ELECTRICAL REVIEW

VOL. CXXXIX. DECEMBER 6, 1946 NO. 3602

For Purposes of Identification

A.S.C.M. STEEL CONDUIT IS MADE BY:

ALMA & CRANMORE TUBE CO. LTD.
BARLOW, H. J. & CO. LTD.
ELECTRICAL CONDUITS LTD.
GENERAL ELECTRIC CO. LTD.
GRIFFITHS, ISAAC & SONS
HILDICK & HILDICK
McDOUGALL, JAMES LTD.
SIMPLEX ELECTRIC CO. LTD.
Comprising:
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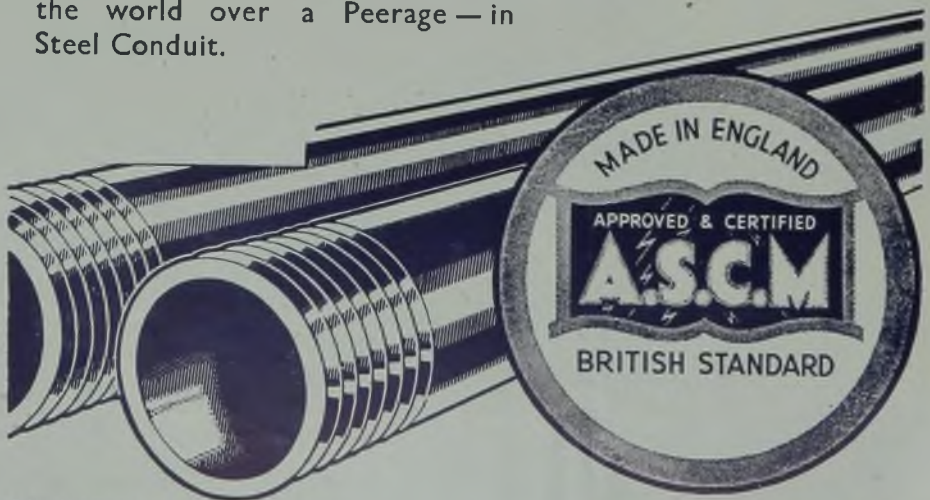
TALBOT-STEAD TUBE CO. LTD.
TIPPER BROTHERS (Bilston) LTD.
WALSALL CONDUITS LTD.

Undoubtedly Heraldry developed from the practice, by Knights of Old, of emblazoning a device on their shields to identify armour-clad individuals on the battlefield.

Although the A.S.C.M. Mark does not appear in the records of the College of Heraldry, it represents the world over a Peerage — in Steel Conduit.

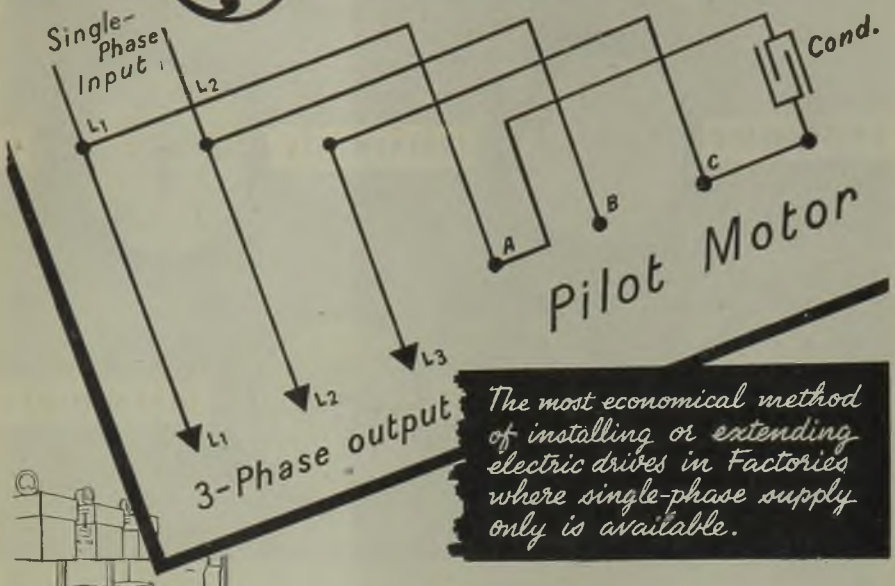


Advertisement of the Association of Steel Conduit Manufacturers, 25 Bennett's Hill, Birmingham 2

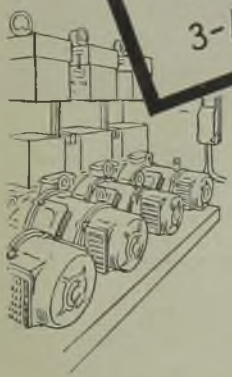
"3-PHASE FROM SINGLE-PHASE"

B T-H CONVERSION SYSTEM

(PATENT No. 485495)



The most economical method of installing or extending electric drives in Factories where single-phase supply only is available.

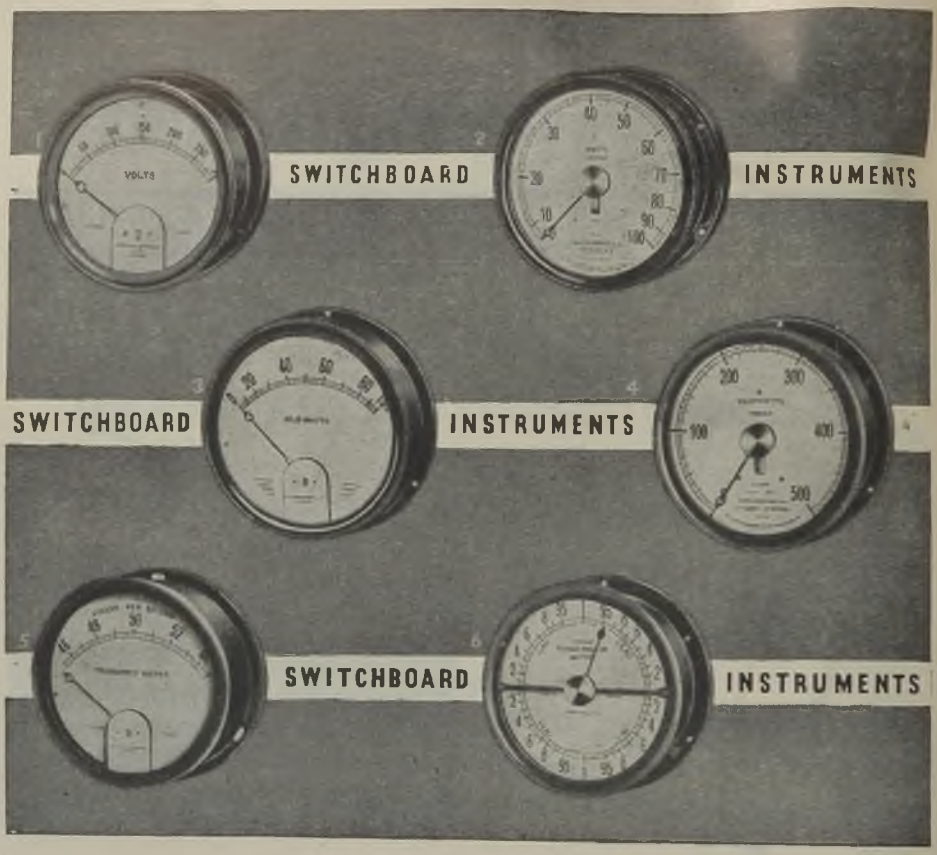


- Enables standard three-phase motors and control gear to operate on single-phase supply.
- Adaptable to all likely load conditions with equally high standard of performance.
- Gives exceptionally good voltage balance under all working conditions, thus enabling the full three-phase output to be obtained from the load motors.
- Easy to control.

Let BTH Engineers advise you.

BTH RUGBY

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, RUGBY, ENGLAND. A 3616



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2. Cirscale Ammeter and Voltmeter—Moving Iron and Moving Coil.
3. Dynamometer Wattmeter.
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5. Frequency Meter.
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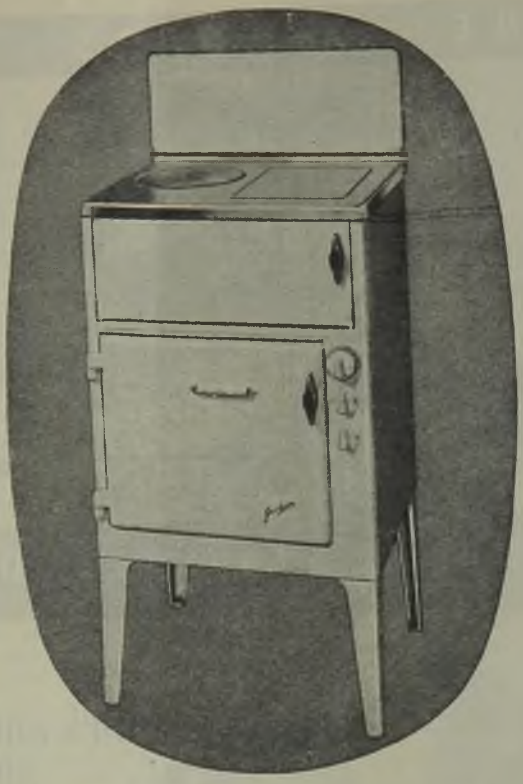
SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD., 38/39 Upper Thames St., London, E.C.4
Branches at Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield.



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1. Pressed Steel Hob with Chromium Plated finish.
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3. Plug-in Elements throughout.
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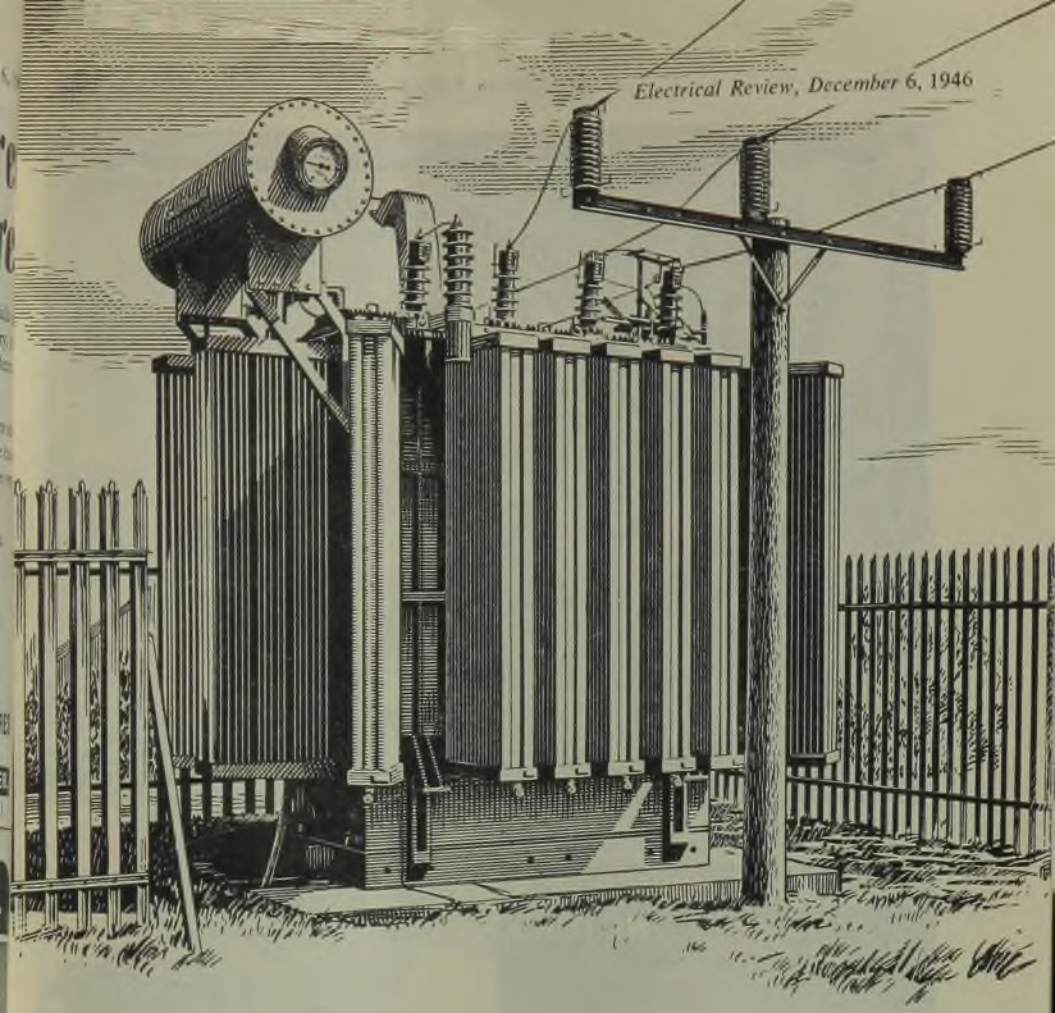
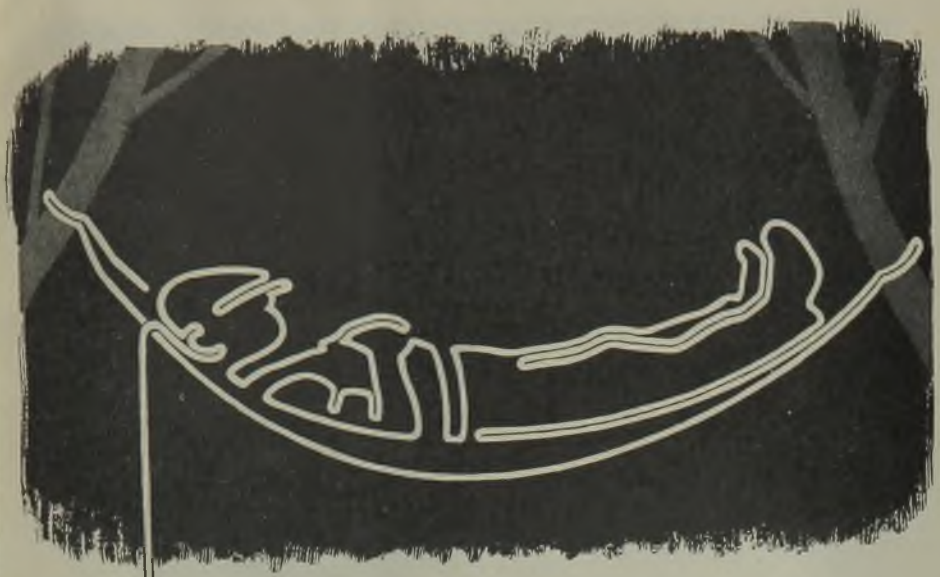


10 MVA AT PYLE SUBSTATION

Among the recently erected J. & P. power transformers of the larger type is this 10 MVA for Messrs. Guest, Keen, Baldwins Iron & Steel Co. Ltd. at Pyle Sub-station, South Wales (Consulting Engineers: Messrs. McLellan and Partners). Details: 3-phase, 50 cycle, ratio 33/11 kV star/star connected with 3.3 tertiary delta, off load tappings, naturally cooled with radiator tank.

