Manchester, 2.

Glasgow.—New factories at Hillington Industrial estate; manager, Scottish Industrial Estates, Glasgow.

Grimsby.—Houses (40), Humberston and Immingham, for R.D.C.; P. E. Hopps, clerk, Council Offices, Deansgate.

Halesowen.—Houses (100), Hasbury; A. & J. Mucklow, Ltd., builders, Haden Hill.

Hemel Hempstead.—Permanent houses (98), Anchor Lane; Louis de Soissons, architect, 21, St. John's Wood Park, London, N.W.8.

Hereford.—Jam factory, Three Elms Road; Watson & Johnson, Birmingham.

Hull.—Temporary shops, Ferensway, and three secondary schools; city architect.

Kidsgrove.—Houses (80), Woodshutts estate, for U.D.C.; Wood, Goldstraw & Yorath, architects, Station Road, Tunstall, Stoke-on-Trent.

Leicestershire.—Police houses (£31,000) and staff cottages, Carlton Hayes Hospital (£18,200); county architect.

Lichfield.—Extensions, Phoenix Foundry, Beacon Street; Chamberlain & Hill, Ltd.

Factory for machine tools, etc., Trent Valley estate; Wilson's (Wolverhampton), Ltd.

Factory, Trent Valley estate; Bound Brook Bearing Co., Ltd.

Llanidloes.—Houses (40), Green Villa site (£45,818); H. N. Meredith, builder, Llanidloes.

Lowestoft.—Permanent houses (56), Yarmouth Road and Kirkley Gardens; borough engineer, Town Hall.

Manchester.—Re-equipment of college for teaching and research in rayon technology (£60,000) and primary school, Victoria Avenue; city architect.

Middlesbrough.—Additions to steel constructional shop for Dorman Long & Co., Ltd. Additions to factory for Middlesbrough Casements, Ltd.; Stephen Coates, Ltd., builders, Langbaugh Place.

Montrose.—Houses (55); burgh surveyor, Town Buildings.

Neston.—Permanent houses (152), Little Neston, for U.D.C.; James & Bywaters & Rowland Pierce, architects, 5, Bloomsbury Street, London, W.C.1.

Newark.—Houses (70), Winthorpe Road (£81,552), for T.C.; H. Baggaley, Ltd., builders, Baums Lane, Mansfield.

Newburn-on-Tyne.—Houses (126), Claremont estate; G. Bainbridge, builder, Lemington.

Newcastle-on-Tyne.—Houses (38), Acorn Gardens; U. & W. Cooknell, Coburg Street, Blyth, Northumberland.

Alterations in Carlisle Square for Milligan Reed & Co., and in Albion Row for Domestos, Ltd.; Cackett, Burns Dick & McKellar, architects, 21 Ellison Place.

Houses on 134-acre site at Kenton Lane for the City Council; city architect, 18, Cloth Market.

Newcastle (Staffs).—Semi-detached houses (14), Stratford Avenue, May Bank; Baddeley Bros., 78, Dimsdale Parade.

St. Austell.—Houses (130), Poltair estate, for U.D.C.; J. Williams & Co. (Cornwall), Ltd., builders, South Street.

Shilbottle.—Houses (34) for the Alnwick R.D.C.; J. G. Green & Sons, Butts, Warkworth, Northumberland.

Workington.—Houses (44); Leslie & Son, builders.

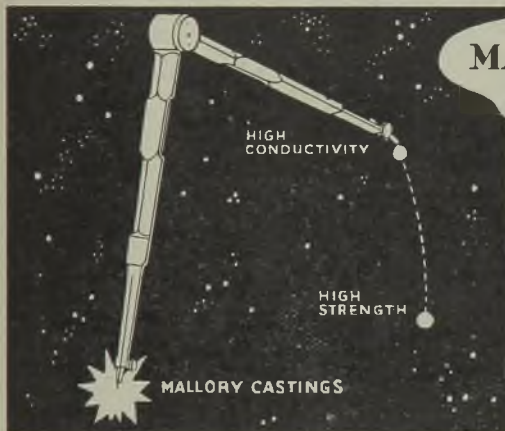
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THE WONDERFUL LAMP

A S.E.C. PAPER

A new era of brightness in the home, office and factory! Brightness, cheerfulness, cleanliness, fresh air, good health and good lighting are the order of the day. Good lighting is a tonic—especially with Osram!



Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to **First Post on Monday**, at Dorset House, Stamford Street, London, S.E.1.

THE CHARGE for advertisements in this section is 2/- per line (approx. 7 words) per insertion; **ONLY OFFICIAL AND GOVERNMENT ANNOUNCEMENTS CAN NOW BE DISPLAYED**—30/- per inch. Where the advertisement includes a Box Number this counts as six words and 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.

OFFICIAL NOTICES, TENDERS, ETC.

CITY OF MANCHESTER

THE Electricity Committee invites tenders for the following:—Specification No. 873: Supply, delivery and putting into service of Battery and Charging Equipment at two substations. Specification No. 874: Supply, delivery and erection at three substations of 660-volt D.C. Traction Switchgear.

Specifications, etc., may be obtained from Mr. R. A. S. Thwaites, Chief Engineer and Manager, Electricity Dept., Town Hall, Manchester, 2, on payment of a fee of one guinea for each specification, which amount will be refunded on receipt of a bona fide tender.

Tenders, addressed to the Chairman of the Electricity Committee, to be delivered not later than 10 o'clock a.m. on Tuesday, 17th September, 1946. The Committee does not bind itself to accept the lowest or any tender.

PHILIP B. DINGLE, Town Clerk.

Town Hall, Manchester, 2. 2301
21st August, 1946.

COUNTY BOROUGH OF SOUTHEAST-ON-SEA ELECTRICITY DEPARTMENT

To Manufacturers and Agents

A central file of catalogues is being inaugurated and manufacturers or agents who so desire may send copies of their catalogues to the undersigned. Suitable arrangements should be made to keep the information up to date.

Catalogues required are those relating to gear and ancillaries of electricity generation and distribution and also Diesel engines.

R. C. GOLDING, M.Sc.,

Borough Electrical Engineer.

Electricity Dept.,
85, London Rd., Southend-on-Sea.
22nd August, 1946. 2294

CITY OF MANCHESTER

THE Electricity Committee invite tenders for the supply, delivery and erection of Mercury-Arc Rectifier Equipment for Trolley-bus Supply (Specification No. 872).

Specification, etc., may be obtained from Mr. R. A. S. Thwaites, Chief Engineer and Manager, Electricity Dept., Town Hall, Manchester, 2, on payment of a fee of £1 1s., which amount will be refunded on receipt of a bona fide tender.

Tenders, addressed to the Chairman of the Electricity Committee, to be delivered not later than 10 o'clock a.m. on Wednesday, 18th September, 1946. The Committee does not bind itself to accept the lowest or any tender.

PHILIP B. DINGLE,

Town Hall, Manchester, 2. Town Clerk. 2340
17th August, 1946.

CITY OF MANCHESTER ELECTRICITY DEPT.

TENDERS are invited for the supply and delivery during the period of twelve months ending 30th September, 1947, of Accessories for use with Domestic Appliances (Specification No. 875).

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

Tenders, addressed to the Chairman of the Electricity Committee, to be delivered not later than 10 o'clock a.m. on Monday, 9th September, 1946. The Committee does not bind itself to accept the lowest or any tender.

PHILIP B. DINGLE,

Town Hall, Manchester, 2. Town Clerk. 2341
23rd August, 1946.

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.

SITUATIONS VACANT

CROWN AGENTS FOR THE COLONIES

Colonial Government Appointments

APPPLICATIONS from qualified candidates are invited for the following post:—

ELECTRICAL FOREMAN (Telegraph and Telephones) required by the Gambia Government, Public Utilities Department, for one tour of 18 to 24 months with possible permanency. Salary according to age, experience or war service in the scale £400 a year rising to £560 a year. Cost of living allowance of £40 a year for single men and for married men £60 a year, with separation allowance of £60 a year for the first child and £36 a year for the second. Outfit allowance £60. Free passages and quarters. Candidates, not over 40 years of age, must be capable of carrying out overhead telephone construction and maintenance, underground telephone cable laying and jointing, testing equipment for lines and apparatus, and installation and maintenance of subscribers' telephone apparatus and of exchange equipment, automatic and C.B. They should possess City and Guilds Certificates in Technical Electricity, Telegraphy, Telephony and Radio Communication. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/16854 on both letter and envelope. 2307

BURGH OF OBAN

Appointment of Burgh Electrical Engineer

APPPLICATIONS are invited from qualified persons for this appointment. Applicants must be Corporate Members of the Institution of Electrical Engineers and not more than 45 years of age. Experience in electricity supply undertaking is essential and recent experience in change-over work is desirable.

The salary will be in accordance with the agreement dated 9th July, 1941, made between the National Joint Committee for Local Authorities and Chief Electrical Engineers, but in pursuance of Clause 10 of this agreement 85% of the salary will be paid in the first year, 92½% in the second year, the full salary being payable in the third and subsequent years.

The present unit assessment of the undertaking is three million units. The appointment will be subject to three months' notice on either side and will be subject to the Local Government Superannuation (Scotland) Act, 1937.

Applications, stating age, experience and qualifications, together with not more than three recent testimonials, should be delivered to me not later than 12th Sept., 1946.

A. MACINNES,

Municipal Buildings, Oban.

Town Clerk.

20th August, 1946.

2284

GLOUCESTER CORPORATION ELECTRICITY DEPARTMENT

Castle Meads Power Station

REQUIRED, Switchboard Attendant. Wages 32.25d. per hour. N.J.I.C. conditions. Sick pay and pension schemes in operation for which medical examination is necessary. Must have had previous experience in control room of modern generating station and have undergone suitable training. Apply at once, with copies of recent testimonials to: Chief Engineer & General Manager, Electricity Dept., Commercial Road, Gloucester. 2323

METROPOLITAN BOROUGH OF WOOLWICH ELECTRICITY DEPARTMENT

Appointment of Lady Cookery Demonstrator

A vacancy arises for the position of a Lady Cookery Demonstrator at the Electricity Showrooms, Electric House, Powis Street, Woolwich. Candidates, who should hold the E.A.W. Certificate, or Diploma, should not be less than 21 years of age, and have had experience in demonstrating cooking by electricity.

The salary will be in accordance with the National Joint Council for Local Authorities' Administrative, Professional, Technical and Clerical Services, General Division (Female), which is, at the age of 21, £120 per annum, plus £16 weighting for London, plus war bonus, rising to £240 per annum, plus £24 weighting, plus bonus, at the age of 30.

The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination prior to appointment. Applications, stating age, qualifications and experience, together with not more than three recent testimonials, should be addressed to the Borough Electrical Engineer, Electric House, Powis Street, Woolwich, and received not later than Saturday, 7th September, 1946. Canvassing members of the Council, either directly or indirectly, will be a disqualification.

DAVID JENKINS.

Woolwich, S.E.18.
29th July, 1946.

Town Clerk.
2168

BOROUGH OF WATFORD ELECTRICITY DEPT.

Mains Assistant

APPLICATIONS are invited for the above position with salary and conditions in accordance with Grade 8b, Class H (plus 5% London Area), of the National Joint Board Schedule, also a car allowance. Candidates must have had a good technical education and experience in general mains work, including operation of E.H.T. and L.T. switchgear, laying and jointing L.T. cables, testing and connecting in substations and kiosks. Corporate or Graduate Membership of the Institution of Electrical Engineers is desirable.

The successful applicant will be required to pass a medical examination, as the appointment will be subject to the provisions of the Local Government and Other Officers Superannuation Acts, 1922-1937. Applications, stating full details of experience, age and qualifications, together with copies of not more than three recent testimonials, must be submitted to the undersigned not later than 4th September, 1946, endorsed "Mains Assistant."

A. W. BARHAM.

Chief Engineer and General Manager.

Electricity House,
The Parade, Watford. 2206

MILFORD HAVEN URBAN DISTRICT COUNCIL ELECTRICITY UNDERTAKING

Appointment of Distribution Assistant

APPLICATIONS are invited for the above appointment. The selected applicant will be engaged on the construction, maintenance and operation of rural and urban overhead and underground systems up to 11 kV. Mains records experience essential. Extension and change-over programmes are in hand.

The salary will be in accordance with the N.J.B. Schedule, Class B, Grade 7 (at present £368, rising to £379 per annum).

The appointment will be subject to the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination. Applications, stating age, qualifications and experience, accompanied by not more than three testimonials, must be delivered to the undersigned by not later than September 9th, 1946.

A. J. DALTON.

Electrical Engineer and Manager.

Town Hall, Milford Haven. 2154

ALTRINCHAM ELECTRIC SUPPLY LTD.

Plumber-Jointer

APPLICATIONS are invited for employment as a Plumber-Jointer. Wages and working conditions in accordance with N.J.I.C. No. 3 District Schedule; present rate 28.45d. per hour.

Applications, stating age and experience, should be submitted by September 9th, 1946, addressed to the Engineer and Manager, Altrincham Electric Supply Ltd., 60, Stamford New Road, Altrincham, Cheshire. 2238

CENTRAL ELECTRICITY BOARD

THE Central Electricity Board have vacancies for the following:—

One Cable Engineer at a commencing salary of £750 to £850 p.a., depending on qualifications.

One Transformer Engineer at a commencing salary of £750 to £850 p.a., depending on qualifications.

To the basic salaries will be added war-time payments in accordance with the arrangements in force from time to time. At present the additional payment on these basic salaries is £62 8s. per annum.

Applicants for the position of Cable Engineer must have sufficient experience in the design, manufacture and installation of high voltage cables to enable them to revise specifications, scrutinise designs, supervise tests and installation, and investigate performance of cables and accessories.

Applicants for the position of Transformer Engineer must have sufficient experience in the design and manufacture of large high voltage transformers to enable them to revise specifications, scrutinise designs, supervise tests and installation, and investigate performance of transformers and tap-changing equipment and accessories.

Applicants should state age, and give full particulars, with dates, of education, technical training, practical experience, degrees, diplomas, etc. Selected applicants will be required to undergo a medical examination and, if approved, will be required to join the Board's Superannuation Scheme.

Applications must be submitted, in writing, to the Chief Engineer, Central Electricity Board, Trafalgar Buildings, 1, Charing Cross, London, S.W.1, and be received by him not later than midday on Monday, 9th Sept., 1946. 2259

METROPOLITAN BOROUGH OF WOOLWICH ELECTRICITY DEPARTMENT

Appointment of Testing Assistant

APPLICATIONS are invited for the position of Testing Assistant in the Meter Section of the Electricity Department. Candidates should be Graduate Members of the I.E.E., or hold equal qualifications, must have sound technical experience and should be thoroughly conversant with the construction of single and polyphase metering equipment and the operation of polyphase testing equipment. Previous experience in a type "A" testing station of a large electricity undertaking is essential.

The salary will be in accordance with Grade 9, Class J. of the National Joint Board Schedule, at present commencing at £446 5s. per annum.

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

Applications, stating age, qualifications and experience, together with not more than three recent testimonials, should be addressed to the Borough Electrical Engineer, Electric House, Powis Street, Woolwich, and received not later than Saturday, 7th September, 1946. Canvassing members of the Council, either directly or indirectly, will be a disqualification.

DAVID JENKINS.

Woolwich, S.E.18.
29th July, 1946.

Town Clerk.
2169

BOROUGH OF LOUTH ELECTRICITY DEPT.

Appointment of Consumers Engineer

APPLICATIONS are invited for the above appointment at a salary in accordance with Grade 6, Class A, N.J.B. Schedule, at present £368 rising to £391 per annum. At the present rate of growth of load the Undertaking is likely to transfer to Class B in 1947, when the salary will be £402 rising to £417 per annum.

Applicants must have had a sound technical and practical training in electrical engineering, with previous experience of sales and showroom organization and load development. Experience in the supervision of testing, inspecting and connecting consumers' installations and domestic apparatus is essential. The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate may be required to undergo a medical examination.

Applications, giving age, details of training and experience, present position held, and accompanied by copies of two recent testimonials, must be delivered not later than Thursday, 12th September, 1946, to H. Doust, A.M.I.E.E., Borough Electrical Engineer, Electricity Offices, Cannon Street, Louth. Canvassing, either directly or indirectly, will disqualify.

E. BAILEY.

Town Hall, Louth.
20th August, 1946.

Town Clerk.
2273

BOROUGH OF ASHTON-UNDER-LYNE ELECTRICITY DEPARTMENT

Appointment of Substation Control Engineer

APPPLICATIONS are invited for the position of Substation Control Engineer for shift duties in the Council's Wellington Road Works, at a salary in accordance with the N.J.B. Schedule, Class F, Grade 9, commencing at the present rate of £358 per annum. Applicants should have had a sound technical training and experience in the control of high and low pressure switchboards, operation of rotary conversion plant and grid switching.

Applications, stating age, education and technical training, experience, present position regarding service in H.M. Forces, release from present employment, and accompanied by not more than three testimonials, should be sent to Mr. N. Jones, Chief Engineer, Electricity Department, Wellington Road, Ashton-under-Lyne, not later than Friday, September 20th, 1946, endorsed "Substation Control Engineer." Preference will be given to applicants of graduate standard of the I.E.E.

Applicants should state whether related to any member or senior officer of the Council, and should not be more than 45 years of age. As the appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, the selected candidate will be required to pass a medical examination and contribute to the superannuation fund. The Council regrets that it is unable to offer housing facilities to the successful applicant.

D. W. BROMLEY,

Town Hall, Ashton-under-Lyne.
22nd August, 1946.

Town Clerk.
2305

CITY OF MANCHESTER ELECTRICITY DEPT.

APPPLICATIONS are invited for the following appointments on the staff of the Electricity Department:—
ONE SHIFT CHARGE ENGINEER at Stuart Street Power Station. Salary in accordance with Class J, Grade 7, of the N.J.B. Schedule (£563 p.a. to commence).

ONE ASSISTANT SHIFT CHARGE ENGINEER at Barton Power Station. Salary in accordance with Class K, Grade 8b, of the N.J.B. Schedule (£487 p.a. to commence).

Candidates must have served a workshop apprenticeship and have at least the Higher National Certificate in Electrical or Mechanical Engineering. Training and experience in boiler operation essential. Age limit, 40 years.

The appointments will be subject to the City Council Superannuation Scheme, and the successful candidates will be required to pass a medical examination.

Applications, giving full particulars of age, technical training and experience, together with copies of recent testimonials, must be endorsed "Shift Charge Engineer" or "Assistant Shift Charge Engineer" and addressed to the Chairman of the Electricity Committee, Town Hall, Manchester, 2, not later than 10 a.m. on Monday, 9th September, 1946. Canvassing, directly or indirectly, will disqualify.

PHILIP B. DINGLE,

Town Hall, Manchester, 2.
August, 1946.

Town Clerk.
2156

SUNDERLAND EDUCATION COMMITTEE

The Technical College

Principal: D. A. Wrangham M.Sc. (Lond.), Sen. Wh.Sc.,
M.I.Mech.E., D.I.C.

APPPLICATIONS are invited for the post of Lecturer in the Electrical Engineering Department, duties to commence as soon as possible. Salary in accordance with the Burnham Technical Scale. The commencing salary will include an allowance for approved industrial or professional experience (after the age of 21 years) up to 7 years, or in special cases up to 10 years.

The standard of the full time day courses is that required for an Honours Degree, and of the evening courses the Higher National Certificate. Candidates should have a good Honours Degree in Electrical Engineering, with qualifications in "Telecommunications," and have had practical experience in modern developments in this field. Forms of application and further particulars may be obtained by sending a stamped addressed foolscap envelope to the Registrar, The Technical College, Sunderland. Application forms should be returned to the undersigned as soon as possible.

W. THOMPSON,

Director of Education.

Education Offices,
15, John St., Sunderland.
August, 1946.

2303

CENTRAL ELECTRICITY BOARD

North-West England and North Wales Area

THE Central Electricity Board have vacancies in their North-West England and North Wales Area for: (1) Assistant Section Engineers; (2) General Assistant Technical Engineers for protective gear testing on site.

Starting salaries will range from £300 per annum to £375 per annum basic, depending on qualifications. To the basic salaries will be added a temporary salary adjustment in accordance with the arrangements in force from time to time. At present this temporary salary adjustment is at the rate of 30% on the basic salary, with a minimum of £39 per annum and a maximum of £62 8s. per annum. Applicants should state their age and give full particulars, with dates, of education, technical training, experience, degrees and diplomas, etc. The selected applicants will be required to undergo a medical examination and, if approved, will be required to join the Board's superannuation scheme.

Applications must be submitted in writing, addressed to the Manager, Central Electricity Board, Grid House, Wilmslow Road, East Didsbury, Manchester, 20, and be received by him not later than September 14, 1946. 2252

BOROUGH OF KING'S LYNN ELECTRICITY DEPARTMENT

Appointment of Mains Superintendent Without Charge of Substations

APPPLICATIONS are invited for the above appointment in accordance with the National Joint Board Schedule of Salaries and Conditions, Grade 4, Class E, commencing £558 per annum.

The appointment will be subject to the Local Government Superannuation Act, 1937, and to the passing of a medical examination by the Council's Medical Officer.

Applications, stating age, whether married or single, present position and duties, with particulars of technical training and past experience, endorsed "Mains Superintendent," should be delivered to the undersigned not later than Monday, 9th September, 1946. Corporate Membership of the I.E.E. will be an additional qualification.

FRANK G. REEVES,

Town Hall.

King's Lynn.

Town Clerk.

2208

MIDDLESEX COUNTY COUNCIL

County Architect's Department

TWO Assistant Engineers required to supervise maintenance engineering staff at Hospitals and Institutions. Applicants must have experience of similar work and be conversant with steam and direct heating boilers, including mechanical stokers and coal handling plant, heating and domestic hot water systems, electric generation and distribution, electric lighting, X-ray equipment, automatic telephones, wireless, cold water services and all equipment of an engineering nature generally associated with large general hospitals. Salary £545 p.a., plus temporary bonus, now £60 p.a. Established and pensionable staff, subject to medical examination. Application forms obtainable from C. G. Stillman, County Architect, Middlesex House, Vauxhall Bridge Road, S.W.1, to be returned, with three recent testimonials, by 13th September, 1946. (A.93.)

C. W. RADCLIFFE,

Guildhall,

Westminster, S.W.1.

Clerk of the County Council.

2250

CITY OF MANCHESTER ELECTRICITY DEPT.

APPPLICATIONS are invited for the position of Assistant Chemist at Barton Power Station. Candidates must have had experience in general analysis, and hold the Higher National Certificate in Chemistry or equivalent.

Salary in accordance with Class K, Grade 10a (£357 p.a. to commence).

The appointment will be subject to the City Council Superannuation Scheme, and the successful candidate will be required to pass a medical examination.

Applications, giving full particulars of age, technical training and experience, together with copies of recent testimonials, must be endorsed "Assistant Chemist" and addressed to the Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2, not later than 10 a.m. on Monday, 16th September, 1946. Canvassing, directly or indirectly, will disqualify.

PHILIP B. DINGLE,

Town Hall, Manchester, 2.
August, 1946.

Town Clerk.

2160

CITY AND COUNTY BOROUGH OF CARLISLE ELECTRICITY DEPARTMENT

Appointment of Switchboard Attendant

APPPLICATIONS are invited from suitable candidates for the above position at the Willow Holme Power Station. Candidates should hold a technical qualification or show that they are in course of obtaining qualification for Corporate Membership of the Institution of Electrical Engineers. Experience with a manufacturer of power station electrical equipment or with an electricity supply authority in a modern power station control room is essential.

Salary and conditions of service will be in accordance with N.J.B. Agreement, Class H, Grade 9a. Present salary £365-£381 per annum. The appointment will be subject to the provisions of the Local Government and Other Officers Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, giving age, details of training and experience, together with copies of not more than three testimonials, or alternatively, the names and addresses of three referees, should be delivered to the undersigned in sealed envelopes, appropriately endorsed, not later than Monday, 16th September, 1946.

A. C. THIRTLIE, A.M.I.E.E., A.M.I.C.E.,
City Electrical Engineer and Manager.
Electricity House, 46/48 Castle Street, Carlisle. 2258

METROPOLITAN BOROUGH OF WOOLWICH ELECTRICITY DEPARTMENT

Appointment of Showroom Assistant

A vacancy arises for the position of Showroom Assistant (Male) in the Electricity Department. Candidates, who should be over 21 years of age, should have had previous experience in electrical showrooms, be of good appearance and able to interview consumers.

The salary applicable is £160 per annum, plus £20 weighting for London, plus war bonus at the age of 21, rising to £300, plus £30 weighting, plus war bonus at the age of 30.

The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination prior to appointment. Applications in candidate's own handwriting, stating age, qualifications and experience, together with not more than three recent testimonials, should be addressed to the Borough Electrical Engineer, Electric House, Powis Street, Woolwich, and received not later than Saturday, 7th September, 1946. Canvassing members of the Council, either directly or indirectly, will be a disqualification.

DAVID JENKINS,
Town Clerk.
Woolwich, S.E.18.
29th July, 1946. 2167

BOROUGH OF GRAVESEND ELECTRICITY DEPT.

Switchboard Attendant

APPPLICATIONS are invited from suitable applicants for the position of Switchboard Attendant in the Corporation's Selected Power Station. Applicants must have had a good general education and suitable experience in a power station or similar class of work.

The salary will be in accordance with N.J.B. conditions, commencing at £327 per annum, rising to £338 per annum. Applications, stating age, education and experience, should be addressed to the undersigned not later than Sept. 7, 1946.

G. V. HARRAP, A.M.I.E.E., M.I.I.A.,
General Manager and Engineer.
17, Harmer St.,
Gravesend, Kent.
21st August, 1946. 2293

UNIVERSITY OF BIRMINGHAM

Faculty of Science—Chair of Electrical Engineering

THE Council invites applications for the Chair of Electrical Engineering. The stipend offered is £1,650 per annum. It is desired that the applicant should take up his duties as soon as possible, and not later than 1st January, 1947.

Six copies of the application, together with the names of three referees, should be sent before 1st November, 1946, to the undersigned, from whom further particulars may be obtained.

C. G. BURTON,
Secretary.
The University,
Edmund St., Birmingham, 3. 2282

LEEK URBAN DISTRICT COUNCIL

Appointment of Electrical Engineer and Manager

APPPLICATIONS are invited from fully-qualified Electrical Engineers for the above appointment. The salary will be in accordance with the National Agreement, 85% of this salary will be paid in the first year, 92½% in the second year, and the full salary, on present output, £224 per annum, from the commencement of the third year.

Applicants must be corporate members of the Institution of Electrical Engineers, and have a thorough knowledge and experience of high tension and low tension underground and overhead distribution networks, and substations, on both A.C. and D.C. systems, and must be conversant with the administration of an electricity undertaking. Preference will be given to candidates with experience of changing over from D.C. to A.C. The appointment will be terminable by three months' notice in writing on either side, and will be subject to the Local Government and Other Officers' Superannuation Act, 1937, and to a satisfactory medical examination.

Applications, giving full particulars of age, qualifications, past and present appointments and experience, accompanied by copies of three recent testimonials, must be received by the undersigned not later than 10th September, 1946. Envelopes should be endorsed "Electrical Engineer." Canvassing will disqualify.

S. F. ESLAND,
Clerk of the Council.
Town Hall, Leek.
23rd August, 1946. 2312

COUNTY BOROUGH OF PRESTON ELECTRICITY DEPARTMENT

Mains Engineer (Second Advertisement)

APPPLICATIONS are invited for the above position from suitably qualified Engineers. Applicants must have had wide experience in the operation and maintenance of an extensive E.H.T. system of transmission and including 33 kV; experience on a 66-kV system will be an added recommendation. The duties will include the erection of overhead lines and laying of underground cables, also maintenance of the complete transmission and distribution networks.

Applicants must be technically qualified up to at least Higher National Certificate standard, and preference will be given to those who are either corporate or graduate members of the Institution of Electrical Engineers.

Salary and conditions of employment in accordance with the National Joint Board Schedule, Class J, Grade 4 (at present £713, rising to £744 per annum).

Applications, stating age and giving full particulars of technical qualifications, training and experience, accompanied by not more than three testimonials, and appropriately endorsed "Mains Engineer," must be received by the undersigned not later than Saturday, 14th September, 1946.

G. A. ROBERTSON, M.Sc.Tech., M.I.E.E.,
M.I.Mech.E.,
40 & 41, Lune Street, Borough Electrical Engineer.
Preston.
24th August, 1946. 2313

COUNTY BOROUGH OF SOUTHPORT ELECTRICITY DEPARTMENT

Appointment of Lady Demonstrator

APPPLICATIONS are invited for the appointment of a Lady Demonstrator in the Electricity Department at a salary in accordance with the National Scale of salaries (£252-£288, plus war bonus, at present £48 2s. per annum).

Applicants should be over the age of 21 years and must have had a good general education, and hold a recognised Diploma in Domestic Science and/or the E.A.W. Electrical Housecraft Diploma. Applicants must be competent to arrange and conduct lectures and cookery demonstrations, and advise on the selection and use of electrical appliances of all types.

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

Forms of Application may be obtained from the Borough Electrical Engineer, 188, Lord Street, Southport, to whom they should be returned not later than Saturday, 14th September, 1946, in an envelope endorsed "Lady Demonstrator."

R. EDGAR PERRINS,
Town Clerk.
Town Hall, Southport.
23rd August, 1946. 2317

THE SUSSEX ELECTRICITY SUPPLY COMPANY LIMITED, LITTLEHAMPTON

Mains Assistant

APPPLICATIONS are invited for the above position from Engineers with the necessary qualifications. Practical experience in E.H.T. and L.T. overhead and underground distribution and substations, including erection, maintenance, fault location, control and organisation of labour is required. Minimum technical qualification, higher National Certificate, Graduate I.E.E. preferred. Salary in accordance with N.J.B. Schedule, Class B, Grade 7/4 first year, rising to Grade 8 after two years' satisfactory service. Pension scheme and other benefits.

Applications, stating age, training and experience, together with copies of recent testimonials and endorsed "Mains Assistant," should be forwarded to "Silverlands," 37, Alexandra Road, Epsom, Surrey, not later than September 7th. Interviews will be arranged in London for September 17th, 1946. 2342

MID-LINCOLNSHIRE ELECTRIC SUPPLY CO. LTD.

Overhead Linesmen

APPPLICATIONS are invited for the position of Overhead Linesmen. Applicants must have had experience in the erection of H.T. and L.T. overhead lines and rural type substations. Conditions of service and rate of pay in accordance with Schedule for District Council No. 7, East Midland Area, at present 2s. 3d. per hour per 47-hour week. The successful applicants will be required to participate in the Company's Superannuation Scheme. Applications in writing, stating age, details of previous experience and accompanied with copies of recent testimonials, should be addressed to the Constructional Engineer, Mid-Lincolnshire Electric Supply Co. Ltd., North House, Grantham, not later than 14th September. 2338

CITY OF LONDON ELECTRIC LIGHTING CO. LTD.

Junior Draughtsman

APPPLICATIONS are invited for the position of a Junior Draughtsman in the Distribution Department of the above Undertaking. Applicants must have been trained as Draughtsmen and have experience in a Drawing Office of an Electrical Undertaking. Electrical qualifications will be an advantage. Salary according to age and qualifications. Applications, giving full particulars, to be sent to the undersigned not later than September 12th.

G. H. FOWLER, M.I.E.E., Distribution Supt.

Falcon House, Aldersgate St., London, E.C.1. 2244

ESSEX EDUCATION COMMITTEE

ELECTRICAL Maintenance Fitters required, one in each of the five Divisions of Essex, to carry out maintenance and running repairs of school canteen equipment.

Applicants must have served an apprenticeship with a recognised firm of electrical contractors. Preference will be given to applicants who have had experience in maintaining and repairing modern refrigerating plants.

Wages according to appropriate trade union scales of pay for the district. Service van provided.

Further particulars obtainable from the Chief Education Officer, County Offices, Chelmsford. 2318

AN Experienced Technical Writer required by a London company for the preparation of advertisements, catalogues and operating manuals for industrial and scientific equipment concerned with instruments, electronics and physical apparatus. Applicants should have the requisite technical background and be capable of handling the firm's publicity work, but applications are invited from young men who, otherwise suitable, could assume fuller responsibility for the latter duty after experience with the company. A permanent and progressive post offering excellent opportunities for a first-class man. Apply, giving full details of experience, qualifications, salary expectations, etc., to—Box 2254, c/o The Electrical Review.

ARMATURE Winders and Improvers required. A.C. and D.C. top rates, good working conditions—Electrical Power Repairs (Gillingham) Ltd., Strover Street, Gillingham, Kent. 9365

ARMATURE Winders and Improvers wanted for general electrical work. A.C. and D.C. top rates.—Phillips & Sons Electrical Ltd., 40, Waterford Road, S.W.6. 9496

A number of vacancies exist in established telephone manufacturing and operating co. in South America for experienced Apparatus and Equipment Engineers. Adequate salary offered for minimum of 8 yrs. experience, with age limits 25-35. Interviews arranged in London by appointment. Write in confidence, in first instance, giving full details of qualifications and experience, and stating salary required, to—Box D.6042, A.K. Advgt., 212a, Shaftesbury Avenue, W.C.2. 2290

APPICATIONS are invited for the position of Winding Shop Foreman with a progressive electrical engineering firm in East London specialising in motor repairs of all sizes, both A.C. and D.C. Applicants must have wide experience in, and be fully conversant with, the following: (a) Taking particulars of windings and obtaining former sizes; (b) Methods and materials for insulating; (c) Armature and stator winding of all sizes; (d) Coil winding of all sizes, including heavy bare strip; (e) Shop organization, rate fixing and control of mixed labour. Applicants should state age, qualifications and experience, and if selected for interview their travelling expenses will be refunded. Apply—Box 2278, c/o The Electrical Review.