Nothing spectacular—just the ordinary "bread and butter" work that fills our shops—but which receives as much care and individual attention as the "specials" which so often come our way.



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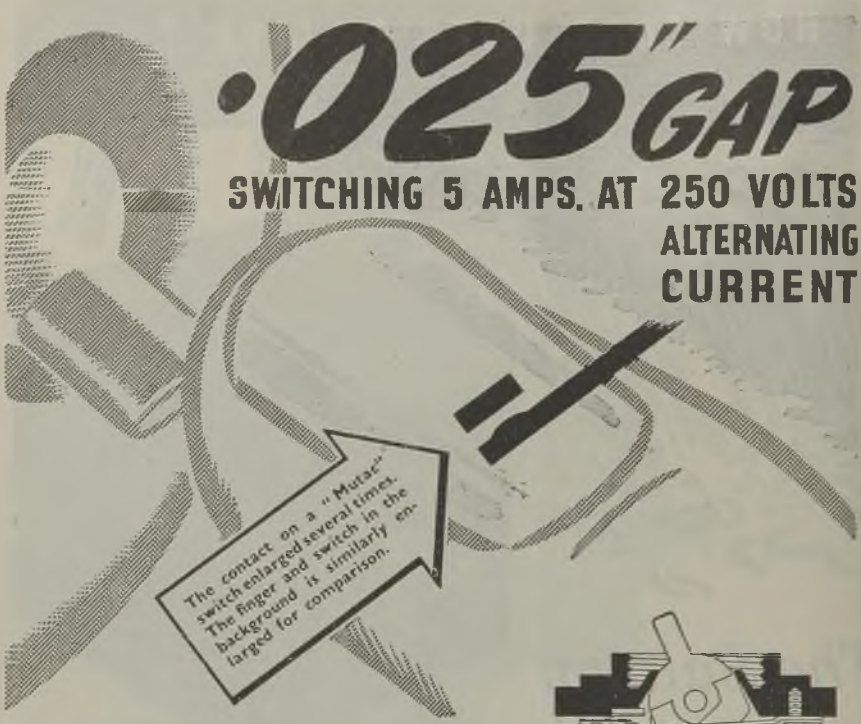
B

Phascolarctos cinereus—the KOALA—the native bear of Australia is the original of the nursery Teddy Bear. Unusual features are its black, rubbery nose and large, bushy ears. Its colouring is grey, fawn, blackish and brown, with white underparts. Fully grown—about two feet long—at four years, it may live to fifteen years or more. Powerful limbs and stout claws make it perfectly adapted to climb the tall trees wherein it lives, subsisting upon the foliage of Eucalyptus. Timid in disposition it whimpers and cries like a baby when molested.

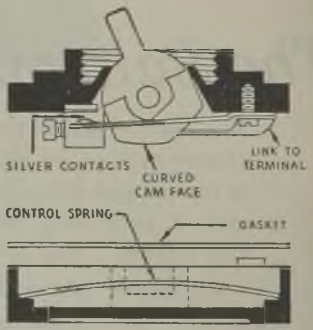
·025" GAP

SWITCHING 5 AMPS. AT 250 VOLTS ALTERNATING CURRENT



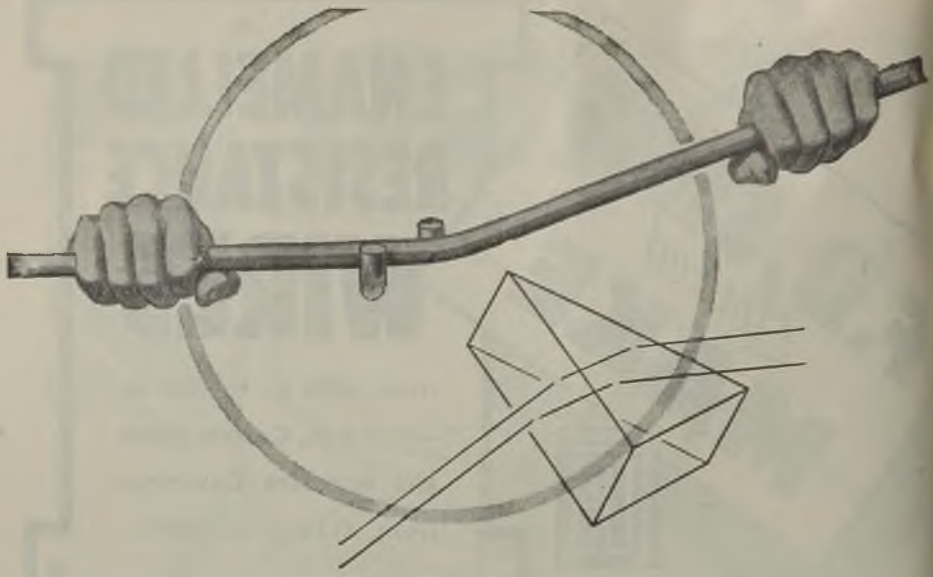
The mechanism of the "MUTAC" silent A.C. switch is a complete breakaway from orthodox design. Switching is effected through a silent cam-action, operating silver contacts with a gap of only ·025". Housed in a sealed chamber, these contacts are rendered free from dirt, moisture, or interference. Outstanding advantages are :—

- Silent action.
- Long life—designed for 5 amps., tests show a useful life of over 100,000 operations at 100% overload, i.e. 10 amps.
  (B.S.1299 Part 1/1946 calls for 15,000 operations at normal rating.)
- Positions of fixing holes and terminals, and size ($2\frac{1}{4}$" dia.) are all normal to facilitate replacement of existing switches.



Detailed leaflet S9868 available upon request.

"MUTAC" Silent A.C. SWITCHES by G.E.C.



The bending of light by transmission or reflection through prisms is the principle employed in providing controlled illumination by Holophane. It ensures that all the available light is directed to the required areas. The principle is embodied in a series of refractors and reflectors covering the requirements of any type of lighting installation.

If you need advice in connection with illumination, the Holophane Technical Service Department will gladly help you.

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If Merlin joined our board

No doubt Merlin's magic could produce M.E.M. switchgear out of thin air. But without such assistance, even the most enlightened board of directors must contend with shortages, controls and restrictions in the face of an increasingly heavy post-war demand. All the same, good progress is being made in stepping up production and increasing quantities of M.E.M. gear are being rushed to the wholesalers.

They in turn are doing a splendid job of work in distributing all available supplies fairly and equitably. Depend on it you will get your supplies more quickly through your wholesaler.

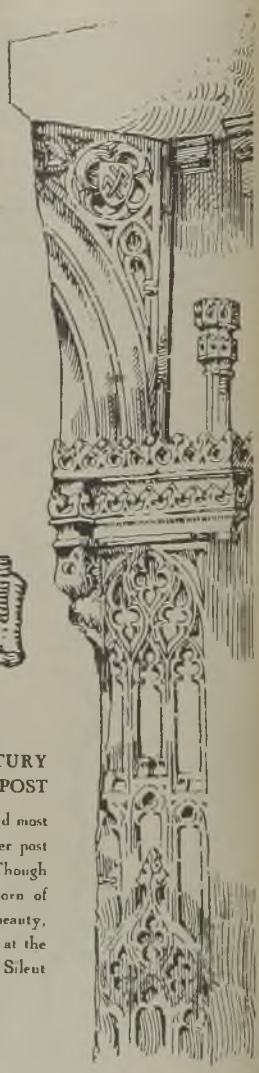
M·E·M

MIDLAND ELECTRIC MANUFACTURING CO. LTD., TYSELEY, BIRMINGHAM, 11

SWITCH, FUSE AND MOTOR CONTROL GEAR, ELECTRIC FIRES AND LOCALISED LIGHTING EQUIPMENT

London Showrooms & Stores: 21-22 Rathbone Place, W.1 : Manchester Showrooms & Stores: 48-50 Chapel St., Salford, 3

Silent Street Corner, Ipswich



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THE fine example of a Corner Post in Silent Street, Ipswich, is a fitting reminder that the same qualities of reliability and craftsmanship displayed in these medieval Corner Posts are incorporated today in BULL Super Silent Motors. These machines are unsurpassed for those situations where silence is imperative.

15th CENTURY CORNER POST

The finest and most ancient corner post in Ipswich. Though somewhat shorn of its original beauty, it still stands at the corner of "Silent Street."

YOU CAN ALWAYS RELY ON

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BULL MOTORS (E. R. & F. TURNER LTD) IPSWICH

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ELECTRICAL REVIEW

December 6, 1946

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXIX. No. 3602. DECEMBER 6, 1946 9d. WEEKLY

The Years Between

Commissioners' Record of Wartime Electricity Supply

WITH the issue yesterday of the Sixteenth Volume of Engineering and Financial Statistics, the Electricity Commissioners have filled more than half of the eight years' gap in the detailed record of each one of 575 authorized electricity supply undertakings in Great Britain. Although the information given refers in the latest cases to a period no later than the spring of 1943, it is of more than historic interest since it illustrates certain trends and their causes sufficiently to suggest future possibilities.

Thus the Returns show, what was not at one time widely realized outside the industry, that some 60 per cent of the electricity now used is provided by publicly owned concerns. An insight is also given into the effects of restrictions on new connections and of the gas-electric truce, which are apparent in the heavy drop in the number of new consumers—the three-quarters of a million additions in 1938-39 falling to less than one-fifth of that figure as an average for the next four years, although many connections were made for war purposes.

Domestic and Industrial Increases

In spite of this drastic falling-off domestic consumers increased their consumption by about one-eighth until checked at the end of the period by the fuel economy campaign, when for the first time there was an actual decline which reflected the spirit of patriotic self-denial then prevalent.

At the same time an 80 per cent increase in the amount sold for power makes clear how fundamental a part was played by electricity in industrial production—a condition that still exists. Fortunately maximum demand did not go up proportionately with consumption and so the results of the inability to provide commensurate generating plant capacity (owing to more urgent claims on manufacturing priorities) were not then so apparent as they are now.

Coal Prices and Quality

Only part of the story of coal is revealed in the Returns. They show that in 1942-43 the average price per ton, though nearly two-thirds more than it was in 1938-39 was, at 33s. 4d., still far less than the 43s. 4d. it reached last year, which is nearly three times the price paid ten years ago. No indications are given of the depreciation in heat value, irregular quality, unsuitability to the power stations to which it was allocated or the high proportion of ash (which had to be transported and disposed of)—all of which help to reduce the effective kW of plant available and to add to the burdens of operation and maintenance on reduced and often relatively inexperienced staffs. Nor does it fall within the scope of these statistics to refer to the diminishing of fuel reserve margins year by year, foreshadowing present anxieties on that account.

In spite of all these obstacles to efficient production the overall price to consumers fell slightly: the brunt of increased costs was then, as now to a greater extent, borne by the industrial load through the opera-

tion of the coal clauses, the domestic charges being almost inappreciably higher.

Our review of the returns in this issue includes some bulk figures, received separately, for 1945-46, which will enable a comparison to be drawn with pre-war conditions as a whole. When the two further statistical volumes, now in course of preparation are ready, the detailed records of electricity supply will be complete up to 1944-45. It is to be hoped that later volumes will not lag far behind since, in order that they may be of the greatest value, they need to be as nearly up-to-date as printing difficulties permit.

Transport Nationalization

WE deal in this issue with the features of the new Transport Bill which may throw some light on the Government's intentions with regard to the nationalization of electricity supply. The main provision is the setting up of a British Transport Commission and five " Executives " all of whom are to be appointed by the Minister of Transport The terms of compensation for the railway owners have already been announced. It is of interest to learn that compensation to local authorities for their transport undertakings will cover the interest and sinking fund charges on the debt of the undertaking but the extent to which such undertakings will be affected is not clear from the Bill much of which is in very general terms.

Power from Norway

THE possibility that Norwegian hydro-electric resources might be found within reach of this country as a result of developments in d.c. transmission was recently suggested by Lord Forrester. Prominence has been given in the *Sunday Dispatch* to a plan to import electric power by means of a dozen or so submarine cables over the 300 miles separating Norway from Scotland, the work to start in about eight years' time. While British cables capable of operating at 550-kV d.c. have already been made, many other considerations are involved. The statement in the newspaper report that electricity could be thus supplied here at a fraction of its present cost apparently overlooks expenditure on transmission in addition to the usually heavy capital charges for water-power production.