ASSISTANT Foreman for winding department. A.C. D.C. Motors, fractional to 500 h.p. Permanent progressive position to suitable applicant.—Higgs Motors, Witton, Birmingham. 106

BRITISH Electrical and Allied Industries Research Association. Electricity Supply Research. The Electrical Research Association requires one or two Technical Assistants for research into problems of electricity distribution, e.g., load characteristics of consumers and groups of consumers, determination of costs of supply, etc. Salary £350-£450 exclusive of cost-of-living bonus (Whitley Code) and superannuation (F.S.S.T.) according to qualifications and experience. Candidates should have some practical experience in electricity supply. Applications should be made to the Director, E.R.A., 15, Savoy Street, London, W.C.2. 2232

BUYER for electrical mfg. cov. must be energetic and capable of maintaining first-class chasing system. Permanent progressive position. State age, salary, and include testimonials.—Box 2137, c/o The Electrical Review.

CABLE manufacturers require keen man about 24 to 35 at head office in London. Trade association and legal experience of advantage. Prospects for right man. Pension scheme. Applications will be treated in strict confidence. Write full particulars and salary required.—Box 2275, c/o The Electrical Review.

CHIEF Draughtsman required for drawing office staff of six products: electrical motors, generators, rotary transformers, motor alternators up to 10 kW, all frequencies, all voltages, including high tension. Salary according to ability, south-east London district. Reply stating experience, technical training and salary required to—Box 2309, c/o The Electrical Review.

CHIEF Progress Engineer required by firm of electric motor manufacturers, London dist. State experience and salary required.—Box 2084, c/o The Electrical Review.

CLERICAL Assistant required for stores office. Must have good knowledge of electrical material.—London Electrical Co., 92, Blackfriars Road, S.E.1. 104

CONTROL Gear Manufacturers, near London, require young engineers for estimating and technical work.—Box 9458, c/o The Electrical Review.

DRAUGHTSMAN required by manufacturers of Electric Motors in London area. Good prospects for suitable man.—Box 2316, c/o The Electrical Review.

DRAUGHTSMAN required for switchgear contract work on Cubicle and Flat Back types of A.C. and D.C. Switchboards. Full particulars of experience, technical training and salary required to—Erskine, Heap & Co. Ltd., Lancashire Switchgear Works, Manchester 7. 2339

DRAUGHTSMAN wanted, experience in transformers, promising position for versatile young man. Apply, stating age, experience, salary required, to—Brentford Transformers Ltd., Windmill Rd., Brentford, Middx. 2255

DRAUGHTSMEN (Electrical), experienced in design and layout of power and substations, H.T. and L.T. distribution systems, factory equipment and lighting connected with gas and chemical plants, required by North-East Coast engineering company. Apply—Box 2300, c/o The Electrical Review.

DRAUGHTSMEN required by switchgear engineers. Experienced in contract work, protective gear diagrams or design. Applications in writing, with full particulars, to—Ferguson, Pailin Ltd., Manchester, 11. 86

ELECTRIC Motor Repairs, Winding, etc., Foreman required for small repair shop, London district. Partnership basis could be considered.—Box 2233, c/o The Electrical Review.

ELECTRICAL and radio wholesalers, large staff and turnover. E.W.F. require as Sales Manager man of ability, personality, with wholesale experience. Permanent, remunerative and progressive post. Midland connection and domicile preferred. Letters—F. Westerman (Wholesale) Ltd., 94, Dale End, Birmingham, 4. 9486

ELECTRICAL Engineer, age not over 35, required for large modern industrial plant in West Africa. Must be qualified technically and practically in the installation, operation and maintenance of industrial generating plant, switchgear, transmission and distribution equipment, all types of electric motors, factory, office and household appliances and wiring. Salary from £700 per annum, separation and children's allowances married men. Tours of 21 months' duration, free passages, furnished quarters, membership to pension fund. Apply, giving full particulars of training and experience, to—Box 1280, c/o Charles Barker & Sons Ltd., 31, Budge Row, London, E.C.4. 2247

ELECTRICAL Engineer, preferably with experience of cable work, required for the technical control of cable contracts. Vacancy is in the West London area. Salary offered is from £400 to £600 per annum, depending on experience and qualifications. Write—Box 2797, c/o White's Ltd., 72, Fleet Street, E.C.4. 2260

ELECTRICAL Engineer required for North East Coast iron and steel works. Must be experienced in maintenance and/or production of heavy electric equipment; should also be capable of planning for development of plant. Apply, stating age, experience, technical qualifications and salary required, to—Box 2214, c/o The Electrical Review.

ELECTRICAL Fitters required for general overhaul work on all types of electrical plant for large repair shop in London area. Only men with previous experience need apply. E.T.U. rates and conditions. Write, stating age, experience, to—Box 2030, c/o The Electrical Review.

ELECTRICIAN. Must be good at power and used to automatic control. Also Armature Winder for repair shop.—Boys Ltd., 187, Goswell Road, E.C.1. 2060

ELECTRICIANS at N.F.E.A. "B" or D.J.I.C. No. 8 rates required in East Anglia. Only fully qualified men need apply to—The East Anglian Electric Supply Co. Ltd., Finborough Hall, Stowmarket. 2280

ENGINEERS and Draughtsmen are invited to apply to a large electrical engineering firm in the Midlands which has vacancies in the switchgear department for Technical Sales, Contract, Costing and Design Engineers; also experienced Technical Engineers capable of handling large projects for generation, transmission and distribution. Vacancies also exist for Draughtsmen for circuit diagram and general work.—Box 69, c/o The Electrical Review.

ESTIMATORS required. Age 25 to 40, with experience on small electro-mechanical parts. Preference will be given to applicants with workshop experience and knowledge of finishing and assembly departments. West London area. Write, stating age, fullest details of experience and salary required, to—Box 2236, c/o The Electrical Review.

EXPERIENCED man required for battery service station, used to lead burning and replating of car and house lighting batteries. Replies to—Box 2253, c/o The Electrical Review.

FIRM in London area require several Senior Draughtsmen for their transformer dept. Experience on large high-voltage units an advantage but not essential. Very good salary and excellent prospects to suitable men. State age and experience.—Box 2052, c/o The Electrical Review.

FOREMEN, Heavy Electrical Power, for factories in the Isle of Wight, Hove and Preston areas, experienced and capable of taking complete charge for augmented supplies, 400 kVA and upwards.—Box 9380, c/o The Electrical Review.

FOREMEN wanted to take charge of footmaking, sealing-in, pumping and capping, by firm in N.W. London. Good prospects. Write, giving full details of experience and qualifications, to—Box 2298, c/o The Electrical Review.

IMPERIAL Chemical Industries Ltd. Applications are invited for the position of Shift Charge Engineer in the company's power stations in Runcorn and Widnes. Applicants, who should not be less than 33 years or more than 45 years of age, must have had a sound practical and technical training in mechanical engineering and good experience of the shift operation of modern steam power station equipment, including turbo alternators and water tube boilers of not less than 10,000 kW and 50,000 lbs. steam/hour capacity respectively. Generous commencing salary. Applications, which must give the applicant's date of birth and full details of qualifications and experience, including a list in chronological order of posts held, should be addressed to—Staff Manager, Imperial Chemical Industries Ltd., General Chemicals Division, Cunard Building, Liverpool, 3. 2239

INSPECTOR required by manufacturers of small and medium size A.C. Motors in London area. Sound knowledge of testing and detail inspection essential. Good prospects for suitable man.—Box 2315, c/o The Electrical Review.

ISTRUMENT Makers and Service Engineers required for Mechanical and Electrical Instruments used in connection with the testing of Aero Engines and general industrial plant. Please state general training, experience, position and salary, and forward any inquiry to The Employment Manager, Messrs. Rolls-Royce Limited, Derby. 2337

JUNIOR Draughtsman required. Experience in detailing small mechanical mass-produced components. Interesting work and good prospects for suitable applicant.—"Diamond H" Switches Ltd., Gunnersbury Avenue, London, W.4. 2245

LADY Tracers, light electro-mechanical engineering work, Wembley district. Apply, giving age, experience and wages required, to—Siemens & General Electric Railway Signal Co. Ltd., East Lane, Wembley. 2249

LEADING domestic appliance manufacturers urgently require commission only Representatives covering the following counties: Bedfordshire, Essex, Huntingdonshire, Cambridgeshire, Norfolk and Suffolk. Full particulars to—Box 2182, c/o The Electrical Review.

LEADING Sound and Cinema Equipment Company requires Sales Representatives in London, Cardiff, Bristol, Birmingham and Newcastle districts. Applicants should give full details sales experience past ten years and possess car. Good salary and commission.—Box 2322, c/o The Electrical Review.

LONDON Patent Agents require Assistant with good knowledge of electrical engineering, preferably a graduate. Previous Patent experience essential. Write stating salary required and previous experience to—Box 2328, c/o The Electrical Review.

MAN aged 20 to 25 years, with B.Sc. (Engineering) or Higher National Certificate in Electrical Engineering required for investigation and testing of high voltage power cables and accessories. Salary £300 to £400 according to qualifications.—Apply Staff Officer, British Insulated Callender's Cables Ltd., Belvedere, Kent, quoting Ref. SR/3. 2121

MAN, under 30, with B.Sc. in Physics or Engineering or Higher National Certificate in Electrical Engineering, with specialised knowledge of electronics, required for investigation and test of power cables and accessories. Write, stating qualifications and salary required, to—Staff Officer, British Insulated Callender's Cables Ltd., Belvedere, Kent. 2033

MICHELIN Tyre Co. Ltd., Stoke-on-Trent, require Senior Draughtsman with good experience of installation electric machines, cables, switchgear, L.T. and H.T. Minimum qualification, Ordinary National Certificate, Electrical. Write Labour Office in confidence, stating salary required for 44-hour week. 2302

PUMBER-Jointer, F.H.T., required in East Anglia. Apply—East Anglian Electric Supply Co. Ltd. (L.R.S.), Finborough Hall, Stowmarket. 2291

POWER Plant Superintendent required for large Birmingham industrial concern to take charge of operation and maintenance of back pressure turbines, large water tube boilers, ancillary plant and steam services. Must be technically qualified (membership of Institution of Mechanical Engineers and/or Institute of Fuel desirable) and have had sound practical experience in order to operate and maintain plant at highest efficiency. A house is provided at nominal rent. Annual remuneration approx. £475.—Box 2033, c/o The Electrical Review.

PRODUCTION Manager required for London factory all stages of production, particularly low voltage lamps of all types. Must be able to take full control. Please write full details of experience and salary required.—Box 2185, c/o The Electrical Review.

PRODUCTION Superintendent required with extensive experience in the manufacture of electrolytic condensers. Write, stating age, experience and salary required, to—Box 2267, c/o The Electrical Review.

PURCHASING Assistant required by electrical engineering and sound equipment firm, London area. Previous similar experience preferable. Post entails a certain amount of routine work as well as technical commercial correspondence and negotiation with suppliers. Commencing salary £300 to £340 per annum, according to qualifications. Apply stating age, education and experience to—Box 2257, c/o The Electrical Review.

REPRESENTATIVE required by high-class manufacturers of shafts and table lamps for Yorkshire and North Midlands. Must be first-class salesman, good connection with electricians, electrical contractors and electricity undertakings. Car essential. Remunerative position for able man. Reply—Box 9487, c/o The Electrical Review.

REQUIRED, Confidential Secretary to directors of old-established firm of electrical contractors, Southern Counties.—Box 2279, c/o The Electrical Review.

REQUIRED for service in India, Technical Assistant for the head office of a company controlling a group of electricity undertakings. Must possess sound technical training in electrical engineering and subjects connected with thermal power stations, A.C. and D.C. systems, F.H.T. and L.T. supplies. Extensive practical experience an essential qualification. Salary according to qualifications, 5 years' agreement, home leave with pay on renewal, provident fund, free medical attention. Write, with full particulars, to—Box 1278, c/o Charles Barker & Sons Ltd., 31, Budge Row, London, E.C.4. 2249

REQUIRED for supervisory posts in Birmingham, Glasgow and Cardiff. Engineers to control small staff engaged on installation and maintenance of high grade electronic and light electro-mechanical equipment throughout branch office area. Applications invited from men with practical experience, sound electro-technical training, good education and personality. Salary approximately £550 per annum, plus car allowance and expenses. Two months' training given in London, with salary, plus living allowance by arrangement. Write full details, stating age, training, experience and when available.—Box 2083, c/o The Electrical Review.

SALES Engineer for transformer company. Young man with connections in the industry, good education and technical training to enlarge and build up existing sales connections of important special type equipment. Write, stating age, experience, salary required, to—Brentford Transformers Ltd., Windmill Rd., Brentford, Middx. 2257

SALES Organiser wanted by established contractors. East Midlands area to take complete charge to develop sales and service in industrial and domestic field. Only applicants with previous experience and accustomed to dealing with suppliers need apply. Write, giving full particulars, stating salary or commission required.—Box 2324, c/o The Electrical Review.

SALES Representative required by manufacturers' agents for Oxon and Berks. Salary and commission. Car essential.—Box 9491, c/o The Electrical Review.

SALES Representative with experience required by large manufacturer for north-west area, specialising in electric cookers, water heaters, kindred appliances. Preference given to applicants having established connections in this area.—Box 2270, c/o The Electrical Review.

SECRETARY—Accountant, male or female, for electrical mfg. cov. employing 200/250, capable and energetic. Permanent progressive position to suitable applicant. State age, salary and include testimonials.—Box 2135, c/o The Electrical Review.

SENIOR Draughtsman required for large variety of rotating electrical machines of small and medium size. State age, experience and salary required.—V. Mackie & Co. Ltd., 129, Lambeth Road, London, S.E.1. 2310

SHOWROOM Assistant required at Weybridge. Commencing salary £255 per annum plus war bonus at the rate of £59 16s. per annum. Applicants should have had previous experience and be able to arrange showroom displays. Full conditions of service and duties can be obtained on application to—Area Officer (Consumers), London and Home Counties Joint Electricity Authority, Burford, Dorking, Surrey. 9508

STATION Engineer capable of designing, erecting and running 500-kVA steam generating station in Devonshire. Permanent position. Write—Wilson, Branscombe, Highweek, Newton Abbot, Devon. 2162

STOREKEEPER for electrical mfg. cov., must be competent to take complete charge and maintain records. Permanent progressive position. State age, salary and include particulars of previous positions.—Box 2136, c/o The Electrical Review.

SURVEYORS and Engineers with field experience of H.V. and L.V. overhead lines required by firm of electrical contractors for work in Scotland. Good wages and prospects for energetic men. Write, giving full details of experience, age, etc., with copies of testimonials, and state when free, to—Box 2170, c/o The Electrical Review.

TECHNICAL Laboratory Assistant required. Qualifications to Higher National standard in electrical engineering; to take charge of small testing and development laboratory dealing with thermostats, switches and domestic electrical accessories.—"Diamond H" Switches Ltd., Gungahsbury Avenue, London, W.4. 2246

TRANSFORMER Contracts Engineer for inside work. Used to dealing with enquiries and orders up to 3,000 kVA. Write, stating age, experience and salary required, to—The Personnel Officer, Foster Transformers & Switchgear Ltd., Apex Works, South Wimbledon, S.W.19. 2292

TECHNICAL Sales Representative required by a firm of Electrical Engineers for Bombay/Calcutta. Candidates preferred single, not over 35 years, and of good education. Good experience in electrical engineering essential, some sales experience, and ability to estimate for lighting, lift and fan installations, and supervise erection. Salary £630 p.a., annual increments £45. Initial agreement 4 years, passages paid. Reply in writing, giving full details of experience and present employment to Ministry of Labour and National Service, London Appointments Office, 1-6, Tavistock Square, London, W.C.1. Reference F.A. 530. 2326

THE Salcombe Gas & Electricity Co. Ltd. Joiner/Linesman required immediately, D.J.I.C. conditions, No. 12 Area, single man essential. Applications, giving age and experience, to be addressed to—"Silverlands," 37, Alexandra Road, Epsom, Surrey. No interviews except by appointment. 2209

TIME Study Engineer or Ratefixer, with experience of light electrical and/or radio assembly work and small machined parts. Good prospects for a keen, energetic man. Slough district. Write, giving full details of training and experience and state age and salary required, to—Box 2264, c/o The Electrical Review.

TRANSFORMER Design Engineer required by progressive firm manufacturing all types of transformers up to 1,000 kVA. Write, stating age, experience, salary required, to—Brentford Transformers Ltd., Windmill Rd., Brentford, Middx. 2256

URGENTLY required, Electrical Testers with experience of testing A.C. and D.C. machines, also transformers. Applicants should possess technical knowledge equivalent to Ordinary National Certificate. Apply, stating age, experience and details of technical training, to—Superintendent, Personnel Dept., British Thomson-Houston Co. Ltd., Rugby. 2063

WANTED by well-known firm in Bedfordshire manufacturing fractional h.p. motors. Designers whose responsibilities will include new designs, issuing windings and all technical data. Applicants must have up-to-date experience in A.C., D.C. and universal types, being fully conversant with present-day requirements. Apply—Box 2281, c/o The Electrical Review.

WANTED, experienced Designer/Production Engineer for domestic electric appliances, for small London factory. Write, giving full details of experience and salary required, to—Box No. T.185, c/o Maurice Vernon Ltd., 2, St. Andrew's Hill, London, E.C.4. 2304

WANTED, Live Salesman, by engineering firm in N.W. London. Connection with mechanical and electrical trades essential, including public bodies and supply companies. Details as to salary, etc., to—Box 2253, c/o The Electrical Review.

WELL-established firm of sign manufacturers have a vacancy in their Neon Dept. for an Assistant Estimator. Applicants should be capable of interviewing clients and supervising installation and maintenance work. Permanent and progressive post for suitable man. Apply, stating experience, age and salary required, to—Box 2036, c/o The Electrical Review.

WELL-known Electrical Engineering Company have vacancies for suitable lads, over 16 years of age, with matriculation or general school certificate, for apprenticeship in the above industry. Good rates of pay and living accommodation provided.—Box 101, c/o The Electrical Review.

WORKING Charge Hand required for electrical installation work, large and small contracts. Must be adaptable. Permanent position for right man, with paid holidays. South London district.—Box 9468, c/o The Electrical Review.

YOUNG Electrical Engineer required for South Africa, with experience in neon sign and fluorescent lighting manufacture and installation.—Box 2251, c/o The Electrical Review.

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.

BRIGHTON Corporation—Shift Charge Engineer; Rochdale County Borough—Second Asst. Mains Engineer and Asst. Meter Engineer. All applicants are thanked.

SITUATIONS WANTED

ACCOUNTANT seeks position. Experienced in all books of account and preparation of final figures, management, staff control, costings, statistics, general correspondence and all office routine.—Box 9394, c/o The Electrical Review.

A Director of Sales.—See "A Sales Organisation" under "Agencies" column on page 70.

A position with a future required by ex-Flight-Lieutenant, experienced sales manager and buyer in the electrical trade.—Box 9438, c/o The Electrical Review.

A ACCOUNTANT-Secretary, 37, 14 years' experience electricity supply industry, England and abroad, requires position with progressive concern.—Box 9439, c/o The Electrical Review.

A DVERTISER (32) seeks position as Technical Sales Representative. Administrative and technical experience in manufacture, design, production, costing, etc., of small motors and associated equipment.—Box 9404, c/o The Electrical Review.

A DVERTISER (50), Buyer, stock control, costing, first-class commercial background and organizer, experience all types of electrical supplies and accessories, machine and small tools, metals, steam fittings, available at early date.—Box 9478, c/o The Electrical Review.

A M.I.E.E., A.M.I.Mech.E., age 32, 13 yrs.' experience in design, manufacture and application of electric motors, and in the workshop management of maintenance of diverse mech. and elec. plant, seeks responsible post, home or Dominions, on plant maintenance, works production or technical sales. Available immediately.—Box 9494, c/o The Electrical Review.

A M.I.E.E., age 32, ex-B.T.H. Willenden apprentice, experienced supervising installation, testing and maintenance electrical industrial installations and distribution, seeks progressive appointment.—Box 9470, c/o The Electrical Review.

A M.I.E.E. (41), ind. app., experienced O.H. and U.G. distribution systems, power stations. Practical, technical and commercial experience electricity undertakings. Situation desired overseas.—Box 9476, c/o The Electrical Review.

A SSISTANT Chief Ratefixer and Time Study Engineer, mass production chokes to 45,000 kVA, transformers, f.b.p. motors to 50,000 kW, turbo-alternators, cores, windings, assembly, fitting, etc., costing, estimating, latest time methods and procedure, present position last 10 years, after apprenticeship and practical experience, age 37, seeks change, chief or managerial.—Box 9399, c/o The Electrical Review.

A SSOCIATE I.E.E., age 46, 5 years' charge factory maintenance and installation, seeks post Coventry area.—Box 9501, c/o The Electrical Review.

C ABLE Foreman seeks progressive position, 20 years' experience all types and processes of rubber cable manufacture.—Box 9414, c/o The Electrical Review.

C HARTERED Electrical Engineer (39), design, technical sales and consulting experience motors, control gear, transformers and instruments, invites enquiries re senior executive post, London area or Home Counties. Knowledge of marine, mining and industrial markets. Willing to undertake representation.—Box 9424, c/o The Electrical Review.

C HARTERED Electrical Engineer, 42, seeks post, electrical and radio equipments.—Box 9423, c/o The Electrical Review.

C OMMUNICATIONS Specialist, just demobbed after 3½ years' commissioned service in Electrical branch, R.N.V.R., requires job in which 17 years' wide experience this field will be used to best advantage. Experience includes development work on, and installation, operation and maintenance of, marine and aircraft W/T, R/T and D/F gear; high-speed line telegraphy (Creed perforators, column printers, etc.); teleprinters; picture telegraphy equipment; auto telephone and carrier telephone circuits; Asdic, Radar and pulse transmission techniques; modulated light comm. systems. Holds current 1st Class P.M.G. Certificate and prefers unusual job abroad, Age 34. Minimum salary £600 p.a.—Box 9504, c/o The Electrical Review.

D F.H. (Hons.), A.M.I.E.E., A.I.Mech.E., age 33, 4 years design, construction and maintenance H.T. and L.T. rural supply systems, 5½ years in Government research establishment on design of aerial rotation systems and other electro-mechanical problems in connection with Radar Stations; some radio research work, with experience in pulse and C.W. techniques, seeks permanent and progressive post, London area preferred.—Box 9408, c/o The Electrical Review.

D RAUGHTSMAN-Designer, experienced electrical heating design, requires a position in Swansea area.—Box 9499, c/o The Electrical Review.

E LECTRICAL Engineer, requiring change of employment, seeks progressive and responsible post, preferably in South or South-west England. Wide experience in installation and maintenance. Good worker.—Box 9435, c/o The Electrical Review.

E LECTRICAL and Plastics Engineer, who held the post of chief engineer for many years in an electrical engineering firm and later in a plastics firm, and who is a well-known writer of technical articles on electrical and plastic subjects, requires post as Sales Manager or Assistant Sales Manager, or Publicity Manager. Write to—Box 9477, c/o The Electrical Review.

E LECTRICAL Engineer, A.I.E.E., M.A.S.E.E., 25 years electrical contracting, seeks position, state requirements. Box 9506, c/o The Electrical Review.

E LECTRICAL Engineer seeks position, thoroughly qualified practical and technical, power and lighting A.C. and D.C. layouts, over 30 years' experience, highest testimonials, age 53, supervisory position preferred.—Box 9415, c/o The Electrical Review.

E LECTRICAL Engineer, age 26, Graduate I.E.E., good technical and practical experience, desires progressive post offering work of design or engineering nature in connection with A.C. and D.C. equipments. Services available one month's time. West Midland area preferred.—Box 9485, c/o The Electrical Review.

E LECTRICAL Engineer (25), Grad.I.E.E., Grad.I.Ec.E., etc., Lower and Higher National Certificates Electrical and Mechanical Engineering, Author of articles, papers, etc., part-time technical lecturer seeks technical and/or commercial sales position in Dublin. Would travel for a British firm.—Box 9505, c/o The Electrical Review.

E LECTRICIAN Supervisor (43), at present own business as contractor, exp. all branches electrical installation work, estimating, costing, correspondence, as well as practical exp., seeks progressive position as Representative, sales and service, or with factor. Own car.—Box 9469, c/o The Electrical Review.

E LECTRICIAN, capable, long experience installation and maintenance, seeks advantageous change, S.W. London, N. Surrey areas.—Box 9464, c/o The Electrical Review.

E LECTRICIAN wants job anywhere, 30 yrs. in trade, all systems, charge or otherwise.—B, 13, South Vale, S.E.19. 9427

E NGINEER, age 41, practical experience covers most aspects electricity supply work and organization. Specialised knowledge tariffs measurements, relays, H.V. and general testing techniques applied over a wide field: A.M.I.E.E., versatile, adaptable, desires change, moderate salary.—Box 9426, c/o The Electrical Review.

E X-Arm. Art. R.E.M.E., experienced all types of installations and A.C./D.C. machines, requires position as Maintenance Electrician, London area.—Box 9475, c/o The Electrical Review.

E XPERIENCE counts. Estimating, supervising, specifications, schemes for complete installations, introduce new business, make contracts pay, good salesman, would represent good firm, age 48, own car, London or Home Counties.—Box 9429, c/o The Electrical Review.

E X-R.A.F. Accounts seeks position in costing. Pre-war exp. book-keeping, gen. acting, & costing. Mod. sal. W. London area preferred. Apply—Box 9490, c/o The Electrical Review.

F OREMAN seeks situation. Long exp. production and assembly of elec. apparatus and control and training of male and female labour.—Box 9473, c/o The Electrical Review.

G ENERAL Manager seeks an appointment with electrical engineering firm where wide knowledge of the electrical industry can be fruitfully employed. Works, commercial and sales experience gained at two of the largest organizations in the country. Products covered include: motors, transformers, switchgear, bakelite accessories, lighting units, cables, electric cookers and domestic appliances, generally. Capable organizer and staff controller.—Box 9433, c/o The Electrical Review.

G RAD.I.E.E. (28), excellent academic record, apprenticeship, experienced works, test, contracts, D.O. on general elect. eqpt. and installations, seeks post on Tyneside.—Box 9493, c/o The Electrical Review.

I F the Chief Electrical Engineer in charge of a selected station in South-East England could utilise the services of a qualified cost accountant (39), with eighteen years' public utilities experience, would he care to write—Box 9507, c/o The Electrical Review.

I NDUSTRIAL Electronic Designer seeks responsible post.—Box 9442, c/o The Electrical Review.

K EEN Electrical Engineer (21), disengaged Oct., desires progressive position; having H.N.C. and served an indentured apprenticeship.—Box 9444, c/o The Electrical Review.

L IVERPOOL district, Electrical Engineer with technical and extended commercial experience desires occupation with manufacturers, contractors or others. Experienced estimator familiar with markets.—Box 9462, c/o The Electrical Review.

MANUFACTURERS' Agent desires to represent a Manufacturer, in the Midland Counties, a good long established connection in the wholesale electrical and radio trade, remuneration by commission, use own car.—Box 9410, c/o The Electrical Review.

NAVAL Officer (Electrical Branch), aged 32, desires situation of trust and responsibility. Over 5 years' Commissioned Service, 2 years teaching R.A.F. Electrical School. Released 30th September.—Box 9463, c/o The Electrical Review.

PLUMBER-Joiner, first-class experience all L.T. and E.H.T. cables, station equipments, supervision.—Box 9472, c/o The Electrical Review.

PURCHASING Manager, Gentleman with many years' experience buying all classes of materials for the engineering trade, both electrical and mechanical, desires post in London area. Excellent knowledge of all requirements both non-ferrous and ferrous materials, electrical components, etc., etc. Salary at present £650 per year and would accept same to commence. Age 49 years. Reply to—Box 9489, c/o The Electrical Review.

SALES Manager, 26 yrs. formerly cont. agent, wide exp. tech. and pract., good correspondent, typist (own machine), whole or part time, London area. Nom. remuneration.—Box 9386, c/o The Electrical Review.

STOCK record, stores control, buying and general office experience, transformer manufacture with sound knowledge of component materials, aged 36, desires change.—Box 9413, c/o The Electrical Review.

SWITCHGEAR Engineer, B.Sc., 20 Years' technical and commercial experience, tenders and contracts, good connection, desires post with manufacturer or consultant.—Box 9406, c/o The Electrical Review.

TECHNICAL Sales, F.H.P. Motors. Young man (24). 9 years' experience small motors, seeks position, home or overseas.—Box 9393, c/o The Electrical Review.

TRANSMISSION Telephone Engineer, 11 years installing carrier and audio equipment, 3 years test and inspection same. Own car. Midlands preferred.—Box 9492, c/o The Electrical Review.

WORKS Manager requires similar position London area. 25 yrs. production experience light electro-mechanical industry, radio, television, radar, domestic appliances. Efficient organizer and administrator. Excellent references.—Box 9379, c/o The Electrical Review.

YOUNG Electrical Eng. (22 yrs.) desires change. H.N. Cert. std., 2 yrs. laboratory experience, including development of aircraft electrical equipment.—Box 9481, 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.

COUNTY BOROUGH OF PRESTON ELECTRICITY UNDERTAKING

THE Electricity Committee of the above Council invites tenders for the purchase and removal of the following: One Battery-driven Locomotive; make, English Electric Co. Ltd., No. 572, year 1924; weight 2½ tons, gauge 2' 6", wheelbase 3', overall length 9' 4", overall width 4' 0 1/2".

The present battery, which requires renewing, is of 129 amp.-hr. capacity at 5-hr. discharge rate; it is composed of 40 cells with 9 plates per cell—type 1.M.V.4—and was manufactured by the Chloride Battery Company. The approximate h.p. of the motor is 5.

Arrangements for inspection can be made on application to the undersigned, to whom tenders, in plain sealed envelopes endorsed "Sale of Locomotive," should be forwarded not later than Saturday, 14th September, 1946. The Committee does not bind itself to accept the lowest or any tender.

G. A. ROBERTSON,

Borough Electrical Engineer.

40 & 41, Lune St.,

Preston.

24th August, 1946.

2314

BOROUGH OF MORLEY

Sale of Siren

OFFERS are invited for the purchase and removal of one "Cent" 8-h.p. Siren, suitable for operation on 3-phase, 400-volts, 50-cycles system, and complete with main switchfuse and ancillary equipment, situated at the Town Hall, Morley. Inspection may be made by prior arrangement with the undersigned, to whom tenders should be delivered not later than Tuesday, 17th September, 1946.

E. V. FINNIGAN,

Town Clerk

Town Hall,
Morley, Yorks.

2319

CITY OF PORTSMOUTH

TENDERS are invited for the purchase and removal of one Westinghouse 50-b.h.p. Direct Current Electric Motor, 900-1,100 r.p.m., in good working order. Forms of tender may be obtained on application to the Contracts and Supplies Section, City Treasurer's Department, 48-51, Clarence Parade, Southsea, and tenders must be delivered to the undersigned in the envelope provided not later than 10 a.m. on Tuesday, 10th September, 1946. The envelope must not bear any name or mark indicating the sender.

V. BLANCHARD,

City Council Chambers,

1, Clarence Parade, Southsea.

Town Clerk.

2308

CITY AND COUNTY OF KINGSTON-UPON-HULL

THE Electricity Department has for disposal a 4-cylinder Petrol Engine by Dorman's of Stafford, and a 20-kW, 220-volt D.C. compound wound British Westinghouse Generator (850 r.p.m.), which would be suitable for use as a motor.

Further particulars upon application to the General Manager, Electricity Department, Ferensway, Kingston-upon-Hull, to whom offers should be delivered not later than noon, 9th September, 1946, in a plain sealed envelope endorsed "Petrol Generator." 2269

PORTLAND URBAN DISTRICT COUNCIL

THE above Council offer for sale by tender one Low Tension Three-panel Enamelled Slate Switchboard, manufactured by Messrs. Crompton Parkinson Ltd. The switchboard comprises one oil circuit breaker, 4 150-amp. triple-pole knife switches, fuses, meters, etc. Further particulars supplied on request. Tenders in plain sealed envelopes, endorsed "L.T. Switchboard," should be forwarded to the undersigned not later than 8th Sept., 1946.

IVOR G. EVANS,

Electricity Dept.,

Council Offices, Portland, Dorset.

Electrical Engineer.