Municipal Radio Service

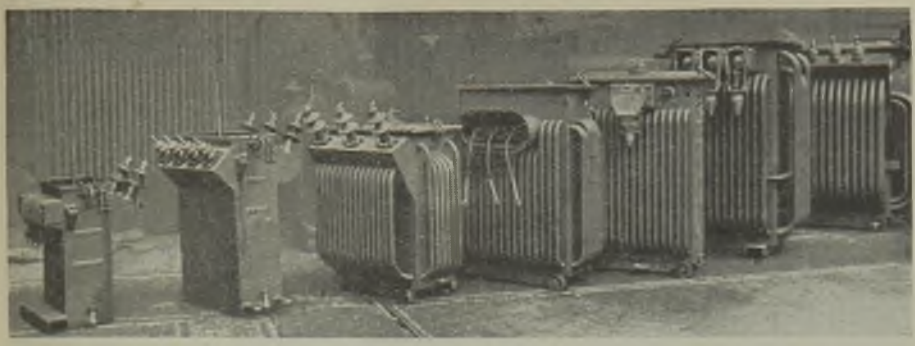
IN explaining its policy with regard to the sale and maintenance of radio and television equipment, mentioned on another page, the Fulham Borough Council disclaims any thought of putting private retailers out of business. It is contended that these retailers do not fully appreciate the position and an attempt is made to draw a parallel with what happened in connection with the sale by municipalities of domestic electrical apparatus. The Council points out that as the electricity supply industry has expanded the number of electrical retailers has increased. This is true, but electrical retailers may reply that this has resulted in the business being spread so thinly that electrical retailing on its own is a somewhat precarious business.

Associations and Prices

TACIT recognition of the possible value of trade associations is afforded in a Ministry of Works statement on the control of prices of building materials and components. It is said in this that the Government Departments concerned do not accept as a basis the lower prices which may be charged by non-association concerns as these may be made possible by low wages, lower quality, inadequate provision for development and research, or deliberate price cutting. By implication, membership of a trade association imposes obligations in these directions which conduce to a healthiness in an industry, a fact which those who attack associations ignore or do not appreciate.

Aluminium Expansion

DURING the war the production of aluminium was phenomenally expanded and to-day in a world of scarcity this metal is perhaps unique in being available in almost unlimited quantities. Much is being done to develop the use of aluminium and new applications are constantly being found for it. Faith in its undoubtedly great future is demonstrated by the decision of the Northern Aluminium Co. to erect, at a cost of about £2½ million, what will be the first continuous rolling mill in this country with an initial output of 50,000 tons of sheet per annum, rising if necessary to 150,000 tons.



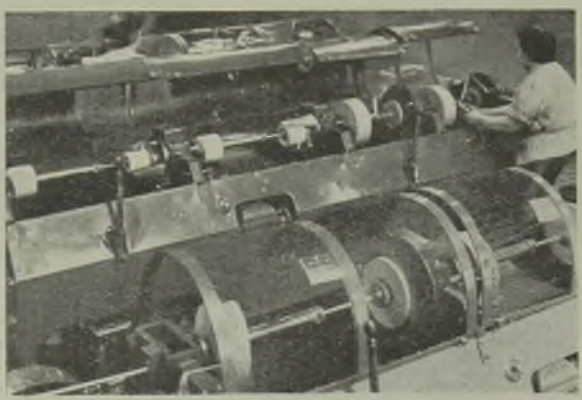
Making Power Transformers

Essential Manufacturing Processes

As part of our series on how electrical equipment in common use is made, we have selected the "standard power transformer" as our subject and we are indebted to Mr. R. Weaving, director and general manager, British Electric Transformer Co., Ltd., for his co-operation and permission to visit the company's works at Hayes, Middlesex.

Our first difficulty was to define the "standard transformer." We soon found that, quite apart from unusual designs and sizes for special purposes, hardly any two transformers are alike within the range of "everyday requirements," because of the customers' widely differing specifications. It seems, however, that apart from "specials" and features arising out of customers' predilections, there is a general common manufacturing basis for transformers of sizes up to 1,500 kVA and for operation up to 11 kV. With still wider deviations from the common line, another manufacturing basis can be visualized for a range of transformers above this size and operating voltage, up to certain higher limits, but in this article we propose to confine our attention to the lower range.

Before detailing any of the processes we must stress the importance attached to the policy of giving the Design Department the greatest possible working scope. A special works specification which it draws up for every job, serves as specific instructions for the operatives in all departments, and the picture thus presented of the whole job is evident at all stages of manufacture. Although there is a definite sequence of operations in the making of the transformer, many of the components are constructed independently and at the same time, and are not introduced until the later assembly stages.



Horizontal covering machines will each apply four lappings in any combination of paper and cotton in one operation

It will be convenient first to deal with the production of the coils, the first stage of which is their insulation. Round or strip copper is selected according to the physical requirements consequent on the electrical loading, and as a general rule this resolves

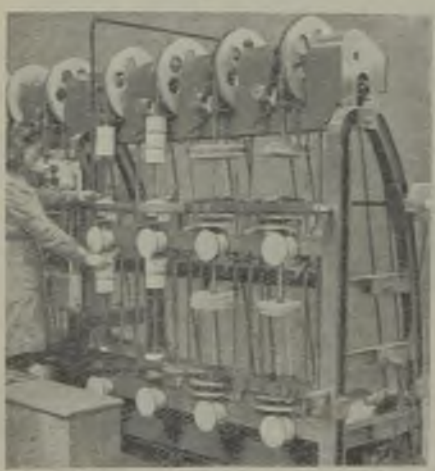
into round conductors for high-voltage (low-current) coils and strip or " rectangular " section copper for low-voltage (high-current) coils. The next decision is what kind of insulation shall be used, and this again is generally dictated by the coil voltage—paper for high voltage and cotton for low voltage; but paper insulation is frequently covered with cotton for mechanical protection, at the same time adding to the insulation. High-grade Manila paper is employed, and to ensure sharp clean edges this is cut into strips of the required widths on the job, wide sheets of paper being passed under roller knives with pre-set spacings. The paper strips are half lapped when wound on the conductor, and at least two layers are wound in reverse directions, which actually results in four layers of insulation and avoids interstices when the conductor is bent or stretched. The horizontal machines which are employed for strip covering, will each apply in one operation four lappings in any combination of paper and cotton. The selection generally depends on the level of the interturn insulation specified by the customer.

In winding a l.v. coil, a shaped pressboard end piece is first applied . . .

. . . the coil ends are taped and additional insulation is applied

The vertical machines used in covering round conductor will provide two coverings of paper and/or cotton in one operation, and if further applications are required the conductor is passed through the machine a second time. So as to afford a continuous length of copper in any one winding the ends of the strip lengths, as supplied, are successively butt welded as they pass through the lapping machine. This is done by the use of a special electric butt welding machine suspended from an overhead runway system conveniently near the lapping machines.

. . . the conductor is usually arranged as a bunch of strips and interleaving pressboard and distance pieces are placed between the layers



Vertical covering machines will provide two lappings of paper and or cotton in one operation

To complete the description of the major insulation work we have to refer to the permanent formers or linings on which the coils are wound, the intercoil spacers, the end distance blocks and the wedge-shaped strips arranged longitudinally around the periphery of the former and along which the dovetailed spacers slide. All these are usually constructed of oil-impregnated pressboard (" Elephantide "), and there is a definite constructional policy behind the use of this material, in that its dielectric constant is fairly close to that of the transformer oil in which it has to operate. The pressboard formers are shaped cylindrically from sheet in simple three-roll machines

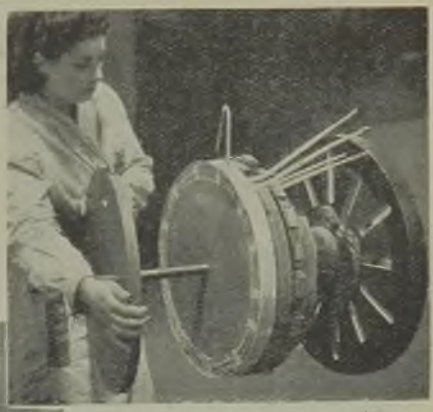
like metal-bar and sheet-benders. Band saws are used on straight cuts on pressboard and circular spacers are dealt with on jig saws. The material is rather difficult to cut because it rags at the edges, so these are treated on finishing machines, the edges being merely held against a sandpaper band running over a couple of rollers, either horizontally or vertically.

Dovetailing the grooves of the interspacers is an interesting case of precision machine-tool work. Flame cutting for the production of clamping rings, for burning holes through casings and for cutting out channels for leads, precision drilling of holes in the transformer tanks and arc welding for frame construction are some of the other auxiliary processes which are not always evident when following the production-flow line, but which are essential to the success of the major operations. They are also representative of the centralized precision work which is carried out in a particularly well equipped central machine shop such as the one which we inspected.

In the case of h.v. winding wood collars effect the end-to-end dimensions . . .

. . . two coils are normally wound at a time: the tie tape is most important

In the actual winding of the coils the designer's " electrical specification " plays a bigger part probably than in any of the other processes. And here too the " snag " in the use of the word standard is more evident than it is in connection with most of the other processes. The designer's specification gives the size of the conductor, the number of turns, the positions of tappings, the dimensions and positions of spacers, and so on, all worked out to meet the requirements of the consumers who call for widely different copper and iron losses, apart from all manner of sizes, voltages, tappings, etc. Having got a clear picture from the designer's specification, the operative sets up his former, with the end flanges, which is often in the form of the pressboard lining already referred to, the cylinder being first clamped at the lap, where it is then bonded. For the smaller coils the winding set-ups are usually on bench-mounted machines, while for the larger coils pedestal-mounted machines are used.

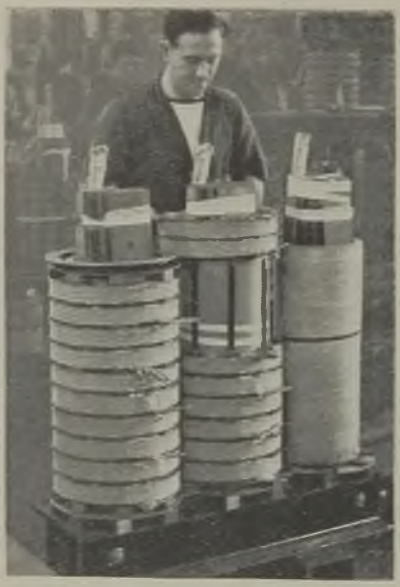


The last turn is hand taped

Winding proper is certainly not " everybody's job," and a progressive scheme of training is a definite part of the con-

There comes a point where cross-over winding does not offer sufficient strength, and disc winding is then adopted

structional work. Every effort is made to get young people to start with a training in the repetitive winding of very small work—choke



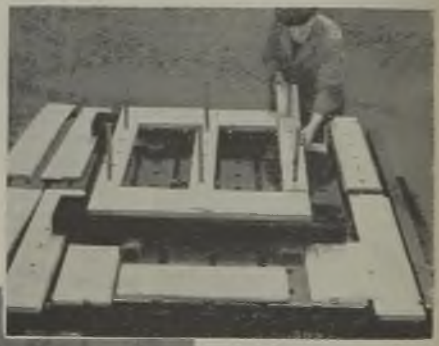
The yoke is removed for the assembly of the coils, the l.v. coil is first slipped (right) on, then insulation and distance pieces and then the h.v. coil

coils, for instance. The rest is then a progressive scheme of up-grading of those who produce the best results, always with an eye on the first aim—the tight coil.

To refer first to the winding of a low-voltage coil: after applying the distance pieces a tapered pressboard end-piece is first applied with the coil end to the cylindrical former or lining

Making the off-load tapping switch is essentially a mass-production job; left to right — placing tapping board on spider, shield, contacts and forks, bakelized Y clamp, complete assembly

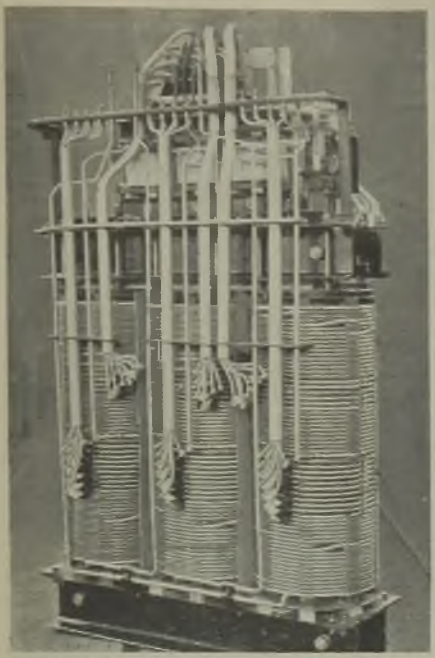
to produce a regular end to the winding, i.e. to "take the helix." This shaped end-piece also insulates the coil from the core, and at the point where the lead-out leaves the coil additional insulation is provided by the insertion of mica. The conductor is usually arranged as a bunch of strips, and the lead-out is first clamped in position and taped overall. At about the centre of the coil, corresponding to the positions of the tappings on the high-voltage coil to be applied later, so as to balance the ampere-turn distribution, the dovetailed spacers are slid into position along the distance pieces. The spacers also regularize the complete assembly with regard to the overall physical dimensions and the turn requirements. The tie-tape is of great concern to the winder who, by deft interleaving, securely anchors the coil at each turn. On the completion of the first layer another shaped end-piece of pressboard is applied again to accommodate the helix. A sheet of interleaving pressboard is then placed over the first layer, followed by a set of distance pieces, and the winding back of the second layer is carried out in much the same way as that of the first layer. On completion



The laminations are built up on the frame members with leg and yoke plates interleaved at the corners

of the coil, the lead-out, the additional insulation, and so on, are all applied to conform with those at the other end.