2240

A. Cookley & Co. Ltd. offer large selection of used Electric Motors, A.C. and D.C. Write—21/25, Tabernacle Street, London, E.C.2 (Monarch 3357/58) 46 number of unused Portable Petrol-driven Welding Sets, suitable for use with electrodes sizes 8 to 12.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 2332

A. C.D.C. Generating Set: input 400/3/50, silver type: output 63 kW, 60 v., 1,000 amps.; on bedplate. Complete.—The Electrolplant Co., Wembley. 2261

A. C. and D.C. House Service Meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one year. Repairs and recalibrations.—The Victa Electrical Co., 47, Battersea High Street, S.W.11. Tel. Battersea 0780. 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 2278-9). 102

A. C. Motors, 1/75th h.p. to 5 h.p., all voltages. Also D.C.—The Johnson Engineering Co., 319, Kennington Road, London, S.E.11. Telephones, Reliance 1412/3. 57

A. ERIAL Wire (covered), 50 ft. for 4d.—Hendon Distributors, 136, Hendon Way, N.W.2. 9445

A. PPROX. 130 unused 8.75-kW Meadows Portable Petrol-driven Generating Sets. Export enquiries invited.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 2329

A. TTRACTIVE weekly offers from The Electrolplant Co., Wembley, Middx. A number of complete Dynamos or Sets, 150 amps.-600 amps., 6/10 v. A number of Alternators from 1½ kVA, 230/1/50, almost new. Many M.G. Sets of various descriptions. Ask for further details. 2262

A. USTIN 7 Van, 1934, new body just fitted, tyres and engine in very good condition. £120.—Middlesex Electron Co. Ltd., Molesey 3541. 9452

B. & W. Water Tube Boilers for disposal. Two 50.000 lbs. per hour, 310 lbs. W.P., together with economisers, etc., erected or F.O.B.—Burford, Taylor & Co. Ltd., Middlesbrough. 85

B. ARLOW Whitney, Type B0643, Electrical Industrial Oven, 400/415 v., 3-phase, fitted 4" Cambridge control, range 100/160 deg. F., with relay oven fitted 6 trays. For disposal, price £250. Write—Box 2289, c/o The Electrical Review.

B. ATTERY Chargers for home and export, 4 models, 2-6-12 v., 1, 2 or 4 amp. D.C., any mains voltage. Generous trade terms. Write for catalogue.—The Banner Electric Co. Ltd., Hoddesdon, Herts. Tel.: Hoddesdon 2659. 97

B. T.A. A comprehensive service is now available for all classes of tools and equipment for the accumulator trade.—B.T.A., 246 Cavendish Road, London, S.W.12. Tel.: Balham 6691/2. 92

BEEANTEE Festoon Striplight Holders, made of X20 Bakelite, for use with 7/029 T.T.R. cable, require no tools or screws for wiring. Immediate delivery of any quantity. Passed by the fire authorities. Used by corporations and supply companies all over the world. Large quantities of British made Electric Lamps and Cable always in stock.—The Beantee Illuminations (London) Ltd., Temporary Address, 6, Upper Street, Islington, London, N.1 (Phone, Canonbury 4555). 71

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

CONDENSERS, 21, 38, 146 kVA, 3-phase, 50 cycles, for P.F. correction. 200-amp., 3-phase, B.B. Trunking and accessories, 1,000 gals. Swift Oil L.C. and Armoured Cable, 12 to 30 inch, 3 and 4 core, Oil immersed Sw. Gear, 1,100 amp. to 100 amp., A.C. Starters for Squirrel Cage Motors.—Midland Counties Electrical Engineering Co. Ltd., Grice Street, Spon Lane, West Bromwich. 88

CONTROL Panel for two Electric Furnaces, with switchgear, new, by Wilde-Barfield, fitted with Cambridge instruments and Watford switchgear.—W. H. Sugden Ltd., Glenny Road, Barking, Essex. 240

D.C. Motors, new, 200/230 volts, 1,400 r.p.m., 8 to 314 h.p., also 110 volts, D.C., 21 h.p., several available with starters.—Stewart Thomson & Sons (Ipool) Ltd., Fort Road, Seaford, Liverpool, 21 (Telephone Number, Bottle 2697), or 28, Victoria Street, Westminster, London, S.W.1 (Telephone Number, Abbey 2101). 96

ELECTRIC Cable, unused, on drums, .5, .3, .25 and .2, 3 and 4 core, paper-insulated, lead-covered, steel-tape armoured, for immediate delivery.—I. Lipton, Phenix Works, Lamprell Street, E.3. 90

ELECTRIC Motors and Dynamos. We hold one of the largest stocks of new and secondhand motors. Secondhand machines are thoroughly overhauled. Inspection and tests can be made at our works. For sale or hire. Send your enquiries to—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Phone, 5512-3 Clerkenwell). 13

ELECTRIC Motors, etc. We supply all types and sizes, etc., of electrical machinery. Send your enquiries to Be-Be Engineering, 3, Retreat Close, Kenton, Middx. Wordsworth 4928. 42

ELECTRIC Motors, 1/3 h.p., 3,000 r.p.m., D.C. 110 volts. Also 22 volts. Stock delivery, 26 each.—John Steel, Clyde Mills, Bingley, Yorks. 84

ELECTRIC Welding Plant, Engine and Electric, A.C. driven, 300 amps. output, complete with weather-proof covers.—Box 34, c/o The Electrical Review. 1

ELECTRICITY for Country House. Complete equipment for sale, including 20-h.p. Oil Engine, Electric Generator and Booster Set, Switchboard, Battery and Motors, 200 volts supply, in good running order. Inspection. Apply—Baily, Grundy & Barrett Ltd., Electrical Engineers, Cambridge. 9333

FLUORESCENT Chokes, 80 watt, wax filled, silent in operation. Prompt deliveries.—Micramatic Ltd., Meico Works, Congleton, Cheshire. 73

FLUORESCENT Lighting. Constead Units for sale. Dispenses with all starter gear and gives instantaneous lighting, prevents maintenance worries, each unit guaranteed. Apply—Scemco Ltd., 6/7, Soho Street, London, W.1 (Tel. GER. 2034). 2241

FLUORESCENT Lighting Fittings. Extensive range, including Trough and Flush type, fitted with "All in One" "Constead Unit." Delivery 7 days, with tubes. Write—Scemco Ltd., 6/7, Soho Street, London, W.1. Phone, GER. 2034. 100

FLUORESCENT Lighting: 18"-15 w., 24"-25 w. and 36"-45 w. Fittings, complete with tubes. Colours: White, Warm White, Daylight and Pink.—Scemco Ltd., 6/7, Soho Street, London, W.1 (Tel. GER. 2034). 2242

GEORGE Cohen, Sons & Co. Ltd. for guaranteed Electrical Plant, Motors, Generators, Switchgear, etc.—Wood Lane, London, W.12 (Telephone, Shepherd's Bush 2070) and Stanningley, near Leeds (Telephone, Pudsey 2241). Established 1834. 27

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

IMMERSION Heaters for home and export available middle September. Send enquiries to—Box 9497, c/o The Electrical Review. 83

INSTALLATION Tester, 500 v. Record Minor, £11. From stock.—Robins Electrics, 222 & 222b, West End Lane, N.W.6. 83

INSTRUMENT Makers disposing of large quantity 1 m.m. Sangamo Glass Jewels, immediate delivery ex stock, 10s. per 100. Write—Box 2286, c/o The Electrical Review. 70

JUNCTION Electric Irons, superior design and quality, supplied with suitable stand. Also Junction Nickel-plated Torch Cases. Supplied for home trade and export. Distributors—Brooks & Bohm Ltd., 90, Victoria Street, London, S.W.1. Tel. Vic. 9550. 49

KETTLE Elements, Mica Elements and Spiral, all voltages, all wattages, highest quality, competitive prices. Enquiries to Irish Domestic Electrical Appliances Ltd., 34 South Frd-rick Street, Dublin, Eire. 76

LADDERS, single and extension, from—Ramsay & Sons (Forfar) Ltd., Forfar. 9004

LAMINATIONS, quantity stator and rotors for fractional h.p. motors.—Fosters, Otways Avenue, Ashted, Surrey. 9429

LARGE number of Plating and Anodising Generators, for the most part unused. Send requirements to—Fyle, Wilson & Co. Ltd., Bishop's Stortford (Tel. 1000/1). 2331

LARGE quantity Swedish Iron Laminations ex Trans-formers, sizes from 1" x 30" to 53" x 30".—George Taylor (Clayton) Ltd., 8-10, Oldfield Street, Clayton, Manchester. 9503

LARGE quantity 25-s.w.g. Double Silk-covered Wire, recent manufacture and in perfect condition, also few gauges enamelled available. Instrument Rectifiers, 1 ma. and 5 ma., quantities.—Champion, 43, Uplands Way, London, N.21 (Lab. 4457). 9378

LARGE quantities Screws, Nuts and Washers, 0 BA to 12 BA; also Brass Hexagon Rods, 5/64" to 3" A/F; also Brass Round Rods, 5/32" to 3"; also 4" x 2" x 18 gauge Brass Sheet; also various Brass, Phosphor Bronze and Copper Strips; also 1" x 1/2" and 1 1/16" x 1/2" Copper Bars. For disposal.—Box 2258, c/o The Electrical Review. 1

LARGE range of toasters, fans, portable and wall electric fires, radiators, convactor heaters, floor standard and table lamps, electric irons (heat controlled and others), vacuum cleaners, hair dryers, novelty bowl fires, boiling rings, electric kettles, immersion heaters. (Radios very shortly available.) Large range of torch cases, cycle lamps and all types of lighting and H.T. batteries, etc. Detailed list and catalogues available. Place your orders in good time.—Brooks & Bohm Ltd., 90, Victoria Street, London, S.W.1. Phone, Victoria 9550/41. Inland Telegrams, "Beebats, Sowest, London." 66

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.R.). 18

LONDON Hospital, E.1. For sale, one Ricardo 6-cyl. vertical type Petrol Engine, rated 150 h.p. at 1,000 r.p.m., coupled to one 50-kW, 220-v., 1,000-r.p.m. compound interpole Generator by Crompton Parkinson. Complete with bedplate, four cooling tanks, self starter, shunt regulator, switchgear, pipe connections, etc. Also one Kohler Generating Set, petrol-driven engine developing 2 1/2 h.p. driving generator 110 v., 2 kW, with automatic cut-out and cut-in. All in good working order. Can be seen working by appointment with Surveyor (Bish. 8335). 2248

MOTOR Generator Sets and Convertors, all sizes and voltages from 1/2 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

MOTORISED 1" Bench Drilling Machine, 13 speeds, £12 2s. 6d.—John E. R. Steel, Clyde Mills, Bingley, Phone 1066. 51

NAMPLATES, Engraving, Dieinking, Stencils, Steel Punches.—Stilwell & Sons Ltd., 152, Far Gosford Street, Coventry. 14

ONE each: Everett Edgumbe universal test set A.C./D.C. four scales. Evershed 500-v. "Wee" megger, Evershed megger circuit testing ohmmeter (Type S). Allen growler, Newton magnetiser 600,000 amp-turns, Mann Egerton magneto armature tester, Simms 6-plus test gaps ring type iron bracket, Simms test stand, base only; quantity C.M.I. Co. slip rings in cardboard boxes and brushes for magnetos and car dynamos.—H. Butterworth, 8, Parkstone Avenue, Southsea, Hants. 9500

ONE new 60-kVA, 3-phase, 50 cycles, oil natural cooled indoor type "Yorkshire" Transformer, ratio 10,500/400 volts, delta/star connected, complete with tubular welded boiler plate tank, lifting lugs, oil gauge, drain valve, thermometer pocket, rollers, porcelain insulators on both sides, and the necessary self filling of Transformer Pool Oil. Price £100.—Box 2276, c/o The Electrical Review. 2325

ONE 230-h.p., 730-r.p.m., 400/440-volt, 3-phase, 50-cycle, 3-bearing, slip-ring Motor by "E.C.C." on fabricated base.—Newman Industries Limited, Yale, Bristol. 2325

PETROL Electric Generating Sets, from 120 w. to 1.5 kW new designs, good deliveries.—Arthur Lyon & Co. (Engs.) Ltd., Africa House, Kingsway, W.C.2. 70

ONE-ton Short Wheel Base Open Trucks by Guy, Morris, Ford, etc., new in 1941/43, ex M.O.S., all in excellent condition. New batteries, good tyres, rugged construction and will withstand considerable hard wear. Prices from £120 to £180.—Mathew Brothers, Matbro Works, Sandy Lane North, Wallington. Phone, Wallington 4050. 1899

PACKING Cases, all sizes and descriptions, for home and export trade; also S/H Cardboard Cartons, all sizes.—L. Goldser & Sons, 14a, Rectory Sq., London, E.1. Phone, Stepney Green 2550. 75

PHONE 98 Staines. 950-kW Ruston Diesel Set, 110 v. D.C.; 25-kW Mirlees ditto, 110 v.; 7.9-kW Ruston ditto, 110 v.; 5-kVA Ruston ditto, 400/1150; Weir Feed Pump, 84" x 6" x 13".—Harry H. Gardam & Co. Ltd., Staines. 60

PLATINGS Generators, unused, several ranging from 350 to 700 amps., 6 to 12 volt, plain or with A.C. or D.C. motor drive. Particulars from—Stewart Thomson (Liverpool) Ltd., Fort Road, Seaforth, Liverpool, 21 (Bootle 2697); or 28, Victoria Street, London, S.W.1 (Abbey 2101). 63

PV.C. and Cotton-covered Bell Wire, single, twin, triple and four core, in beautiful assorted colours, from 6s. 6d. per 100 yds.; send 6d. for samples and lists. We also have in stock irons, firs, extension speakers, etc.—Northern Industries, Dept. 8, 199, Broughton Lane, Salford, 7. 2217

REUILT Motors and Generators. Long deliveries can often be avoided by purchasing rebuilt secondhand plant. We can redesign or replace surplus plant of any size. Send us your enquiries. Over 1,000 ratings actually in stock here.—Dynamo & Motor Repairs Ltd., Wembley Park, Middlesex (Telephone, Wembley 3121, 4 lines); also at Phoenix Works, Belgrave Terrace, Soho Road, Handsworth, Birmingham (Telephone, Northern 0898). 26

RECORDING Apparatus. 2 M.S.S. 12" Turntables with 15-w. Amplifier, M/C Microphone and Radio, £150.—BM/JCHA, London, W.C.1. 9480

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

ROTARY Converters, 200-kW, 6,600/3/50 input 230 volts, 2-wire D.C. output, complete with Transformer and switchgear, seen running in Liverpool. 2,000-kW, 6,600/3/50 input, 418/462 volts, three-wire D.C. output, complete with transformers, starting panels, D.C. machine panels. First-class condition. Two sets available.—Stewart Thomson & Sons (Liverpool) Ltd., Fort Road, Seaforth, Liverpool, 21 (Bootle 2697); or 28, Victoria Street, London, S.W.1 (Abbey 2101). 72

SACKS and Bags in excellent condition for all commodities as low as 4d. each. Write—John Braydon Ltd., 230, Tottenham Court Road, W.1. Tel. No. Museum 6972. 76

SEARCHLIGHTS (new), 10" and 20", also Reflectors, 20" to 44".—Hyams, 5, Glengall Road, London, S.E.15. 9488

SELF-Priming Electric Pumps, 300 g.p.h., £12.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 53

SERIES Type Variable Speed Commutator Motor, 5/2.6 h.p., 960/50 r.p.m., 230 v., 50 cycle, 1-phase, with h/bags and std. bare shaft ext. at both ends and h.d. opd. brush shifting mechanism with special inroclad wall mounting, tot. encl., air break, p.b. opd. starter with h/v and 2 o/l. For sale, £85.—Box 2285, c/o The Electrical Review. 54

SHADED Pole Induction Motors for 8", 6" table fans, with suitable blades, standard speeds.—Box 9471, c/o The Electrical Review. 54

SILK-covered Nichrome Eureka and Copper Wires, 32/48 s.w.g. also 7/14 s.w.g. D.C.C. Copper Wire. For sale ex stock. Write—Box 2287, c/o The Electrical Review. 54

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

STEAM Generating Plant. The following is a selection of sets available in our comprehensive stock: 2,000-kW B.T.H. Turbo-Alternator, 6,600/3/50, 180/210 lbs. pressure, complete with surface condenser and all auxiliaries, seen running. 1,250-kW Brush Ljungstrom Turbo-Alternator, 400/3/50, 200 lbs. pressure, complete with surface condenser and all auxiliaries, seen running. 750-kW Adamson/Mather & Platt High-pressure Pass-out Turbo-Generator, 200-lbs. initial steam pressure, passing out 25,000 lbs. per hour at 80-lbs. pressure, 500 volts, three-wire D.C., with balancer, complete with surface condenser and all auxiliaries. First-class condition. Full particulars from—Stewart Thomson & Sons (Liverpool) Ltd., Fort Road, Seaforth, Liverpool, 21 (Tele. No. Bootle 2697); or 28, Victoria Street, Westminster, London, S.W.1 (Tele. No. Abbey 2101). 98

SPIRALS, first quality, 500, 600, 750 and 1,000 watt, all voltages, for immediate delivery.—Box 59, c/o The Electrical Review. 31

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

STEAM Turbo-Generating Plant available immediately for disposal: 1 used Oerlikon Back Pressure Steam Turbine, with speed reducing gear and normal accessories, 1,000 kW, 12,000/3,000 r.p.m., live steam 300 lbs./sq. in., 350° C., back pressure 17 lbs./sq. in.; 1 new 1,000-kW Oerlikon Three-phase Turbo-Generator Set, comprising back pressure steam turbine with direct coupled three-phase generator, exciter, shunt regulator and air filter, live steam 200 lbs./sq. in., 500° F., back pressure 1.4 lbs./sq. in., speed 3,600 r.p.m., 2,200 volts, 60 cycles/sec. (if operated at 3,000 r.p.m., 50 cycles/sec., 1,800 volts, the set can give an output of 800 kW at P.F. = 0.8); 1 used 400-kW Oerlikon Three-phase Turbo-Generator Set, comprising back pressure steam turbine, speed reduction gear, three-phase turbo-generator, exciter, shunt regulator and air filter; live steam 450 lbs./sq. in., 300° C., back pressure 42 lbs./sq. in., 6,800/3,000 r.p.m., 400 volts, 50 cycles/sec. For further particulars apply (in duplicate) to—Oerlikon Ltd., Victoria House, Southampton Row, London, W.C.1. 2274

SUPERIOR Type Builders' Ladders now in production: S also Steps, Trestles and Extension Ladders. Phone—Shafesbury Ladders Ltd., 453, Katherine Road, E.7, Grangeview 3363/4. 15

TISED Double Flanged Bobbins, good condition, 2,000 gross approx. Measurements 3 3/4" overall, 3 1/4" traverse, 3" diameter flange. Will sell all or part.—Joseph Harari, 42, Whitworth Street, Manchester. 99

VACUUM Cleaner Parts. Hoses, braided, all diameters. Commutators, bearings, fans, carbon brushes, driving belts, brushes, attachments and fittings for all makes. Wholesale only.—Vacuum Cleaner Supplies, 543, Moseley Road, Birmingham, 12. 80

WATER Tube Boilers in stock. Two 25,000 lbs. evap., 250 lbs. W.P.; One 25,000 lbs. evap., 175 lbs. W.P.; Two 20,000 lbs. evap., 175 lbs. W.P.; Two 16,000 lbs. evap., 190 lbs. W.P.; One 12,000 lbs. evap., 200 lbs. W.P.; One 9/10,000 lbs. evap., 200 lbs. W.P. 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

WOOD Channelling, 3-way, 160s. per 1,000 ft. delivered. Fuse Boxes, 3-way, 90s. doz.; 4/5-way, 105s. doz. Best seasoned timber, no restrictions.—Electrical Agencies (Belfast) Ltd., 32 College St., Belfast (Phone 24813). 9484

1-h.p. Motors for immediate delivery, 200-220 and 4 230-250 volts, 50 cycles, split phase, sleeve bearing, automatic thermal protection, starting torque 225%. 28 15s. each in lots of 6 or more.—Box 9422, c/o The Electrical Review. 32

5-kW and 2 1/2-kW, 230/250-volt D.C. Generating Sets, complete with 4-cylinder, 10-h.p. Austin Engines, with petrol tanks, radiators, fans and switchboards. Large number available.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 103

5 to 20 kW D.C. and A.C. Petrol & Diesel Generating Sets, some packed for shipment.—Box 87, c/o The Electrical Review. 103

40 lbs. of 46-s.w.g. Double-wound Silk Copper Wire, 30s. per lb.—Stewart Thomson & Sons (Liverpool) Ltd., Gladstone Works, Fort Rd., Liverpool 21 (Bootle 2697-8). 2065

60-kW Generator, 220/250 volts, 800 revs., by Brush Electrical Co.—W. H. Sugden, Glenny Rd., Barking, Essex. 2039

135-amp., 460-v., Compound Interpole Protected Generator by Crompton, 950 r.p.m., pulley 17" x 9", 65-amp. 460-v. Ditto by B. E. White, 750 r.p.m., pulley 11 1/2" x 8", 65-amp., 460-v. Ditto by D. & M., oil ring bearings. 200-amp., 500-v. Ditto by Crompton, oil ring bearings, half coupling.—Thos. W. Ward Limited, Brettenham House, Lancaster Place, Strand, London, W.C.2. Phone, Temple Bar 9631. 2090

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

500 Electric Motors, Dynamos, Transformers, Converters, etc., at low prices.—S. C. Bisby, A.M.I.C.E., A.M.I.E.E., Crosswells Road, Langley, near Birmingham. Phone, Broadwell 1359. 21

600 amp., 8/12-volt Plating Set, motorised 400/3/50, unused, complete with starter and voltage regulator.—Electric Machinery Co., Union Street, New Islington, Manchester. 41

600 w. Spiral Elements, 230 v., ex stock, surplus from order, 54d. ea. Sold in 1,000 lots. Electric Heating Pads, 15" x 18", 30a. each wholesale.—Middlesex Electron Co. Ltd., Molesey 3541. 9454

ARTICLES WANTED

ACCUMULATOR Plates (old) and lead Peroxide: as actual smelters we pay top price. Also old storage batteries, transformers and whole installations purchased.—Elton, Levy & Co. Ltd., 18, St. Thomas Street, S.E.1. Hop 2825-6. 39

ELECTRIC Lamps, quantities 15 watt, H. & L. voltage, urgently required.—Imperial Lighting Co., Pocock Street, London, S.E.1. 9483

ENGINEERING Technical Books (new or secondhand) wanted in any quantity. Attractive cash offers. Call—Third floor, 355, Oxford Street, W.1, or "Stoneleigh," St. George's Avenue, Worcester. 62

FLUORESCENT Lamps, 5ft., urgently required, any quantity, retail prices paid. Collected London area.—Box 2100, c/o The Electrical Review. 20

MERCURY (Quicksilver) wanted. Write for packing instructions. Gold, Silver and Platinum also purchased.—Collingridge & Co. Ltd., Riverside Works, Riverside Road, Watford (Tel. 5963). 20

MOTOR Generator Set. Motor 440 volts, 3-phase, 50 cycles. Generator approx. 140 volts, 300 amps, shunt wound. Direct coupled on baseplate, starter and control gear. Give details and price.—Tungstone Products Ltd., Market Harborough, Leics. 2219

ONE 125-kVA Frequency Changer, 50/90 cycles, 400 v., 3-phase, and one Double-ended Grinder with 10" wheels, single-phase, 240 volts.—Shimwell, Alexander & Co., 20, Bevis Marks, London, E.C.3. 2299

REQUIRED: Mica Electric Iron Elements; Toaster Elements; Spirals, nichrome wire; Cotton-covered Flexes; Brass, Copper and Steel Sheets, min. size 9" x 6"; Alu. Strip, 3" x 1/2"; Machinery, new and used; Timber; Glazing; Rubber Grommets; Asbestos; Switches; Iron Connectors, etc., etc. Offers to—British Diamix Ltd., Metrum Works, Beatty Street, N.W.1. Euston 5951. 44

SECONDHAND or reconditioned B.T.H. or equivalent Motors, one each 9, 7½ and 2 h.p., T.E., 1/4-hour rated, slipping induction, 440 volts, 3-phase, 50 cycles, suitable for crane installation. Particulars and prices to—Box 2277, c/o The Electrical Review. 20

TUBULAR Heating. A quantity of secondhand 230-v. required. Thermostats if possible. State lengths and prices to—The Mettoy Co. Ltd., Northampton (Phone 3520). 9396

URGENTLY wanted, 2-h.p., 400-v., 3-phase Geared Motor Unit, output shaft speed about 52 r.p.m. Good price offered, immediate delivery.—Fraser & Borthwick Ltd., 12a, College Square North, Belfast. 2272

WANTED, any quantity 6/012 cotton-braided, 3-core round Flex. Samples to—Box 627, Robertson & Scott, 73, Hanover Street, Edinburgh. 9498

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

WANTED for export, steady supply of Domestic Refrigerators, Ceiling and Table Fans, Cooking Stoves, Fires, Radio Sets, Motors, etc. Continuous orders guaranteed. Large or small firms. Reply—Empire Traders, Watling Road, Bishop Auckland, Co. Durham. 9495

WANTED number of Arc Welding Resistances, suitable for 200-amp. generator, 5 or 6 steps.—Box 2335, c/o The Electrical Review. 20

WANTED number of S.P. and D.P. unmounted Knife Switches, 30, 60, 100 and 200 amps.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 2333

WANTED number of Switchboards having voltmeters, ammeters, D.P. switch 100 or 200 amps. and regulator or parts. Send particulars of voltage, etc.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 2334

WANTED, number of Voltmeters, 0-80 (approx.) and Ammeters, 0-250 (approx.) for D.C. supply.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 2336

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

1 h.p., 230-v. A.C. or D.C. Motor.—Universal Electrical, 221, City Road, London, E.C.1. 25

5 h.p., 3-h.p. and 4-h.p., 400-volt, 3-phase, 50-cycle Motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 2321

6 or 7½-h.p. Cage Type Motor, 400 volt, 3-ph., 50 cycles, 950 r.p.m., no pulley, star delta starter, N.V. and 3 O.L. releases.—B. W. Gothard, Eaton Socon, St. Neots, Hants. 2265

15 h.p. and 20-h.p. (or nearest), 3-phase, 400-volt, slip-ring Motors and Starters.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 2320

40/50 h.p. D.C. Motors, 440 v., 750 revs., also smaller sizes, ball bearings; also several 2-phase motors, 2/10 h.p.—W. H. Sugden, Glenny Rd., Barking. 2042

400/3/50 Squirrel Cage Motors, 3 h.p. (3) at 720 r.p.m., 7½ h.p. at 720 r.p.m., 10 h.p. at 960 r.p.m., new or good secondhand.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 2330

1,000 Motors from 1 h.p. to 10 h.p., 400/3/50. Send particulars.—W. H. Sugden Ltd., Glenny Rd., Barking. Rippleway 8302. 2041

20,000 ft. 1" Screwed Conduit, light or heavy, galvanized or enamelled. Required at once in small or large quantities. Building licence available.—Middlesex Electron Co. Ltd., Molesey 3541. 9453

WORK WANTED AND OFFERED

OIL Winding.—I.O.G. Industries Ltd., 476, High Road, Leytonstone, London, E.11. Telephone, Leytonstone 3877. 2105

ELECTRIC Motor Repairs. We specialise in the rewinding and repair of fractional h.p. motors, induction, repulsion and capacitor for refrigerators, washing machines, etc., Also D.C. Good deliveries at reasonable prices.—The Johnson Engineering Company, 319, Kensington Road, London, S.E.11. Reliance 1412/3. 89

ENGINEERS, Precision, South England, seek manufacture of electrical, mechanical or domestic assemblies or components. Press tools, gauges, small stampings, capstan turning, also Internal and External Grinding. Write—Box 74, c/o The Electrical Review. 20

MACHINING Work, for Centre Lathes up to 6½ in. centres and medium-sized milling (good grade work preferred).—The London Electric Firm, Croydon. Up-lands 4871. 56

NEON Sign Glassware. Trade service, repairs, repumping, re-electroding, bell glasses and accessories. Prompt service.—Neon Illumination Service, 26, Welford Road, Leicester. 9482

NICKEL and Chrome Plating, large capacity output. Bulk quantity inquiries invited. Send full requirements and, if possible, samples to—I.E.I. (N.I.) Ltd., Lower Lodge Factory, Flax Street, Belfast, Northern Ireland. 82

PAINT and Metal Spraying. Large capacity available for efficient and prompt handling of all goods sent for treatment. Enquiries to Sales Dept., C.S. Ltd., Staffa Works, Staffa Road, Leyton, E.10. 2237

QUALIFIED Designer-Draftsman undertakes electro-mechanical design, detail and arrangement drawing and tracing. Enquiries invited, strict confidence observed.—Box 9474, c/o The Electrical Review. 20

TRANSFORMERS, 5 VA/5 kVA, coil winding, light assembly, immediate deliveries.—The Transformer & Electrical Co. Ltd., Eastern Road, London, E.17. 91

WINDING. All types of stators, rotors, armatures rewound and repaired, 1-phase and 3-phase, 1 to 10 h.p. All work guaranteed.—Bright Bros. 50, Orford Road, Walthamstow. 9411

AGENCIES

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AGENCIES required by Rex Lighting & Radio Co. at 246, King Street, Hammersmith, W.6. Tel. Nos. Riverside 2283/4. New showrooms offer excellent opportunity to display first-class domestic, electrical and radio products of every description. 2195

AGENCIES required for London, South of England, for the following: (1) Domestic electrical appliances; (2) Brass electrical accessories, switch plugs, etc.; (3) Conduit. Advertisers have clientele with every wholesaler in the territory mentioned. Immediate turnover can be guaranteed. Either commission or buying basis. Post-war arrangements considered.—Box 64, c/o The Electrical Review. 20

AGENCIES required, South of England, including the London area: (a) Cables; (b) Small Switchgear; (c) Transformers; or any lines suitable for distribution for wholesalers' business.—Box 40, c/o The Electrical Review.

AGENTS wanted everywhere to sell direct to the retail trades Electrical Floor Standards, Pendants and Shades. Would consider permanent agencies.—Box 9421, c/o The Electrical Review.

LIVE Electrical Wholesaler in process of developing agencies for Electrical Domestic Appliances, Electrical Accessories of all types, Switchgear, Electric Lamps, etc.—Box 9385, c/o The Electrical Review.

MANUFACTURERS' Agents, returning Melbourne, desires Agencies in Speciality Electrical and/or Mechanical Products, such as: short fluorescent lighting, patent fixings and tools, self-contained apparatus and equipment. Would consider, final assembly installation, and service after sales.—Box 9502, c/o The Electrical Review.

MANUFACTURERS' Agents, covering the whole of Great Britain and Colonies, are desirous of contacting manufacturers with a view to sole selling rights (either commission or buying), post-war arrangements considered.—Box 23, c/o The Electrical Review.

MANUFACTURERS' Agents, with offices London and South Coast, wish to hear of additional lines, including Cables and Domestic Appliances, for sale to corporations, wholesalers, retailers.—Box 9376, c/o The Electrical Review.

MANUFACTURING and Distributing Company, covering the British Isles, and having important export connections, are desirous of handling additional products suitable for the electrical, hardware and ironmongery trade, preferably sole distributing rights. Substantial contracts will be placed for suitable lines. Reply—Box No. T.193, Maurice Vernon Limited, 2, St. Andrew's Hill, Queen Victoria Street, E.C.4. 2268

REPRESENTATIVES required all areas, with good connections electricians, garages, ironmongers, engineering works, etc. Car essential. Reply, giving full details of past selling experience, age, etc., to—Box 105, c/o The Electrical Review.

BUSINESS OPPORTUNITIES

ENGINEER, M.I.E.E., with exceptional influential wide connections and exclusive designs, desires to arrange an association with switchgear and instrument firms to mutual advantage.—Box 9450, c/o The Electrical Review.

SCEMCO Ltd., Fluorescent Lighting Specialists, wish to contact manufacturers of electrical equipment and accessories, including "Novelty" and "Improved" appliances. Domestic fluorescent fittings and components of particular interest. When possible complete output will be taken, and full co-operation given in exchange for sole distribution rights. Replies will be treated with strictest confidence.—Man. Director, Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. 2243

PARTNERSHIPS

ENGINEER, resident abroad with established commercial connection overseas, would like to take substantial financial interest in established firm in Great Britain manufacturing Switchgear and Control Gear. Can guarantee regular monthly contracts for export. Cash against shipping documents.—Box 9381, c/o The Electrical Review.

PATENT NOTICES

IT is desired to secure the full commercial development in the United Kingdom of British Patent No. 598027, which relates to Heat Treatment by Electric Induction either by way of the grant of licences or otherwise on terms acceptable to the patentee. Interested parties desiring copies of the patent specifications should apply to—Stevens, Langner, Parry & Rollinson, 5 to 9, Quality Court, London, W.C.2. 2296

IT is desired to secure the full commercial development in the United Kingdom of British Patent No. 510648, which relates to Electrical Resistance Welding, either by way of the grant of licences or otherwise on terms acceptable to the patentee. Interested parties desiring copies of the patent specifications should apply to—Stevens, Langner, Parry & Rollinson, 5 to 9 Quality Ct., London, W.C.2. 2297

IT is desired to secure the full commercial development in the United Kingdom of British Patent No. 522508, which relates to an Electric Reciprocating Motor for Warning Signals, either by way of the grant of licences or otherwise on terms acceptable to the patentee. Interested parties desiring copies of the patent specifications should apply to—Stevens, Langner, Parry & Rollinson, 5 to 9, Quality Court, London, W.C.2. 2298

PATENT Agents—A. E. Hill, Chartered Patent Agent, 27, Chancery Lane, London, W.C.2. Tele. Chancery 8444. 85

BUSINESSES FOR SALE AND WANTED

ELECTRICAL Contractors' business for sale, N.W. London, £2,000 additional capital considered. Accountant's figures available. Contracts in hand. Write—Box 9479, c/o The Electrical Review.