In the case of the high-voltage coil, the pressboard lining is placed in position on the former assembly and both end flanges are bolted up on the winding spindle before winding proper takes place. Wood



Great attention is paid to lining up the risers : the h.v. side

collars define the end-to-end dimensions of the assembly, and intermediate collars set the limits to the actual coils. Two coils are normally wound at one time. Placing additional pieces of pressboard over the join of the lining, hand taping the coil end, and placing the tie tapes in position are also preliminary operations.

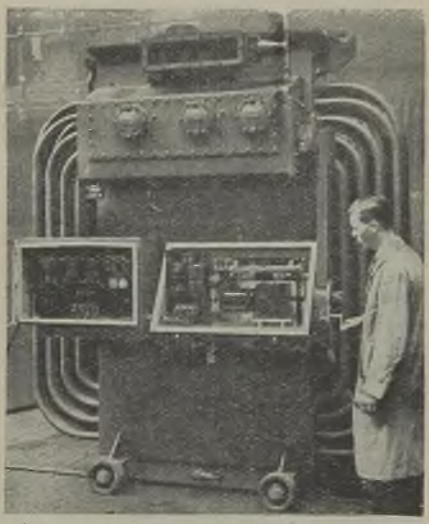
In some cases the end turns are hand taped, sometimes with varnished cloth tape in the case of the higher voltages. The tapping leads are similarly treated. Finally, the end flanges are removed before the coils are taken from the machine. The method described is the cross-over scheme of construction which probably meets most customers' specifications. There comes a point, however, where this method does not afford sufficient mechanical strength, and continuous disc winding is then adopted. The size of the conductor employed, and demands for particularly low iron and copper losses influence the choice between the two methods. Instead of winding a layer along the former, the first turn is followed by another immediately over it, so that a disc coil section is first built up radially from the former. A second disc is then constructed from the outer turn, working inwards, with suitable spacers between the discs which are slid on to longitudinally placed spacers between the turns and on the former. The difficult and skilful job of winding a disc inwards is actually done by first winding it outwards, then collapsing it and reforming it as an inward winding. To protect the completed coils during the subsequent assembly they are immersed in varnish.

Core construction which goes on side by side with that of the coils is governed by a policy which calls for the core and frame as a single self-supporting unit which will withstand any forces arising from an external short-circuit. The laminations or core plates, from outside specialists, are received already cut correctly to size and varnished or "insulined" to reduce eddy currents to a minimum. The frame consists mainly of structural steel channel sections on either

While still hot the internal unit is immersed in the oil-filled tank

side at both the top and bottom of the core and yoke unit, i.e. lined up on either side of each yoke member. The channel frame members for one side are first laid out on a bed-plate and the laminations are then built

up on these in such a way that interleaving of the yoke and leg laminations takes place at every corner in the case of the rectangular core assembly. When the required number of laminations have been correctly placed, the frame members for the other side are put on and the whole frame is bolted up with the core unit. The actual laminations are bolted together through the legs in all but the smaller transformers for which taping is



The necessary relay equipment associated with on-load tap changing can be mounted on a panel on the transformer

employed. The bolts are insulated to prevent contact between them and the laminations.

Before the coils can be put on the legs, it is necessary to withdraw the top yoke member. The low-voltage coil is slipped on each leg first, after the introduction of clamping rings, spacers, etc., and following more of such devices, including an insulating sheet around the l.v. coil, the h.v. coil is slipped on. After a final adjustment of the clamping rings the yoke is then replaced with the correct interleaving of the lamination ends as they were placed on the bed-plate. At this stage the risers are placed in position, and wherever possible the h.v. risers consist of insulated flexible cable or pre-insulated copper rod. The fundamental requirements of low resistance, good insulation and mechanical protection are ensured by bringing out the tappings from the inner turns by copper strip, taken round the conductor, to the copper riser, and by careful insulation with pressboard and taping. Either pressboard or metal with bakelite bushings is used for clamping the h.v. risers which are brought up to a link board specially designed to prevent the detachment of any small part which might fall into the tank or coils.

On the low-voltage side tinned or lacquered bar copper is used for the risers which are supported by steel brackets from which they are insulated by pressboard separators. Attention is paid to the lining up of the risers so as to preserve the best possible conditions of field balance, and here, once again, reference must be made to the difficulty in attempting to define the "standard" transformer. All manner of different schemes are employed in the arrangement of the leads and risers, particularly on the high-voltage side. Where off-load tapping is required the switch is incorporated as part of the inner transformer unit in place of the h.v. link and terminal board. The production of the switch is essentially a mass-production job. It is built up with pre-jigged pressboards in tier formation around a central rod with a square bakelized moulding to which are clamped the spring-loaded moving contacts. The pressboards carry the stationary contacts.

Complete with its link board or off-load tapping switch the inner transformer assembly is now ready for the drying oven in which it is treated at 90 deg C in vacuum. While still hot the inner assembly its subjected to a final clamping and general tightening up, and is immersed straight away in the oil-filled transformer tank in which the insulation is impregnated as a result of normal constructional work.

The wide variety of tank shapes (see heading block), particularly with regard to the terminal arrangements, is another indication of the manufacturing problems involved. Where on-load tapping is required the switch is an external feature and provision has to be made for its fixing on the tank. To refer to only one type of on-load tapping switch. The tappings are brought out to fixed points. The moving contacts are carried on a chain and pinion-gear driven drum, and each moving contact carries a mercury switch which, by a cam operation, breaks the circuit after the main contact is severed. The necessary relay equipment associated with on-load tap changing can be mounted on a panel on the actual transformer or on a separate control board.

Our thanks are due to Mr. Weaving and to Mr. E. T. R. Ball, assistant general manager, for their assistance.

Views on the News

Reflections on Current Topics

SPEAKING in the Commons debate on the Address, Mr. A. M. F. Palmer, A.M.I.E.E., M.P., expressed the view that reorganization of the electricity supply industry was an urgent matter. No doubt there would be general agreement with this if there were any reason for believing that reorganization would relieve the plant shortage or enable more coal to be secured, but what effect will it have in these directions? It may be contended that reorganization will speed up rural and industrial electrification, but it is somewhat doubtful whether the present rate can be improved upon, in view of the shortage of materials. Even if there were acceleration the plant and fuel problems would not be brought any nearer to solution —quite the reverse. While reorganization has got to come (and in certain respects is desirable) I feel that there are other matters for the Government's attention which are really more urgent.

* * *

Those who attended this year's I.M.E.A. Convention at Blackpool wondered whether that would not be the last occasion of its kind in view of the impending reorganization of the electricity supply industry. They will all be pleased to learn that there will be at least one more Convention, for the I.M.E.A. Council is considering where to hold it and has gone so far as to commission two papers —by Messrs. R. Birt and F. W. Lawton— to be read at the Convention. Mr. Birt's subject is "The Law Relating to Electricity Supply"—a subject which will be considerably extended in the near future, although, I suppose, not on the side with which Mr. Birt will deal.

* * *

The virtues of a change of occupation— in this case from the more academic to the more practical aspects of engineering training —as a rest cure are evidently appreciated by students of the Imperial College of Science and Technology. This year the number of those taking part in the vacation work scheme of the I.C. Union has been considerably in excess of any previous year (more than two-and-a-half times the pre-war figure), and an average of about five weeks in each case has been spent in the shops. Visits to industries in Belgium and Switzerland have marked a new development in that arrangements have been made for giving vacation training on an international exchange basis.

* * *

The poster issued by the Electrical Trades Union in support of the nationalization of the electricity supply industry is not unattractive but it seems to me that it is a work of supererogation. Public ownership is now practically inevitable and so it is difficult to understand why the E.T.U. should have gone to so much trouble and expense. The poster says: "A Nationalized Industry Will Serve the People," prompting the question: "Who has been serving the people for the past fifty years or so?"

* * *

The poster was designed particularly for use on London Underground stations but I see that the London Passenger Transport Board has now decided that it cannot permit the poster to be displayed. According to the *Daily Herald* this decision has been made because the Public Relations Committee of the Electricity Supply Companies insisted that if the E.T.U. poster were shown the Board should also allow the Committee to exhibit its anti-nationalization posters. It is also said that the Board has a rule against political advertising in its stations.

* * *

There seems to be some lack of co-ordination between the Ministers of Fuel and Power and of Supply. While Mr. Shinwell deprecates the growing use of electric fires as pernicious peak producers, Mr. Wilmot proudly points to the greatly increased production of these appliances—twice as great as before the war. As an electrical man I honestly don't know which point of view I should approve.

* * *

Gas points have been installed for cookers in Eton Rural District Council's Swedish houses (twenty of them), but in every case the tenants have asked for electric cookers. This is a contingency which might have been anticipated in these enlightened days.

—REFLECTOR.

Commissioners' Statistics

Wartime Hiatus Filled

PUBLICATION of the Return of Engineering and Financial Statistics relating to authorized undertakings, suspended during the war, has now been resumed by the Electricity Commission. The new volume (518 pages), which covers the five years 1938 to 1943, is obtainable from the Stationery Office for £2 net compared with the 15s. charged for the last pre-war volume (1937-38) of 692 pages. Its make-up follows broadly that of earlier Returns, but both engineering and financial figures now come in one entry instead of in separate sections.

Undertakings are placed in alphabetical order, under headings of local authorities and of companies for England and Wales and for Scotland and of joint electricity authorities. Particulars relating to each year are given of the system of supply, generating plant, maximum load, load factor, kWh generated and purchased, kWh sold to various classes of consumers and number of consumers. The financial figures include capital raised and expended; revenue derived from different classes of consumer and other sources; average revenue per kWh sold in each class; works costs divided, where appropriate, into fuel, salaries and wages, repairs and maintenance, works consumption; and gross surplus (or deficit) and its application. A brief summary including 49 tables is followed by six pages of explanatory notes.

The summaries give year-by-year figures of total kWh sold and revenue received by all undertakings. The accompanying table relating to sales of electricity compares more recent information issued by the Electricity Commission for 1945-46 with 1938-39, the last full pre-war year, which is covered by the present Returns. The years of account for companies and joint electricity authorities end on December 31st and for public authorities in England and Wales on March 31st and in Scotland on May 15th.

SALES OF ELECTRICITY BY AUTHORIZED UNDERTAKINGS
1945-46 COMPARED WITH 1938-39

	1945-46				1938-39
A. Public authority undertakings, excluding C.E.B.	kWh sold (millions)	Per cent of total kWh	Revenue £ million	Pence per kWh sold	kWh sold (millions)
Light, heat and cooking	8,387	44·5	47·7	1·36	5,827
Power	9,752	51·7	35·0	0·86	6,306
Public lighting	168	0·9	0·8	1·20	309
Traction	547	2·9	2·1	0·94	566
Total	18,855	100·0	85·6	1·09	13,088
B. Company undertakings					
Light, heat and cooking	3,937	31·3	30·6	1·86	2,611
Power	8,134	64·7	30·1	0·89	4,451
Public lighting	31	0·3	0·2	1·94	70
Traction	468	3·7	1·5	0·76	511
Total	12,570	100·0	62·4	1·19	7,643

	1945-46			1938-39		
C. All undertakings, including C.E.B. for traction	kWh sold (millions)	Revenue £ million	Pence per kWh sold	kWh sold (millions)	Revenue £ million	Pence per kWh sold
Light, heat and cooking	12,324	78·2	1·52	8,438	56·2	1·59
Power	17,886	65·1	0·87	10,757	29·3	0·65
Public lighting	200	1·1	1·31	379	1·6	1·01
Traction	1,247	4·3	0·83	1,254	3·1	0·59
Total	31,657	148·7	1·13	20,828	90·2	1·04

United States Expansion.—*Electrical West* says that unprecedented demands from new population, new industries and new farms have started the greatest power system expansion programme in the history of the Western States. By the end of 1949 it is proposed to add 2,573,375 kW to the plant capacity of the region, equal to an expansion of 30 per cent. Of this total the U.S. Bureau of Reclamation is to provide 1,300,000 kW, including 648,000 kW at Grand Coulee, 225,000 kW at the Davis project on the Colorado River below Boulder Dam, and 150,000 kW at Shasta Dam. Plant extensions by the Pacific Gas & Electric Co. aggregate 378,375 kW, by the Southern California Edison Co. 275,000 kW and by the Los Angeles Bureau of Power & Light 290,000 kW.

Architects and Builders

Co-operation with the Electrical Industry

THE need for close co-operation between architects and electrical engineers in the designing of new buildings was stressed by MR. A. L. OSBORNE, F.R.I.B.A., London, when speaking on "Electricity and the Architect" at the Royal Station Hotel, Newcastle-upon-Tyne, on November 28th. He was addressing a conference called by the Northern Counties Area Committee of E.D.A., attended by about 180 architects and Council surveyors. MR. T. E. DANIEL, borough electrical engineer, Darlington, presided.

Mr. Osborne said that the services that electricity could render to buildings of all types were so widespread that very many architects were not aware of them. An early discussion on the problems involved in any scheme, between architect and electrical engineer, might reveal unsuspected solutions, often resulting in economies and improvements. In the coming years there would be emphasis on the really efficient use of all products and materials. In housing, for example, if greater attention was paid to thermal insulation the manifest advantages of electrical space heating could be enjoyed by far more people at less cost. In larger buildings, the installation of heating panels in walls, floor and ceilings obviously called for consultation between engineer and architect, but schools were a particular case where this was essential in view of the large glass areas provided.