PREMISES FOR SALE AND WANTED

URGENTLY required, Factories in London and suburbs, areas from 5,000 to 100,000 ft. Send pars. in confidence to—Leopold Farmer & Sons, Factory Agents, 46, Gresham Street, E.C. (Tel. Monarch 3422). 2263

MISCELLANEOUS

SHORTHAND in one week. Test lesson, 3d.—Duttons (E4), 92, Great Russell Street, W.C.1. 24

SWEDEN seeks immediate import from England of the following goods: Enamelled Copper Wire, Electric Cable, Dynamo Wire, Electrical Armatures Material, Radio Material, Plastic, Celluloid, Cellon, Tin, Copper, Lead, Chemicals, etc. Payment in English bank. Also a British Contact Man wanted for import and export. Send offers with samples to—A/B Concrete, Rekarné, Sweden. 2271

COMPANY MEETINGS

NEWTON BROTHERS (DERBY)

Demand for Specialities

THE Seventeenth Annual General Meeting of Newton Brothers (Derby) Ltd. was held on the 22nd August at Derby.

Mr. P. C. Cooper-Parry, O.B.E., M.C., J.P., F.C.A., who presided, said: The report and accounts of the company for the year ended 31st March, 1946, disclose both a satisfactory trading result and a strengthened financial position. The reduction in the trading profit from £100,367 to £59,558 was to be expected on the cancellation of many Government contracts following the end of hostilities. As is stated in the Directors' Report, the adverse effects of such cancellations, which became heavier as the year proceeded, will be more felt in the current year. The small increase in the net profit, after taxation, is due solely to the reduction in the rate of E.P.T. and income tax.

In recommending a special bonus of 7½% additional to the normal dividend of 17½% the directors have had regard to the small proportion of net profits which has been distributed in dividends over the past five years. During the year considerable progress has been made in bringing our plant and machinery up to the latest standards, and £16,017 has been spent on new plant. This re-equipment is continuing.

Current Prospects

Concerning current trading and future prospects, trading is difficult at the moment. The specialised electrical equipment which forms a large proportion of our production, and which was supplied in such large quantities to the Government during the war, is generally of the type required for post-war needs, though on a much reduced scale. Our customers—both Government and commercial—for this class of equipment are in process of developing new designs needing from us in turn new patterns and types which our technical staff have to develop through the experimental and prototype stages before quantity manufacture can be reached.

Following on the termination of hostilities we initiated—under expert guidance—a planned advertising campaign for our specialities which is resulting in a gratifying flow of enquiries from both home and abroad, but the continuing deterioration of the delivery position of the basic essentials of our manufactures such as steel, electrical quality sheet stampings, ball bearings and the special grades of insulated wire, makes the quoting of reliable and reasonable delivery dates almost an impossibility.

Last year I spoke highly of the excellent services of your Managing Director, Mr. F. V. Pipe, your Technical Director, Mr. F. Newton, and the whole of the staff and employees throughout the war years. My commendations then are again repeated to-day, but with added tributes to the manner in which all concerned have worked in the past months of continual and difficult change.

I now formally move the adoption of the report and accounts.

Mr. Frederick Newton, M.I.E.E., M.I.Mech.E., seconded the motion, Mr. F. V. Pipe, A.M.I.E.E. (Managing Director) supported it, and it was carried unanimously.

Mr. H. E. Midgley, M.A. (Cantab.), M.Inst.C.E., M.I.E.E., M.I.Mech.E., was re-elected a director, and Messrs. Watson Sower & Co. were re-appointed auditors. The proceedings closed with a cordial vote of thanks to the chairman, directors, staff and employees. 2306

EDUCATIONAL NOTICES

NORTHAMPTON POLYTECHNIC, LONDON, E.C.1

Session 1946-7

A Course of Lectures on X-Ray Technology will be given on Wednesdays, at 7 p.m., commencing on Wednesday, October 2nd, 1946. The course will provide a comprehensive survey of the fundamentals of X-ray Technology suitable for those engaged in the installation, testing and maintenance of X-ray equipment. Laboratory work by arrangement on one additional evening per week.

Enrolment week: Monday, September 16th, to Friday, September 20th, 1946, inclusive, 6.30-9.30 p.m. Further particulars may be obtained from the Northampton Polytechnic, St. John Street, E.C.1. 2311

ENGINEERING Careers and Qualifications. Both Government and industry have announced and emphasised that young men with technical knowledge and qualifications must receive every chance of rising to the highest posts within their capacity in post-war engineering and allied industry. Write to-day for "The Engineer's Guide to Success"—200 courses—free—which gives particulars of the first-class training supplied by the T.I.G.B. for the A.M.I.E.E., A.M.Inst.C.E., A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., B.Sc.(Eng.), C. & G., etc., examinations in which T.I.G.B. home-study students have gained 41 first places and over 1,000 passes. The Guide covers careers in all branches, Electrical, Mechanical, Radio, Aeronautical, etc.—The Technological Institute of Great Britain, 35, Temple Bar House, London, E.C.4. 77

LATEST A.M.I.E.E. Results. In the recent examinations held by the Institution of Electrical Engineers 477 candidates sat who had taken B.I.E.T. courses. Of these 457 were successful in passing the examinations. We believe this record of 457 successes out of 477 entrants has never before been approached by any oral or correspondence tutorial organisation, and indicates the very high efficiency of the modern system of technical training which we have laid down. The B.I.E.T. tutorial organisation is waiting to assist you either with a short specialist course or complete training for a recognised examination. We have available a large full-time staff of instructors, while the efficiency of our extensive organisation is a byword among engineers. We guarantee—"No pass—no fee." May we send a copy of "Engineering Opportunities"? Containing a great deal of useful advice and detailed information on over 200 home-study courses and examinations, this handbook is of very real value to the ambitious engineer. Our highly informative handbook will be sent free and without obligation on request.—British Institute of Engineering Technology (established 1927—over 200,000 students), 12, Shakespeare House, 17, 18 & 19, Stratford Place, Oxford Street, London, W.1. 33

PLASTICS offers particularly good prospects to experienced Engineers with a sound knowledge of Plastics Technology. Authoritative home-study courses are now available in General Plastics and specialised branches of the science. Full details of these courses and the prospects in the rapidly expanding Plastics industry will be found in our Handbook "Opportunities in Plastics"—sent Free on request.—British Institute of Plastics Technology (Dept. 301), 17, Stratford Place, London, W.1. 1971



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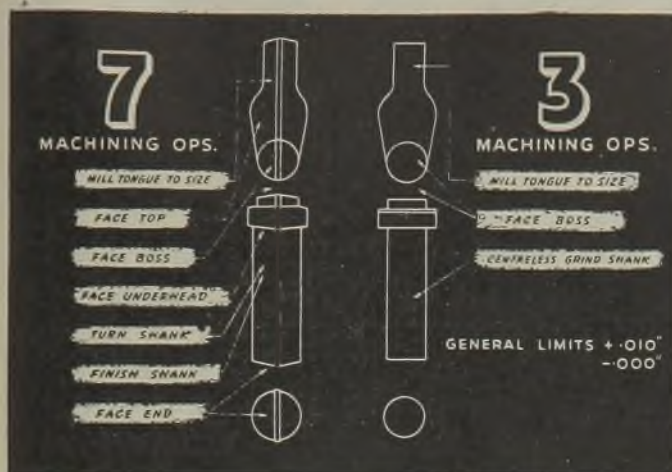


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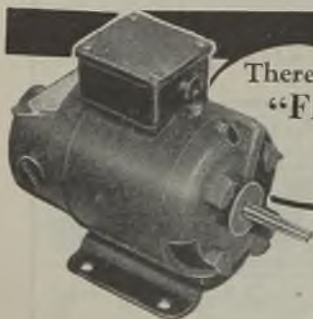
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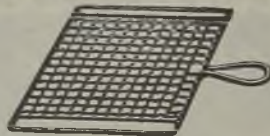
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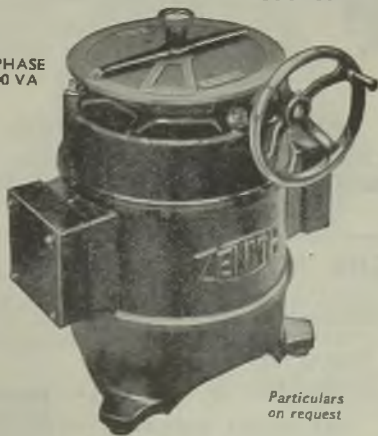
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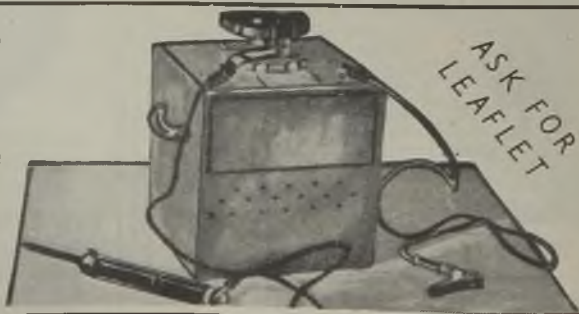
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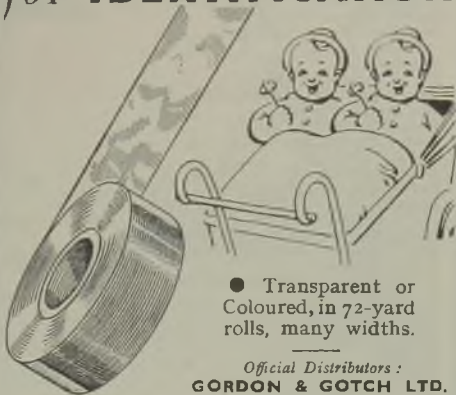
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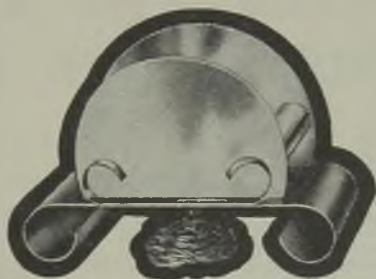
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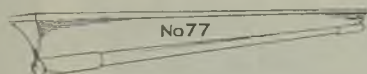
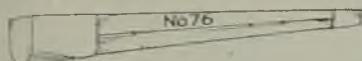
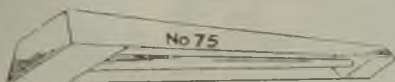
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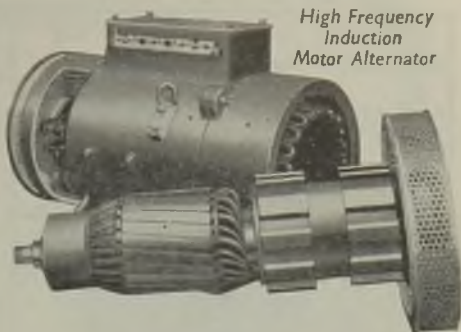
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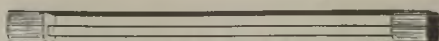


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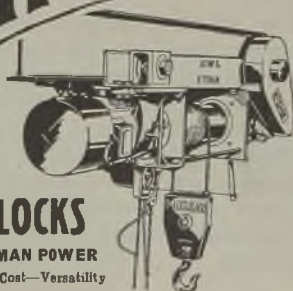
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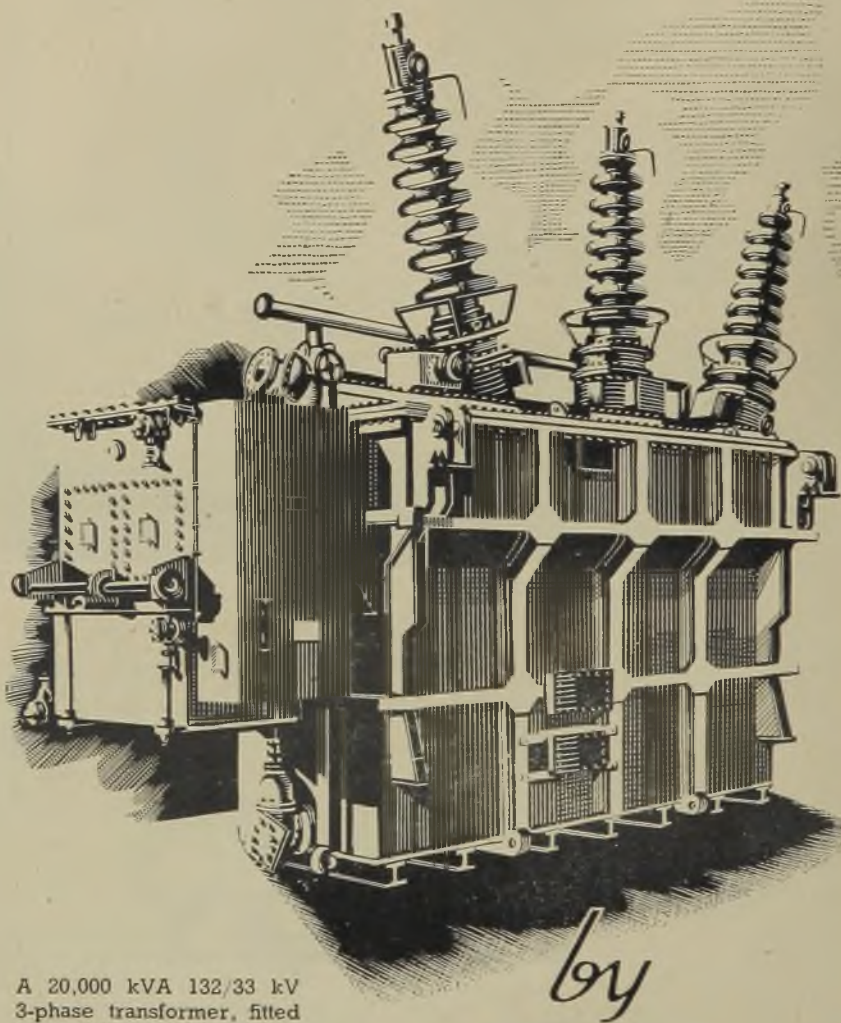
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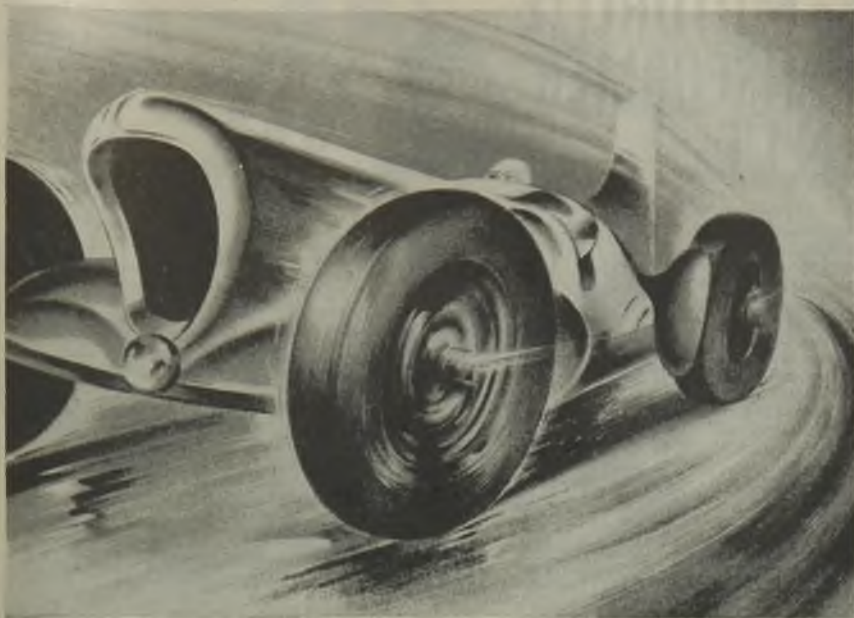
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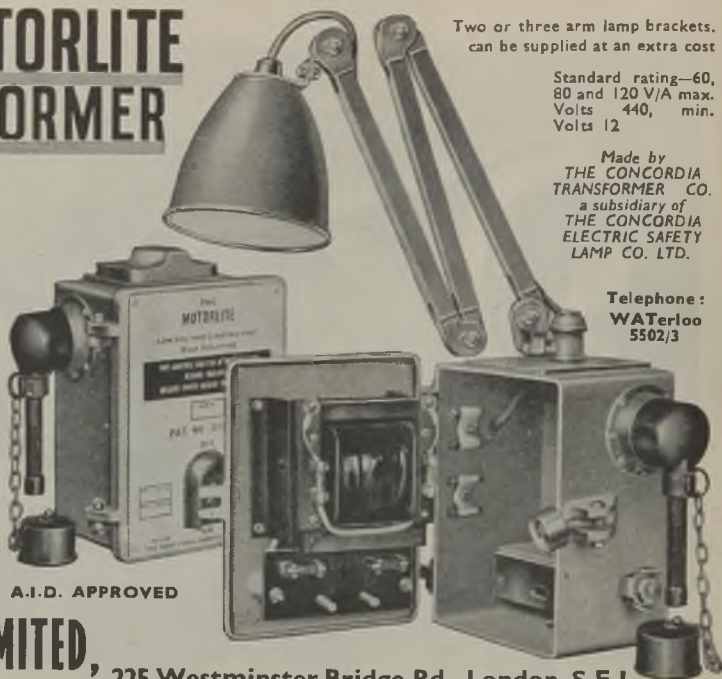
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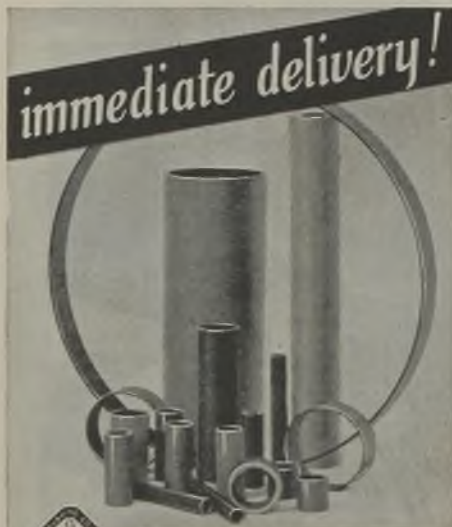


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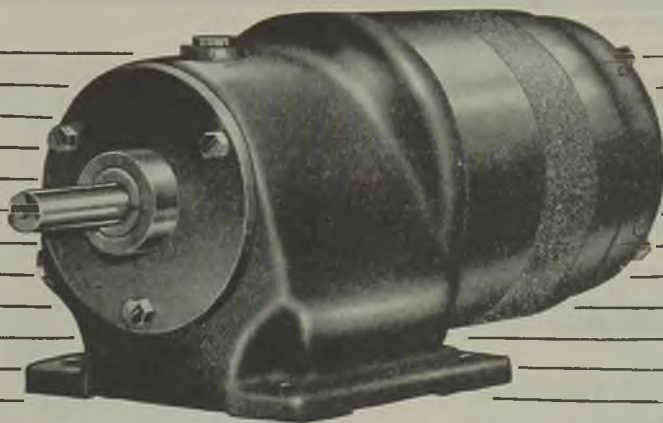
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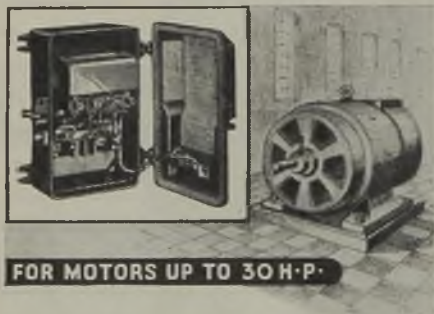
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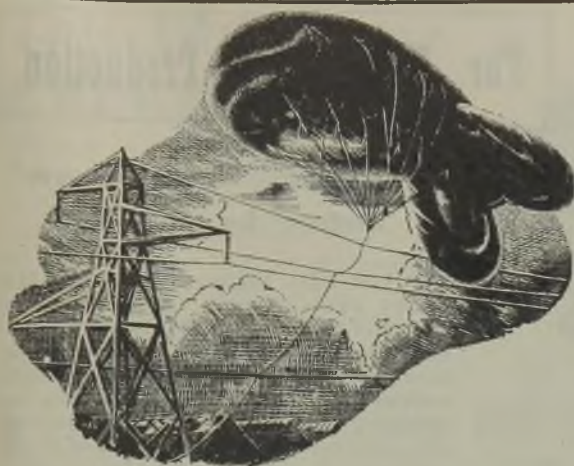
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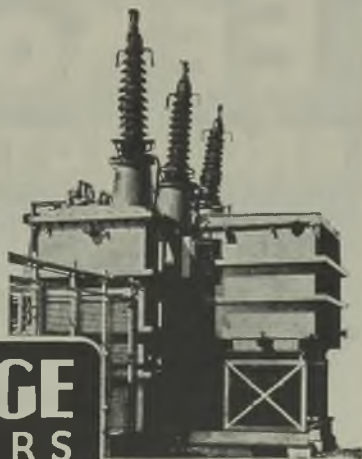
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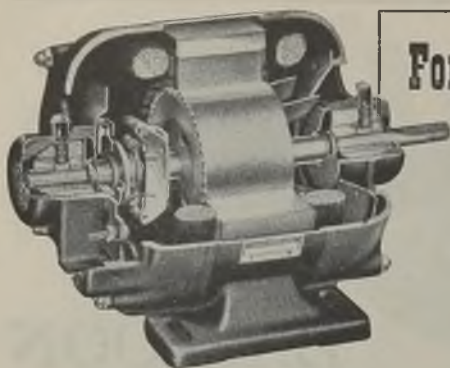
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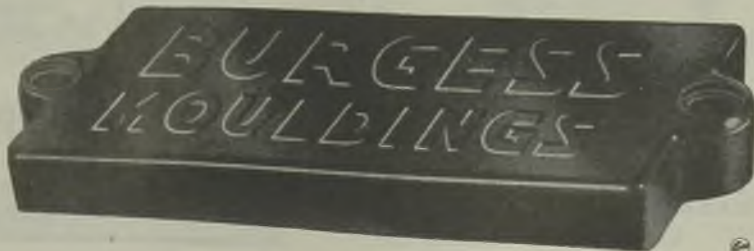
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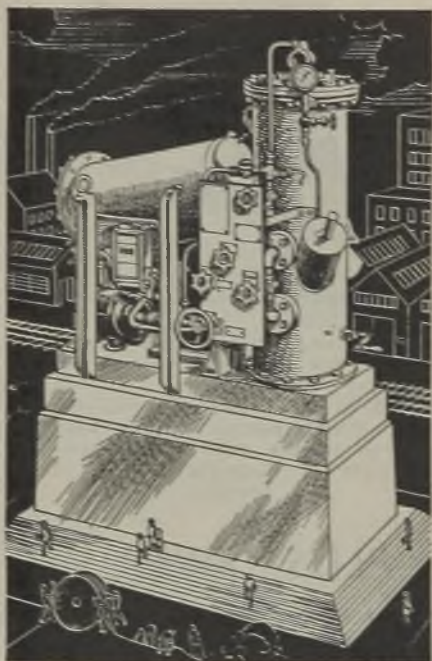
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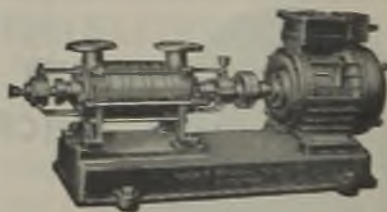
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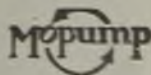
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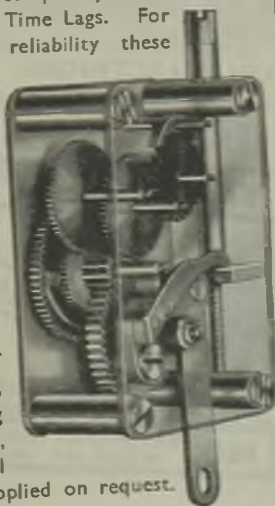
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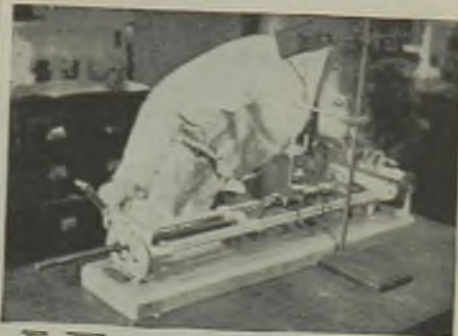


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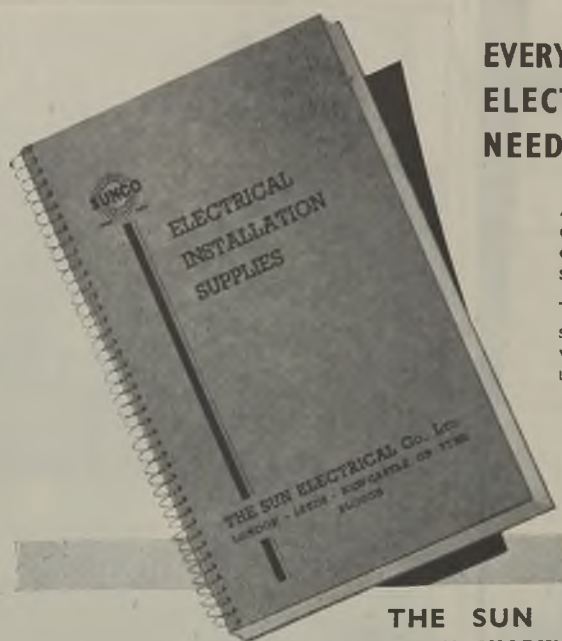
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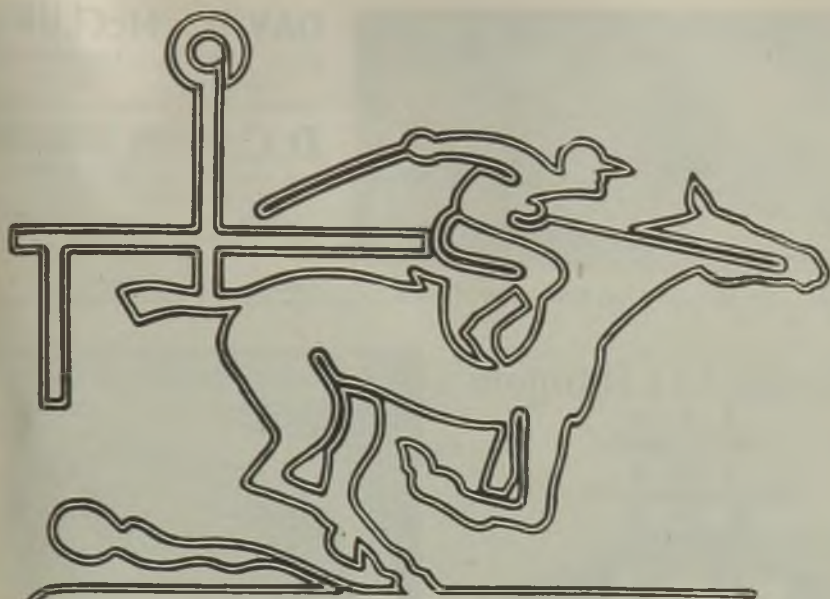
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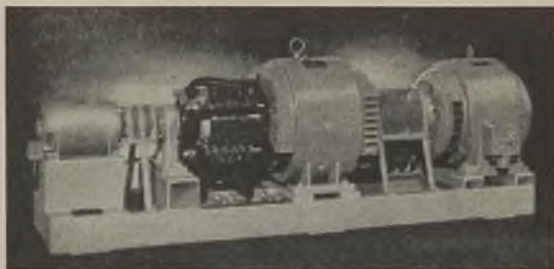
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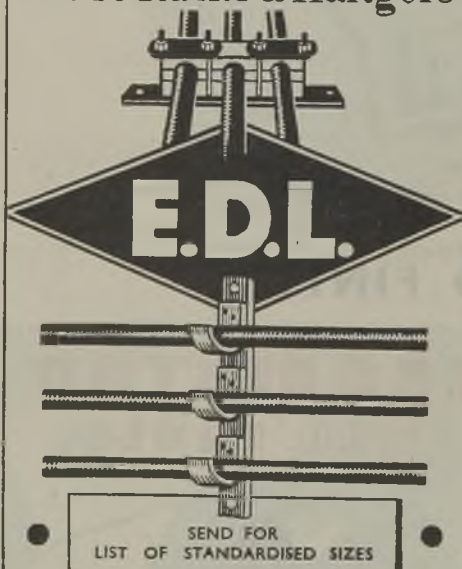
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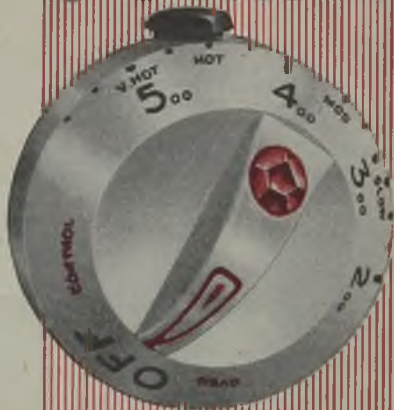
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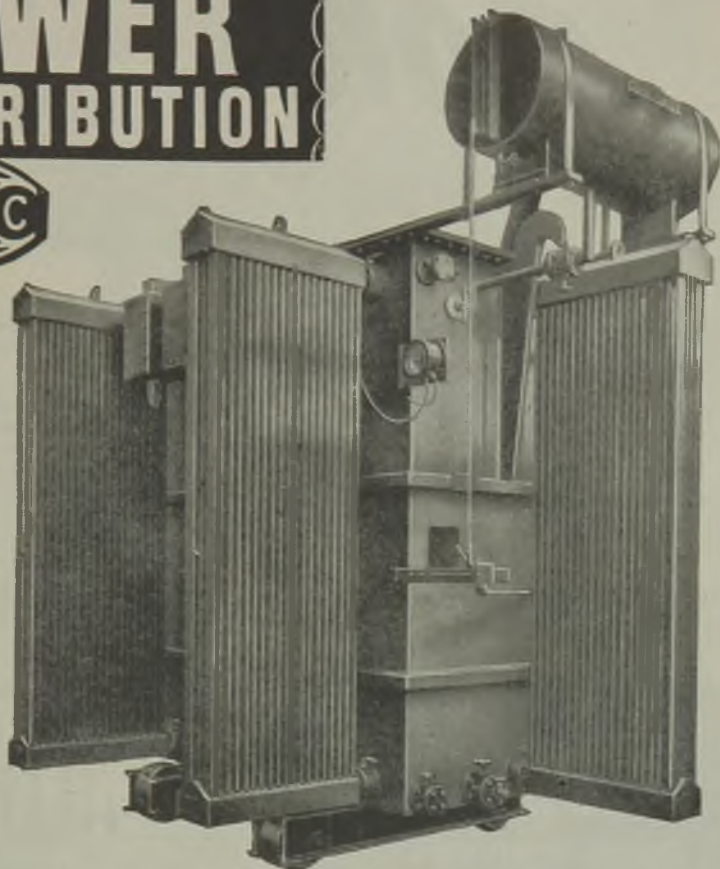
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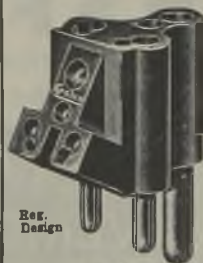
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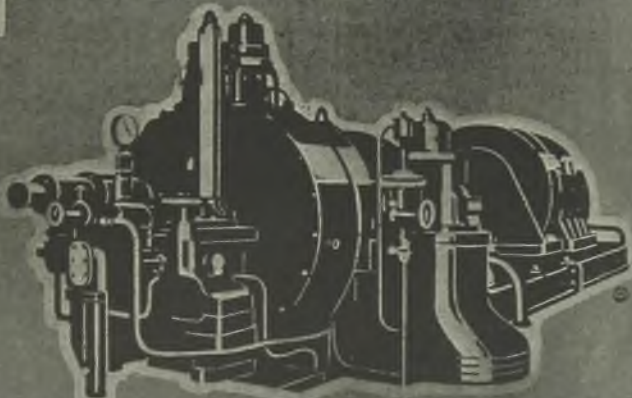
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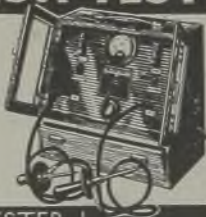
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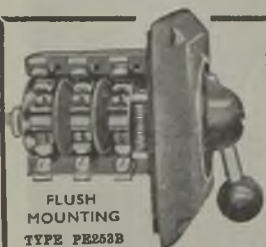
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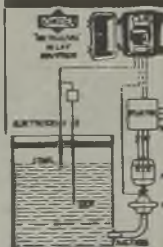


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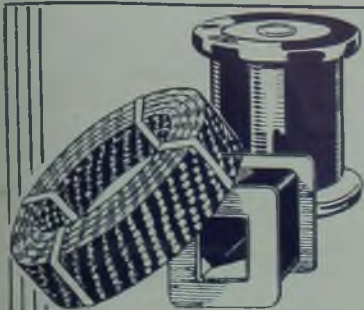
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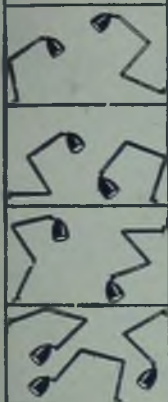
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