Installation Developments

The actual installation for the average small house had undergone a revolution with the advent of the E.D.A. standard service unit in conjunction with the new ring main system of wiring, whereby any number of plug points could be installed in such a house without any increase in the cost of wiring. Together with the new universal plug, this constituted a great advance.

Fluorescent lighting, though not best suited to the home, was making great headway in factories and offices where considerable areas required to be lighted for long periods. Here the electric lighting engineer should be asked by the architect to give his assistance in the early days of the design, so that the very best results might be obtained from the combined skills and experiences of the two professions. Electricity would supply light, heat, power and refrigeration from the same series of cables that ran through the building. These services would be in increased demand as time went on, and provision must be made for this at the start if expensive alterations were to be avoided in the future. It was to the advantage of both professions to collaborate in the service of the community.

The conference was preceded by a luncheon and at the conclusion of the discussion on Mr. Osborne's paper, the E.D.A. film "Their Invisible Inheritance" was shown. Mr. R. N. MacKellar, F.R.I.B.A., president of the Northern Architectural Association, proposed a vote of thanks to E.D.A. and Mr. Osborne.

Adequate Services

Mr. Osborne was again the speaker at a conference for builders held on Monday by the South-East and East England Area of E.D.A., at the Connaught Rooms, London. Opening the conference, MR. G. P. DIXON, Eastern Committee chairman, said that builders, being in a hurry to erect the four million houses required, were apt to overlook the vital necessity for a full service of electricity in every house, shop and factory. Economy in electrical services did not "make sense"; the public was going to demand a full service. Electricity was becoming more and more associated with the structure of the house. Its use for heating would enable chimney breasts to be dispensed with, while electric water heating would simplify plumbing.

Mr. Dixon made a strong plea for adequate room for the house-service unit which E.D.A. had designed, and warned builders against untrained men who set themselves up as electrical contractors. He also stressed the necessity for early application for electricity when building houses. It did not follow that because electricity was already available in a particular area that the local mains and substations were of adequate capacity to deal with a large new load. The object of the conference was to promote good planning.

The Simon Report lay undue stress on solid fuel. E.D.A. had contributed a memorandum to focus attention on the merits of electricity, which was easier and cheaper to transmit than other fuels. Publication had been resumed of the Association's "Electrical Handbook for Builders."

"The Influence of Electricity on Building Design and Construction" was the title of Mr. Osborne's address. He declared that builders should aim at keeping up standards despite shortages. Builders were so busy to-day that they omitted to notify electricity supply authorities of building developments. Consultation in choosing sites would be of great assistance in overcoming problems relating to the density of load.

The ring-main system had much to recommend it and the standard 13-A fuse plug would much simplify installation arrangements. Using these it should be possible to submit to the Ministry of Health schemes which would be

so reasonable that there would be no tendency to cut down on the costs. He could not see any other way of getting amenities to the people but through electricity.

There was no reason why water heating should be tied to a flue. The electric water heater would give a greater amount of freedom and simplify plumbing. He specially praised the under draining board unit, and even if this were not installed at the time of building he suggested that a power point should be provided at a suitable spot. He forecast that in a few years' time coal would be of much more value for producing plastics than it would be for fuel. The coal-electric system was all right in its way but he advised getting an electrical engineer to "vet" the system as there were several "snags." Well-planned heat insulation often saved 10-40 per cent in fuel consumption.

Speaking at lunch, MR. V. W. DALE, general manager and secretary of E.D.A., said there were two things they had got to watch—the authorities and themselves. There was evidence that when any cutting down on price was to be done it was the electrical installation which was the first to suffer. In the course of a few days the Association would be issuing a challenge to the recommendations of the Simon Report.

At the conclusion of the lunch the chairman said that it had been suggested that a future meeting should be arranged between electrical engineers, and builders, architects and electrical contractors. At a film show which followed the conference saw "Hot Evidence," "Their Invisible Inheritance" and "Too Easy."

Building Specialists

THE principal guest at the annual luncheon of the Federation of Associations of Specialists and Sub-Contractors (of which the Electrical Contractors' Association is a member), held on November 26th at the Dorchester Hotel, Park Lane, W., was the Minister of Works (Mr. G. Tomlinson).

In proposing the toast of H.M. Government, MR. J. L. MUSGRAVE, president of the Federation, said that the contribution which the industries associated with the Federation had been able to make to the progress of reconstruction had been limited by over-riding shortages of materials. While they and the Government were fully aware of the effect of these shortages, the general public did not seem to be sufficiently informed. Steady and increasing production could not be achieved without a planned balance in the programme promoted by the Government. The building of houses should receive priority, but the full potential of the industry could not be developed unless those sections of it which were concerned with building other than housing were brought fully into play. The trade associations played a useful part not only in negotiating for the employers with the employees through their trade unions, but as an appropriate channel for dealing with Government Departments in connection with the affairs of their respective industries. He thought that more frequent meetings on a wider range of topics between representatives of employers' associations and trade unions should be encouraged. The Advisory Committee set up to advise the Minister of Works on matters concerning the specialist trades was willing to continue and to extend its services.

MR. TOMLINSON, in responding, said that the past year had been one of intensive effort to overcome the shortage of materials and considerable progress had been made. Ceramics for electrical components were in short supply, but despite this it was anticipated that the output of electrical components would have reached pre-war level by the end of the year.

The toast of the guests was proposed by MR. W. R. COWEN, chairman of the Council of the Federation, to which MR. M. WATERHOUSE, F.R.I.B.A., vice-president of the Royal Institute of British Architects, responded.

Equipment of New Houses

BUILDING problems were discussed at the Conference of the House-Building Industries Standing Committee which was held in London on November 28th.

The conference was opened by Sir Wavell Wakefield, M.P. for St. Marylebone, who advocated the removal of restrictions and controls. Mrs. M. Pleydell-Bouverie, organizing secretary of the Committee, presented a report showing the work done by the Committee during the past eighteen months. The Committee was formed in January, 1945, with the object of showing in a practical way the improvements possible in planning, construction and equipment of houses, and it had constructed a number of demonstration houses in various parts of the country. A national competition was held in which builders were invited to submit architecturally-designed plans for houses not exceeding 900 ft superficial area, from which twenty-seven plans were selected for building. In these houses the latest improvements in domestic labour saving were incorporated. Valuable results were achieved through the close co-operation of various associations who are represented on the Committee, of which E.D.A. is a member.

At the conference the points of view of the architect were put forward by Mr. D. Poulton, F.R.I.B.A., Mr. R. King gave some instances of the difficulties with which a builder has to contend in obtaining permits, and Mr. A. Jarvis, representing the Council of Industrial Design, spoke of the Council's work in encouraging furnishings of improved design.

The speeches were followed by a discussion on the problems facing the building and allied industries.

Tariff Considerations

Strictly Equitable Charges Impracticable

By Fredk. W. Purse,
M.I.E.E., M.I.Mech.E.

LET me state straightaway that I am not proposing to propound any new-fangled tariff or a re-hash of any existing ones; there are far too many already. The Electricity Commissioners have established a third committee to go over the ground again and presumably they will confine their attention to methods of charge and not encroach upon the question of financial make-up of individual tariffs or the relation of one tariff to another. Nevertheless, we have been entertained in and out of season with unending proposals and arguments in regard to the correct manner of equitably allocating the various costs between the tariffs for various services with everyone claiming that they have slavishly adhered to strict financial prudence; now we have a counterblast in the report by the Advisory Council on Domestic Fuel Policy.

Mr. Purse emphasizes the impossibility of accurately allocating costs to each form of supply and warns the industry against the implications in the report of the Advisory Council on Domestic Fuel Policy

Let us examine what this *impartial* group of financial purists have to say upon the intricate subject of electricity tariffs:—

> "Prices charged for the various forms of fuel should be related as closely as possible to their cost of production and distribution. The theory of the matter is relatively simple: it is much more difficult to apply in practice. The determination of the cost involves a decision about the correct apportionment of the standing overhead costs in regard to which there may be difference of opinion."

Then in an appendix on Domestic Electricity Tariffs is a report by the Economists' Sub-Committee and we find the following:—

> "It is impossible to say, in a precise figure, what is the cost of any particular part of the total supply of electricity. The nearest that it is possible to approach to a statement of absolute validity is that a rate which does not cover at least the marginal costs of providing the load to which it is applied is an uneconomic rate. To estimate revenues received is not difficult; this, however, cannot be said of the problem of determining the marginal costs of a particular load. The determination of capital costs in respect of generation, transmission, and distribution capacity attributable to a particular load presents very great difficulty for the simple reason that different loads largely employ the same capital equipment at different times."

Incidentally, in passing, it is interesting to note that whilst the Council, on the one hand, was seeking incriminating evidence of one tariff subsidizing another, yet it had no hesitation in boldly recommending that "the Government should grant a subsidy to ensure the installation of new grates (for solid fuel) in place of old ones on the largest practicable scale." It also recommended "that even in thinly populated rural areas, the ultimate objective should be to lay on electricity in every house, so long as this does not throw *excessive* burdens on the consumers of electricity elsewhere."

However, to revert to the main theme, namely, the cost of supplying any particular demand, the Council has admitted that, in common with any other commodity or public service, it is not possible to segregate costs to any degree of accuracy to ensure equality of charge for equality of service. This point was amply demonstrated in an article by the Financial Editor of the *Observer* in the issue of October 13th last.

In reviewing the subject of nationalization of the railways and dealing with the question of subsidies he makes these observations:—

> "This leads us into deep waters. It is commonly said that heavy freight traffic and workmen's fares are subsidized by the earnings from general merchandise and ordinary passengers. But it is extraordinarily difficult to dissect the costs which each class truly entails."

He then gives a specific example and goes on to say:—

> "It is this problem of apportionment which bedevils the job of making accurate estimates of the economic cost of rail transport for different types of service and of condemning—or justifying—differential rates and subsidies between different forms of traffic."

It is only necessary to substitute electrical terms for railway terms and this financial expert opinion fits our case admirably. Why should the electricity supply industry be continually attacked because it runs its

business on sound commercial lines and why should it worry itself about slide-rule accuracy of its various tariffs? It has worshipped as a fetish in the past that awful slogan "cheap and abundant" and has been spurred on to do so by the jealousy of alternative forms of light, power and heat.

On merit electricity is unassailable and so its competitors have sought to retard its progress by accusations of discriminatory tariffs, by urging insufficient revenue-producing extensions, and inequitable standardization of systems and voltages and now by the Fuel and Power Advisory Council urging upon the Minister of Fuel and Power "that the outcome of the competition between gas and electricity and the influence exercised by the systems of tariff upon the progress of two industries should be kept under constant examination." What a glaring example of the "closed shop" against electricity.

The attention which the Advisory Council has devoted to electricity tariffs needs most careful watching and indeed an exposure of the weaknesses and contradictions of its entire report is long overdue from the electricity supply industry. Has the threat of nationalization brought about such a condition of lethargy that no one is further interested in a promotional tariff for all-electric service? Are we to stand by while the coal and gas industries claim protection against their common enemy which is at the same time the public's friend?

Municipal Reports

Liverpool.—Many inquiries from industrial managements for services and supplies are reported by the city electrical engineer (Mr. J. Eccles) in his survey of the year's trading results. To meet these known and anticipated demands the distribution system is being strengthened and extended by main transmission lines from Clarence Dock to supply the central city load and by new feeders at Marsh Lane, Aintree, Maghull, Knotty Ash and Huyton. During 1945-46 a total of 650·6 million kWh was sold at an average price of 1·079d., compared with 646·3 million at 1·022d. per kWh in the preceding year.

On the generating side, the plant capacity was reduced from 329,000 to 323,000 kW by the taking out of commission of a small set at Lister Drive which had reached the end of its economic life. The maximum load on the stations was 305,440 kW (against 302,350 kW), with an output of 1,238·5 million kWh (1,288·3 million). A fuel price index shows that, taking 1936-37 as 100, the figure for 1945-46 was 274.

Income rose by £136,218 to £3,177,276 and working expenses by £96,868 to £2,594,171. On the other hand debt charges and income tax (after adjustment in respect of previous years) were lower and the balance on net revenue account was £182,306 (against £60,109); £82,989 (nil) is provided for generation expenses disallowed, £20,000 (same) for war damage contribution and £50,000 (nil) for rate aid.

Great Yarmouth.—The annual report on the undertaking (engineer and general manager, Mr. G. T. Allcock) gives many interesting details of the year's activities, both technical and trading. For example, the method of distribution adopted for the south-western rural area, consisting of scattered manors now mostly occupied as farmhouses, is described. The transformers and pillars for these supplies are protected against the weather by Anderson shelter sheets, with steel mesh gates made from Morrison shelter parts. Reference is also made to the wiring service section started in November last year to deal with the installation of domestic apparatus and carry out small repairs and extensions to wiring. The charge-hand responsible carries stock and tools in his van to tackle any ordinary job, and can quote, carry out the work, and collect the money.

Despite the loss of most of the Services load there was an overall increase in sales of 13·8 per cent to 52·9 million kWh. During the war, in which the town suffered considerably, the undertaking incurred losses aggregating some £90,000. In 1944-45 there was a surplus of £6,956—the first for six years—and last year this was improved to £14,253. Of this amount £4,642 came from the sale of apparatus and from contracting work, in which there was exceptional activity during the year. Income from the sale of electricity, £269,399, averaged 1·221d. per kWh sold (against £234,581 and 1·209d.).

Stockton-on-Tees.—The considerable industrial developments in progress or proposed in the undertaking's area were outlined in our issue of November 22nd. The general manager and engineer (Mr. N. Hunter), in his report for 1945-46, says there is no doubt that the demand for electricity, both domestically and industrially, will continue to progress. The undertaking's showrooms have been a centre of activity and the cash sales during the year reached a record figure. It has, he says, been a constant struggle to keep pace with the increased demand in the face of restrictions. A total of 27·4 million kWh was sold last year (against 26·2 million in 1944-45), the average price received per kWh sold falling from 1·30d. to 1·26d. Income amounted to £155,453 (£145,293). The gross profit, at £19,653, was down by £10,005, but loan charges and income tax were also substantially lower (£21,468 against £44,848) and the net result was a deficit of £1,816 against a loss of £15,189 in the previous year.

Industry and the House

Party Views on Nationalization

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

ALTHOUGH shortages continue to be a theme of electricity in Parliament, it is a theme likely to be overshadowed in the present session by the more powerful one of nationalization. In the debate on the Address—to continue the musical metaphor—there was a preliminary tuning up on both sides of the House for the performance that is yet to come. By listening carefully to the notes that were sounded it was not difficult to foresee what form the work would take when fully orchestrated.

The Government's case will be not only that electricity supply must be nationalized as part of a general plan for State control of power, but that in fact—to quote Mr. Morrison—it is " the most simple, the most straightforward, and complete case for public ownership." On that point, the Conservatives, lining up behind the McGowan Report of 1936, will at once differ, urging in the words of the report, that " adequate grounds do not exist for an immediate and complete reorganization . . . under public control by the setting up of regional boards which would buy out all existing undertakings."

Assessment of Compensation

As Mr. Osbert Peake, speaking with the authority of a former Financial Secretary of the Treasury, observed, " the problems of assessing value for the purposes of compensation will be infinitely more complex because we have both private enterprise and public municipal enterprise in the field. . . . It is a pity that the best brains in the industries will be bound for the next two or three years to be employed on these problems, which will do nothing to advance the efficiency or the development of these enterprises."

Or, as affirmed in the amendment on nationalization of electricity supply (which was not called, but provides the pattern for the amendment to be tabled when the Bill is introduced), the Government policy will " impede the improvements and extensions already planned but hitherto hindered by statutory restrictions and wartime damage."

But the Opposition will not be sheerly negative. It is recognized that nothing can now avert the nationalization Bill being passed by the Labour majority, and Tories will seek to minimize the undesirable effects and secure as unshackled a responsibility as possible for those who will have the task of managing the nationalized industry.

Some Conservative members indeed feel that nationalization is coming sooner or later and nothing much can be gained by taking up Parliamentary time opposing it. For one thing it is true, as Mr. Douglas Jay pointed out from the Government side of the House, that " almost every expert body which has inquired into this industry in the last ten years has reported that we can only get technical progress and proper reorganization if we integrate the present nnumerable units of all sorts and sizes and ownerships into one organization under Government control."

The Companies' Attitude

For another thing, the electricity companies have only recently started to state their case. As the general manager of one company remarked to me recently, " It is much easier to make the case for nationalization than against it." If the companies could be persuaded to be equally realistic and prepare to assume their new responsibilities after nationalization, but in the meantime advise members on safeguarding provisions that should be inserted in the Act, the issue might yet be managed in the interests of an efficient service—which, in fairness, is what is desired basically by all parties.

Before going on to review the current cries over shortages, I should like to refer to a high policy issue affecting another branch of the electrical industry, this time the manufacturers of equipment. The Labour member for Elland, Mr. F. A. Cobb, returned, in the debate on the Ministry of Defence Bill, to the topic he opened when defence was debated a month earlier. After emphasizing again the importance of effective liaison between electrical research and production " right throughout the Commonwealth " in time of peace, Mr. Cobb went on to make some arresting observations.

Some of the big units in this country, he suggested, were not owned by British capital, and the Minister of Defence might be advised to discover what proportion of the capital in the radio and electrical (and other) industries was under foreign domination. It might be that in such circumstances research would be centred elsewhere, while the companies in Britain would be confined to production and selling. An investigation would show that in the recent war, and even before it, Ministers were sometimes precluded from giving work to such contractors for fear of "where the information would go." The work had to go to "smaller concerns which were undoubtedly British owned." Mr. Cobb continued: "If this process of the domination by foreign interests of British industries goes on unchecked—and we do not know to what extent it is going on—we may find . . . that some of the big production organizations in the country which would be our principal contractors in time of war, could not be taken into our confidence. At the moment, very large sums of money are being allocated, or being sent overseas, for research which in my view should be done in this country."

Need for Clarification

Unfortunately, despite the hope expressed from the other side of the House by Commander A. H. P. Noble, D.S.O., that the points raised by Mr. Cobb would be carefully considered, the Prime Minister made no reference to them in winding up the debate. If there is substantial truth in the allegation it is clear that action should be taken to safeguard British interests; if not, the industry deserves to be publicly vindicated.

Now for a quick review of the shortages situation. The shortages continue, but at least there were promising signs. One shoe which is pinching M.P.s personally in their work is a dimly-lit Chamber! But, Mr. Tomlinson in a written reply said he declined to install improved lighting because the labour and materials are required elsewhere. This may be some consolation to the householders of Ham in Somerset who, according to another questioner, are using oil lighting because of non-delivery of electrical fittings, and to the cottagers of Smallburgh in Norfolk whose lighting has been delayed by the non-availability of works licences from the regional and local authorities. Local lamentations these may be, but they indicate that we are far from being out of the wood just yet.

On the credit side there was a reassuring statement from Mr. Belcher that at no time, in discussions between Departments and industry, has it been contemplated that certain industries should be closed down through lack of fuel—though it remains a fact that some firms have been gravely hampered by the fuel shortage. Discussions, added Mr. Belcher, were proceeding about arrangements for the supply of fuel to industry this winter, in the event of supplies being insufficient to meet the increasing industrial consumption.

There was a certain cold comfort too in Mr. Wilmot's statement that every encouragement has been given to the electric motor industry to increase production. This has consisted of allocation of resources for expanding capacity, including factories in development areas, a high preference for labour requirements, the protection of skilled workers from call-up, and assistance in the provision of raw materials. The Supply Minister could not arrange for an increased supply of motors to machine-tool makers because "other important industries" wanted them too. There is no system of Government allocation, in fact, of motors of less than 1,000 H.P., and Mr. Wilmot did not consider such a scheme practicable.

Porcelain Production

The Minister also gave another assurance affecting the industry, namely that attempts were being made to increase production of the smaller porcelain accessories indispensable to electrical installations. Every encouragement was being given to new firms to enter the industry and to established firms to expand their existing capacity. In addition, four Royal Ordnance Factories had undertaken production.

In this first fortnight of the new session repeated emphasis has been laid on full production as the nation's over-riding need, and the work of joint production committees in the factories and of the Production Advisory Council at the top has been more than once under discussion. Industrial recruitment, training, and technical education have also been the subjects of detailed statements, and if space permits in a subsequent article I shall try to make some fuller references to these, vital as they are in enabling the electrical industries to discharge their peacetime responsibilities to the full.

CORRESPONDENCE

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

Motor Starters

IN his article on "A.C. Motor Starters" in your issue of November 22nd "Rotor" states that "the overload trip is a medium by which the current is usually cut off should an earth fault cause the metallic sheathing or casing of the conductor to become alive with accompanying risk of fire or shock."

I realize that he is not referring to motors or starters, but even so, the ordinary overload relay is not the type of apparatus on which one can rely upon for protection against shock. This relay will only operate in case of an earth fault if the vector sum of fault current and load current is in excess of the tripping current. In order for this to happen the earth fault current must be comparatively heavy, which it can be only if the earth resistance and the resistance of the earth continuity conductor are low enough for this fault current to develop. The I.E.E. Wiring Regulations stipulate a maximum of one ohm for the latter resistance, but how often is this figure adhered to in practice? Consequently, dangerously high potential differences between any metal casing and earth may develop without the fault current causing the overload relay to trip.

The better method of protecting the operator from shock is surely to employ earth-leakage trips, which will cause the faulty installation to be disconnected when the potential difference between the casing (or the motor or starter) and earth reaches a predetermined value.

Hoole, Chester. B. FELTBOWER.

Electric Motor Enclosure

IN his article in last week's issue Mr. K. W. Jerome suggests a number of definitions for motor enclosure, additional to those given in B.S.168, and included in these suggestions is one for "Drip proof." But this type of enclosure is already covered by clause 21, section 3, of the British Standard.

With regard to flameproof enclosure, the author's reference to B.S.270 though quite correct so far as B.S.168 is concerned, is a little archaic. In 1939 there appeared a later Standard dealing with electric motors (B.S.170) in which a flameproof machine was defined as one constructed in accordance with B.S.229 and this is still the standard definition to-day. B.S.229 is the British Standard which deals comprehensively as well as authoritatively with "Flameproof Enclosure of Electrical Apparatus."

In suggesting that a gas-tight enclosure is a total enclosure with gaskets the author has overlooked the fact that motors "breathe" through their bearings—the reason why British Standard totally-enclosed motors are not defined as "air-tight" (still less "gas-tight").

Finally one point should be stressed in connection with all forms of total enclosure—the necessity for making provision to drain the machine automatically of condensed moisture.

Chislehurst, Kent. A. N. D. KERR.

REGARDING the new suggested definitions proposed by Mr. K. W. Jerome I wonder if the definition for submersible motors could not be improved upon. A considerable number of these submersibles, especially in oilfields in Oklahama, are working in crude oil, and in other countries they are working in transformer oil for circulating it through the coolers.

Most submersible motors used in this country admit the liquid into the motor. Furthermore a number of types permit the liquid to flow around the (insulated) stator windings. I would therefore suggest the definition:—"Capable of operating in a liquid."

Gateshead. H. E. SOMMERGUTH, A.M.I.E.E.

Practical Electrician's Pocket Book

THE forty-ninth edition of "The Practical Electrician's Pocket Book," for 1946-47, which has just been published (*Electrical and Radio Trading*, 186, High Holborn, London, W.C.1, price 4s. 6d. net), has several new features covering tubular fluorescent lamps, horticulture, large-scale cooking and electronic instruments. A number of chapters, including those on generators and motors, illumination and wiring installations, have been revised. New material includes rewinding small motors and service guidance on refrigerators, while the table of supply voltages has been brought up to date. To facilitate reference, the sections have been regrouped and a new index compiled.

Electrical Machinery Traders

First Annual Dinner-Dance

OVER two hundred people spent a very enjoyable evening at the Grosvenor House Hotel on Wednesday last week, the occasion being the first annual dinner-dance of the Association of Electrical Machinery Traders which now has about eighty members. Mr. W. E. Lawton (chairman) presided and the principal guest was Mr. William Leonard, Joint Parliamentary Secretary to the Ministry of Supply, who deputised for Mr. Arthur Woodburn, his colleague at the Ministry, who was prevented from attending by ill-health.

Mr. W. E. Lawton, chairman of the Association of Electrical Machinery Traders, Mrs. W. E. Lawton, Mr. T. A. Atkinson, vice-chairman, and Mrs. T. A. Atkinson, at the annual dinner of the Association.

There was a commendably short toast list which MR. LAWTON opened by proposing the health of the guests, stressing the fact that this was a light-hearted occasion and speeches would be bright and brief. He made reference to a handsomely-produced brochure which had been distributed to the guests setting out the wartime activities and achievements of Association members.

In the course of his response, MR. LEONARD said that the production of the electrical industry and the servicing of electrical machinery had done much to shorten the war. It was fortunate that the Government had been able to call upon the advice of such men as were represented by the Association and he paid special tribute to the electrical industry for the way in which it had converted itself for the production of war supplies. He was sure that it would meet the problems of peacetime equally well. Mr. Leonard said that the members of the Association might be described as fault finders. Fault finders were not popular but progress was impossible without them. There was sometimes apprehension regarding trade associations but if they operated in the national interest the country would look to them for guidance.

MR. A. L. JOHNSON (chairman of the High Conductivity Copper Association), in a speech which included some delightful reminiscences, proposed the toast of the Association. He said that such bodies had an important function and their value was likely to increase. They were the best means of communication between the Government and those responsible for carrying on British industry. Competently-run associations were the most effective defence of wages and conditions in industry. It was a good thing for associations to arrange functions such as this by which members and their friends could mutually discover that they were "nearly human." He hoped that the dinner was the forerunner of many more.

MR. HAROLD VERNON (Thos. W. Ward, Ltd.), replying for the Association, said that it aimed not only at promoting the interests of its members but also those of its clients. He believed that they had succeeded in convincing the dynamo and motor manufacturers that they had something more than a "nuisance value." The Association's progress had been largely due to Mr. Lawton's energy and leadership and to the fact that as delegates or advisory panels members had acted as a team.

After the speeches there was dancing to Sydney Lipton's band and a cabaret show in which Mr. Harold Vernon demonstrated that he was a magician as well as an orator.

Bradford Contractors' Protest

IN a letter to the *Yorkshire Post* the Bradford branch of the Electrical Contractors' Association protests against the decision of the Electricity Committee to set up an electrical contracting department. It is pointed out that there is no obligation on the part of this department to publish an account of its trading so that ratepayers will not know whether it is being run on a commercial basis or not. Fair competition is not feared, but the Association's members resented being compelled to enter into competition with a department financed from the rates which they as occupiers of business premises and householders are forced to provide. It is recalled that the late Mr. T. Roles, when he was city electrical engineer, expressed the opinion that such benefits as would accrue from a contracting department would be incommensurate with the risk and trouble involved.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IN the advertisement section of this issue the newly-created Margate, Broadstairs and District Electricity Board, which is acquiring the undertaking of the Isle of Thanet Electric Supply Co., Ltd., is advertising for an engineer and manager at a salary of £1,000, rising to £1,300. The Metropolitan Borough of Stoke Newington invites applications for the position of borough electrical engineer (scale salary).

Mr. H. F. Carpenter, F.C.I.S., F.S.A.A., has been elected President of the Chartered Institute of Secretaries for 1947, and **Mr. C. Heathcock**, F.C.I.S., has been appointed one of the two vice-presidents. Mr. Carpenter is clerk and manager of the West Midlands J.E.A., and Mr. Heathcock is the vice-chairman of the Authority and chairman of its General and Finance Committee. Mr. Carpenter, besides controlling the affairs of the Authority, is a member of E.D.A. Council, of which he is vice-chairman, while he also holds the post of honorary secretary of the Electricity Supply Joint Committee. Mr. Heathcock is managing director and general manager of the Midland Electric Corporation for Power Distribution, Ltd.

Mr. J. S. Anderson, B.Sc., combustion engineer with the West Midlands Joint Electricity Authority, has been recommended for the appointment of assistant operating engineer with the Fulham Corporation Electricity Department, and **Miss Jane C. Thompson**, technical assistant with the Leicester electricity undertaking, has been appointed temporary assistant technical engineer at Fulham.

Alderman G. H. D. Pickthall (Hyde) has been elected chairman of the Stalybridge, Hyde, Mossley & Dukinfield Joint Transport & Electricity Board, and **Alderman A. Buckley** (Mossley) is to be deputy chairman. Alderman Pickthall said he was taking over the position at the most critical period of the Board's history. He much preferred municipalization to nationalization.

The Kingsway Hall, London, W.C.2, was well filled for the first post-war symphony concert given by the Music Society of Central London Electricity, Ltd., on Monday last. The conductor was Mr. John Steele who departed from custom by opening with the major orchestral work of the evening, Beethoven's Symphony No. 1 in C Major. This performance set a high standard for the remainder of the programme, which was maintained. The choir, consisting of about fifty voices, blended well, especially in three chorales by Bach. Mr. Guy Jonson, who played the Schumann's Pianoforte Concerto in A Major gave a fine interpretation of this difficult work. Mr. Ronald Richardson, baritone, accompanied by the choir, sang excellently three of Stanford's sea songs and Miss Betty Walker, soprano, who sang Mendelssohn's "Hear My Prayer" beautifully, fully deserved the ovation which was accorded her. The evening was fittingly brought to a conclusion with Handel's "Hallelujah Chorus."

Mr. Geoffrey Falk and **Mr. Walter** of Falk, Stadelmann & Co., Ltd., who travelled to New York by the *Queen Elizabeth* on her first peacetime voyage, have now returned, after visiting various manufacturing centres in the U.S.A. and Canada. Valuable contacts were made in connection with the company's manufacturing and sales developments.

Several new appointments in the Associated Electrical Industries group are announced. **Dr. H. W. H. Warren** becomes deputy managing director of the A.E.I., remaining managing director of the British Thomson-Houston Co., Ltd. **Mr. E. H. Ball** is appointed deputy managing director of the B.T.H. Co. **Mr. I. R. Cox** has been appointed chairman of the Edison Swan Electric Co., Ltd., and Edison Swan Cables, Ltd., and retains the position of managing director of the Metropolitan-Vickers Electrical Co., Ltd.

Mr. H. West, M.I.E.E., A.M.I.Mech.E., chief engineer of the Motor and Welding Departments of the Metropolitan-Vickers Electrical Co., Ltd., since 1940, has been appointed assistant to the chief electrical engineer of the company, retaining his position as chief engineer

Mr. H. West

Mr. A. G. Williamson

of the Welding Department. During his apprenticeship at Trafford Park, Mr. West was awarded one of the company's scholarships for part-time education leading to the associateship of the Manchester College of Technology, where he studied electrical machine design under Professor Miles Walker. After a period in the Intelligence Section of the Metropolitan-Vickers Research Department, he joined the Motor Engineering Department, for which he

had been specially selected to undertake development work. Since 1935 he has served on a large number of Committees of the B.S.I., E.R.A. and B.W.R.A.

Mr. A. G. Williamson, M.I.E.E., who has been appointed to succeed Mr. West as chief engineer of the Motor Department, received his technical education at the Manchester College of Technology, joining Metropolitan-Vickers as an apprentice in 1918. Subsequently he was appointed to the engineering staff of the Motor Department, where since 1933 he has been in charge of the d.c. design section. Among his activities was the designing and patenting of the "Paradyne" welding set. During the war Mr. Williamson was responsible for much important work on special machines to meet the requirements of the Admiralty and other Service Departments.

Dr. P. Dunsheath and Mrs. Dunsheath sailed from Tilbury on November 30th on the *Otranto* for a tour in Australia and New Zealand until about the middle of April next. They will visit Perth, Adelaide, Melbourne, Sydney, Canberra, Newcastle, Brisbane, Hobart, Auckland, Wellington, Christchurch, and Dunedin, and at each of these places Dr. Dunsheath will be taking part in meetings and functions arranged by the Overseas Branches of the Institution of Electrical Engineers in conjunction with the Institution of Engineers of Australia and New Zealand. In their absence, all correspondence will be dealt with by Miss Elson, 43c, Cornwall Gardens, London, S.W.7 (Tel.: Western 5656), who will maintain communication with Dr. and Mrs. Dunsheath during their tour.

St. Marylebone Borough Council Electricity Committee has extended the services of **Mr. F. Selley**, chief electrical engineer, for another year.

Bolton Corporation Electricity Committee has decided to re-engage **Mr. H. E. Annett,** the present borough electrical engineer, for a further twelve months from January 28th, when he is due to retire on superannuation. He will receive £1,900 a year, plus bonus with superannuation allowance, against £1,600 at which the position was advertised.

Mr. T. Jack, deputy engineer and manager of the Bolton Corporation electricity undertaking, who retired on November 30th, was on the previous day presented with a nest of jap lacquered tables. Mr. Annett and representatives of various departments expressed their good wishes. Mr. Jack went to Bolton in 1914 as charge engineer, and has held the successive appointments of constructional engineer, staff superintendent, resident engineer, and deputy engineer and manager.

Mr. C. S. Agate who was described as the new chairman of the Radio Industry Council in our issue of November 15th is actually chairman of the Technical Directive Board. The chairman of the Council is **Mr. G. Darnley-Smith.**

Mr. F. H. Dickinson, M.Eng., A.M.Inst.C.E., A.M.I.Mech.E., A.M.I.E.E. has been appointed deputy chief engineer and general manager to the Croydon Corporation Electricity Department, in succession to Mr. H. Spence, who as we have already reported, has been appointed borough electrical engineer at Wimbledon. Mr. Dickinson was educated at Oundle School and the University of Liverpool. He joined the Metropolitan-Vickers Electrical Co., Ltd., as an apprentice in 1932, and three years later went to Liverpool as assistant engineer in the Corporation Electricity Department, where he became assistant technical assistant in the following year. In 1938 he joined the London Passenger Transport Board as personal technical assistant to the electrical engineer (generation), and in 1940 became assistant resident engineer at the Board's Neasden power station. A year later he went to the Lots Road power station as assistant resident engineer, but returned to the Neasden station in 1944 as resident engineer, a position which he is now vacating to go to Croydon.

Mr. W. S. Sawtell, M.I.E.E., general manager of the Scottish Southern Electric Supply Co., Ltd., has been appointed general manager of the Fife Electric Power Co., and **Mr. G. H. Sankey,** B.Sc., A.M.I.E.E., who is at present chief assistant with the Scottish Southern Co., will succeed him as general manager.

Mr. Sawtell, who takes up his new appointment at the beginning of the year, has been in his present position at Galashiels for twenty-four years and was previously with the Dundee Corporation Electricity Department.

Mr. Sankey, after serving his apprenticeship with the English Electric Co., Ltd., at Stafford, held a number of appointments with private concerns in Edinburgh and Chelmsford before joining the Electric Supply Corporation, Ltd., with whom he was associated before going to Galashiels in 1933 as consumers' engineer. He became chief assistant at the beginning of the current year.

Mr. P. E. Simmonds, A.M.I.E.E., at present on the technical sales staff of Gresham Transformers, Ltd., has been appointed district engineer with the Leicestershire & Warwickshire Power Co., an undertaking with which he was connected some years ago. Mr. Simmonds has also held appointments with Blackpool Corporation and the Yorkshire Electric Power Co. He takes up his new duties on January 1st.

Mr. H. V. Field, B.Sc., principal of Constantine Technical College, Middlesbrough, and formerly head of the Electrical Engineering Department of Rutherford College, Newcastle, has been appointed principal of Coventry Technical School.

Precision-Electric, Ltd., held a highly successful dance at the Imperial Hotel, Birmingham, on November 26th. **Mr. A. S. Cheetham,** managing director, welcomed the employees and guests.

Mr. A. S. Hollin, of Halifax has been appointed power station superintendent at York at a salary of £681 per annum.

In the report of the Johnson & Phillips Staff Association dinner in our issue of November 22nd Mr. W. Glass was described as works manager and assistant managing director. He is general manager and deputy managing director.

Obituary

Mr. George Hulbert Wilson, B.Sc., A.M.I.E.E., F.I.E.S., whose death on November 17th was briefly reported last week, was in his forty-fifth year. He joined the research laboratories of the General Electric Co., Ltd., at Wembley in 1922 as a member of the newly formed Illumination Section, and he took over the leadership of this section in 1929. He served the Illuminating Engineering Society on many committees and was for many years an active member of the Council. He also served on B.S.I. Committees, and, from 1928 onwards, he attended the meetings of the International Illumination Commission. He was the author of several papers on lighting read before the Illuminating Engineering Society and the Association of Public Lighting Engineers. The leading part which he played in the development of street lanterns and lighting systems, particularly those associated with the high-pressure mercury vapour lamp, is reflected in a paper, of which he was joint author, read before the Institution of Electrical Engineers for which the Ayrton Premium was awarded. He was one of the authors of the book entitled "The Theory and Design of Illuminating Engineering Equipment," published in 1930. After a period of relief work among air-raid victims during the war, Mr. Wilson became physics master at the Lawrence Sherriff School, Rugby.

Mr. W. J. Bailey.—It is with regret that we record the death, which occurred on November 26th, of Mr. W. J. Bailey, M.I.E.E. He joined the Central Telegraph Office as a telegraphist in August, 1855, passed the Civil Service examination for second-class engineer in April, 1908, and joined the Designs Section of the Engineer-in-Chief's Office, G.P.O., in April, 1909, taking an active part in the introduction of the first automatic exchanges. In March, 1927, he was appointed staff engineer in charge of the Equipment Section controlling the design and provision of automatic exchanges.

Mr. J. McCaffery.—We regret to record the death, which occurred on November 26th, of Mr. James McCaffery, O.B.E., A.M.I.E.E., who until last year was consulting engineer with Laurence, Scott & Electromotors, Ltd. Mr. McCaffery spent the greater part of his life with the Admiralty, which he joined in 1906, and served as electrical engineer in several of H.M. Dockyards at home and abroad, where he superintended the carrying out of important work in H.M. ships and shore establishments. During the 1914-18 war he was appointed to the Admiralty as Warship Reduction Superintendent (Electrical) under the reorganization scheme, and after the war was appointed Assistant Director and later Deputy Director of Electrical Engineering, under the Board of Admiralty. He retired from Admiralty service at the end of 1937, after which he became associated with Laurence, Scott & Electromotors, Ltd. Mr. McCaffery was elected president of the Batti-Wallahs' Society in 1939, and remained president throughout the war.

Mrs. C. G. Tegetmeier.—The death occurred on December 2nd of Mrs. Mary Tegetmeier, widow of Mr. C. G. Tegetmeier, a director of the Northmet Power Co., who died in September last year.

Mr. R. Ball.—We regret to learn that Mr. Ralph Ball, a director of Julius Sax & Co., Ltd., for forty years, died on November 20th.

Wills.—Mr. Albert Ernest Preston, of Weymouth, Dorset, electrical superintendent of the Bengal-Nagpur Railway, retired, who died on October 4th last, left £4,413 gross, with net personalty £4,316.

Mr. Alfred Herbert Dorlencourt Markwick, M.Sc., M.Inst.C.E., A.M.I.E.E., of the Road Research Laboratory, Department of Scientific and Industrial Research, who died on March 5th last, left £5,304 gross, with net personalty £1,096.

Australian Notes

From a Correspondent

THE chairman of the N.S.W. State Electricity Authority (Mr. V. J. Brain) has announced that half the 50,000 farms in that State not now served with electricity would be supplied within the next ten years. Eventually a State-wide grid of electricity supply, linking up from the Murray to the Queensland border, would be established.

The Victorian State Electricity Commission reports applications for electricity supply from no fewer than 10,300 farmers. Of the State's 217,000 rural dwellings, including about 71,000 farms, the S.E.C. now supplies some 82,000 dwellings (including about 9,500 farms). Within ten years it is hoped that an additional 80,000 country consumers will be linked to the Commission's supply.

It has been announced in the Western Australian Parliament that when the electric trams operating in Perth reach a stage where replacement is necessary it is the intention of the authorities gradually to replace them with trolley-buses.

When thieves broke into the premises of the X.L. Engineering Co. Pty., Ltd., Erskineville (Sydney) recently they took away nine electric motors, and as a result 120 employees were unable to work during the next few days.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week, Mr. J. E. Haire asked that the Minister of Supply when he anticipated that refrigerators of the type now being supplied for prefabricated houses would be available for the ordinary consumer. Mr. J. Wilmot said that refrigerators fitted in temporary houses were of special design and were not necessarily the types which the manufacturers would produce for general sale. Limited quantities of refrigerators were now on sale and the supply should improve in 1947.

Tonnage of Lead

In reply to Mr. Byers, Mr. Wilmot said that the total quantities of lead available were as follows:—1945: Fourth quarter, 81,189 tons. 1946: First quarter, 80,711 tons; second quarter, 76,275 tons; and third quarter, 78,875 tons.

Engineering Advisory Board

Mr. Ellis Smith asked the Minister of Supply if he had given further consideration to the suggestion made by the National Engineering Joint Trades Committee that an engineering advisory board should be appointed. Mr. Wilmot replied that he was at present discussing the matter with the engineering employers and trade unions.

Shortage of Accessories

Mr. Marples asked the Minister of Works if he was aware that in the Merseyside area there were shortages of electrical equipment such as main switches, switch splitters, fuse boards, plugs, sockets and other materials; and what action he proposed to take to overcome these shortages. Mr. Tomlinson said he was not aware of particular shortages in the Merseyside area, but his regional officers were prepared to deal with instances where priority work was held up if details were given to them.

Electrical Porcelain

On November 25th, Mr. Bossom asked the Minister of Supply what efforts he was making to overcome the deficiencies prevailing in the small porcelain accessories indispensable to electrical installations. Mr. Wilmot said that every encouragement was being given to new firms to enter the industry and to establish firms to expand their existing capacity. In addition, four Royal Ordnance Factories had undertaken production.

Electricity Poles

On November 26th, Lt. Col. Kingsmill asked the President of the Board of Trade, whether he would consider releasing the 30,000 poles suitable for electricity purposes to those electricity companies who were unable to extend existing supplies owing to shortage of this particular article. Mr. Marquand said that it had already been agreed to release 10,000 of these poles to the Electricity Commission. The remainder of the poles were required for Post Office purposes.

Radio Valves

On November 28th, Sir Stafford Cripps, said that the report of the Central Price Regulation Committee into the price of radio valves was being published that day as a non-Parliamentary publication. The findings did not disclose a case for special action to control the price of radio valves at the present time. The prices of valves would, however, be kept under review. The question of a further inquiry, which would have regard to the effects and the desirability, from the point of view of the public interest, of the practice of maintaining by agreement higher prices for valves for replacement than for valves sold to set-makers would be considered when the conditions affecting the industry became more normal.

[The Committee's report is dealt with on another page of this issue].

Electricity Supply in Norfolk

Mr. Medlicott, asked the Minister of Works if he was aware that the provision of electricity in a large number of cottages in Norfolk, particularly in the area of the Smallburgh Rural District Council, was being held up owing to the non-availability of works licences from the regional and local authorities; and if he would in conjunction with the supply departments, take the steps necessary to put local authorities in a position to grant the licences referred to.

Mr. Tomlinson said that the licences could not at present be given because the supply of approved electrical fittings was insufficient to provide for the requirements of buildings already occupied. The Minister of Supply was doing all he could to increase production so that such demands might be met.

Wireless Telegraphy Act, 1904

On Friday, in the Committee stage of the Expiring Laws Continuance Bill, Mr. Peake asked why a number of enactments which were originally brought in as temporary measures were about to be renewed. He instanced as one of these the Wireless Telegraphy Act, 1904. Mr. W. A. Burke, the Assistant Postmaster-General said that with regard to powers affecting the Post Office, the question of electrical interference had arisen, but the Government was considering a simpler form of Bill. The Bill passed through the Committee and was read a third time.

Colliery Reconstruction

Advantages and Cost

By F. W. Maynard,
M.I.Min.E., A.M.E. & M.E.

WHETHER an abundant supply of low-priced coal will ever again be available to aid this country, as in the past, to maintain its place as a leading industrial power is open to question. It is not reasonable to expect that the passing of the mines from private to public ownership will solve the problem. The problem will still be there, and hard work and enterprise will still be necessary if this country is to hold its own and progress. When atomic power has been harnessed to the peaceful uses of mankind, no doubt it will prove as beneficial as was the discovery of the means of producing fire, but it should be realized that to replace the coal in this country for industrial uses would require about 10,000 tons of unranium every year.

There must be a short-term policy to produce extra coal as quickly as possible and a long-term policy to be spread over many years to maintain that essential supply. The report of the Reid Committee has, by and large, been accepted by all sections of the coal-mining industry. One of its recommendations was that the use of electricity should be extended very considerably. This dictum accepted, it becomes essential that electric power at low rates should be available and that ample supplies of coal should be forthcoming to produce that power.

Collieries are using electricity to a very large extent to-day. Figures given in the reports of the Electrical Inspector of Mines show that in ten years there has been an increase of about 22,000 motors in collieries. The majority of the additional motors are used at or near the coal face and there is every reason to suppose that this rate of increase will be exceeded in the near future. The transport of men and materials to and from the coal face to the surface or railway truck in the sidings introduces problems which should come under the short-term policy, since as much as 30 per cent of the men's available time at the coal face is lost through delays in transport.

Wagon-way to coal face

Coal face, with cutter some little way up

Many schemes are afoot for the replacement of old forms of haulages by trunk belt conveyors, some of which are of 150 to 200 H.P. and electrically driven. The adoption of belt

conveyors involves new problems of safety and control, but British manufacturers of electrical plant have already produced both motors and switchgear which meet all the conveyor makers' and colliery requirements.

The cost of conveyor electrical equipment is seemingly high, due to the stringent regulations with which the apparatus has to comply. The following prices of belt conveyors for a 1¾-mile run may interest those who imagine the figure of £150 million regarded as necessary for colliery reconstruction to be on the high side:—One 42-in., 185-yd, £6,750; six 42-in., 175-yd, £41,000; one 42-in., 265-yd, £8,000; one 30-in., 685-yd, £9,750; one 30-in., 890-yd, £12,000. Each conveyor is driven by a 150-H.P. motor. The cost per mile will thus vary between £44,000 and £22,000 according to the nature of the ground to be traversed, some places requiring up to ten conveyors per mile and others possibly only one or two.

The cost of the electrical apparatus on these conveyors would be about 10 to 15 per cent of the total cost of the installation, excluding cables. With regard to the costs of electrical machines at the actual coal face, the accompanying table giving details of an imaginary machine-mining project shows that the capital outlay to produce about 1,000 tons per week would be in the region of £20,000.

Bearing in mind that intensive machine mining is a comparatively recent innovation, it might be well to record that over £100 million was spent on new and up-to-date equipment between 1919 and 1939—part of which time was the historic period of "depression." The quantity of coal cut by machine increased from 13 per cent in 1920 to 61 per cent in 1939, and the proportion conveyed mechanically rose from 12 per cent in 1928 to 58 per cent in 1939. The horsepower of electric motors in use advanced from 1,080,000 in 1920 to 2,200,000 in 1938.

To attempt an accurate forecast of future extensions of colliery electrical plant and equipment would serve no useful purpose at present because there may be a wide development of horizon mining, whilst in other cases the present system of following the seam may continue. With the improvements to be expected in the manufacture of rubber-belt conveyors, the short-term policy might well be to continue to follow the seam, in which case the demand for electrical apparatus will be very high over the next ten to twenty years.

No scheme of reorganization recently proposed involves a capital expenditure far short of £100,000 per colliery. As there are about 1,700 collieries working, the estimated round sum of £150 million would appear to

EQUIPMENT FOR MECHANIZED MINING PROJECT

Equipment		Voltage	No. Req.	Cost, £
Shortwall coalcutter, 7-ft jib	NS.	500	3	3,600
Joy loader	NS.	500	3	5,100
Coal drill, rotary	S.	C.A.	3+1 sp	200
Troughed belt conveyor, 35-H.P., 600-ft drive	OH.	500	1	1,400
Belt, 30 in. wide, 6-ply, 1,400 ft	S.	—		1,200
Chain conveyor, 200-ft, 20-H.P.	N.S.	500	3	1,000
Chain conveyor, 150-ft, 20-H.P.	NS.	500	4	900
Spotting hoist, 15 H.P.	NS.	500	1	450
Hoist for Joy loader	OH.	C.A.	3	250
Screw-jack props, 5-ft	NS.	—	18+6 sp	84
Vent fan and switch	S.	500	13+1 sp	458
Vent tubing, 50-ft	S.	—	16+2 sp	96
Transformer, 250 kVA	OH.	3,300/500	1+1 sp	250
Section switch	S.	500	1	150
Gate-end switch and remote stop-start switches	S.	500	14+ 1sp	1,960
0·10 sq in., p.i.l.c. and d.w.a. cables, 600-ft	OH.	3,300	5	450
Pliable armoured 0·04 sq in. cables, 200-ft	NS.	500	3	260
Trailing 0·0225 sq in. individually screened cables, 450-ft	S.	500	6+1 sp	750
Straight-through junction box	S.	3,300	4	50
Flit plugs	NS.	500	4	40
Centrifugal sequence unit	NS.	—	4+1 sp	130
Total				£18,778
sp = number of spares				
S. = equipment standard to colliery				4,864
NS. = equipment not standard to colliery				11,564
OH. = equipment on hand at colliery				2,350
Total				£18,778

General Description.—Shortwall cutting in three 15-ft heads: Joy loading on to chains and thence on to 30-in. wide gathering belt. Thickness of coal and dirt mined, 5 ft: thickness of cover, 600-yd. Gradient of seam, one in five. Production in saleable tons:—Capacity of project: Man-shift, 18·00: pit-shift, 162; pit-week, 972. Labour productivity (man-shift) to tub-loading point: Project, 10·45; by conventional methods, 3·45; increase, 7. Increase in coal production: Pit-shift, 109; pit-week, 654.

be too conservative: indeed, some colliery modernization schemes would each require an expenditure of over £700,000 and, taking

Coal cutter at work

twelve selected examples, the proposed expenditure would be about £5 million to gain an increased output of 7 million tons per annum, with a reduction in man-power of about 1,700.

These schemes of reorganization are mostly for underground development, but some include extensive alterations on the surface where electricity would drive winders, screening and cleaning plants, ventilation fans, etc. While we may learn much from the United States, we can also teach them a great deal about mining in very much more adverse conditions than commonly obtain there. Generally speaking, American methods and machines do not fit our totally different geological conditions but where the use of American machines has been feasible here we have used them possibly to greater advantage than they have.

Another development to the fore lately is that of lighting underground and great steps may be expected in this direction in the very near future, both in main-road fixed lighting and in newer and better miners' portable lamps. The potential maximum usage of artificial lighting cannot be made for underground workings, because it is impracticable to have only fixed lighting; the men will always need a portable source of light. There seems to be no reason, however, why in future the well-lighted mine should not approximate to the standard of a London Underground railway station. It should be possible to travel underground in mines right up to the loading point next to the coal face without its being necessary to employ a portable lamp.

This, too, will be costly. If lights are placed at 10-yd intervals, it may easily cost over £4,000 per mile of main road lighted for the initial installation and about 10s. per day per mile in running power costs. This lighting, no doubt, would repay the colliery in the reduction of minor accidents which keep men away from work for one or two days and in the better maintenance of conveyors and haulages, since every traveller along the road would in effect be an inspector. Lighting at the coal face proper will probably remain primarily the duty of the portable lamp as, where shot firing is used to get the coal down, the cost of replacements and removal of fittings of the semi-fixed type would be excessive.

New systems of lighting from the mains are constantly being tried and possibly

Goaf side of coal face showing the packs or walls which have to be built as the face advances

fluorescent lighting may prove a success as giving better diffusion of light than does the ordinary tungsten lamp which entails the

face worker standing in his own light. In any case it has to be emphasized that, where shot firing is used, costs would be prohibitive.

Mining has many problems and technicians and workers in the industry are always ready to listen to constructive criticisms. In general terms it may, however, be said that those who have no knowledge of the industry would be well advised and more helpful were they to leave the difficulties to those competent to frame progress.

The pictures accompanying this article illustrate the advantages of good lighting.

End o the road shown in the first illustration after coal has been removed

Transport Bill

Principal Provisions

THE Government Bill for setting up in Great Britain a publicly-owned inland transport system was introduced in the House of Commons last week.

The central feature of the Bill is a proposal to establish a British Transport Commission to be appointed by the Minister of Transport, consisting of a chairman and four other members, with general powers to carry goods and passengers by rail, road and inland waterways, to provide port facilities within Great Britain and to carry on any other activities of the various transport undertakings to be acquired.

Railway and canal undertakings listed in a schedule to the Bill, including the London Passenger Transport Board, are to be transferred to the Commission on January 1st, 1948. At the same time all privately-owned railway wagons which are at present under requisition by the Minister, are to be transferred to the Commission.

The Commission will acquire all road haulage undertakings which during 1946 were predominantly engaged in ordinary long-distance carriage. With the exception of certain exempted traffics, it will be a condition of every "A" and "B" carrier's licence after an appointed day that goods shall not be carried for hire or reward beyond 25 miles from the haulier's operating centre without a permit from the Commission.

The Commission may prepare, for any area approved by the Minister of Transport, schemes for the co-ordination of passenger transport services, whether by road or by rail, and for the provision of adequate road passenger services. The body established to provide passenger transport may be the Commission or any other body.

To help the Commission there will be five bodies known as the Railway Executive, the Docks and Inland Waterways Executive, the Road Transport Executive, the London Transport Executive, and, as from an appointed day, the Hotels Executive.

Each will consist of a chairman and not fewer than four, nor more than eight, other members appointed by the Minister after consultation with the Commission. The Executive will act as agents for the Commission. It is proposed that for Great Britain there shall be a Central Transport Consultative Committee, and, for such areas as the Minister may direct, Transport Users' Consultative Committees. Scotland and Wales will have separate committees.

Methods of Compensation

Compensation for assets taken over under the Bill is to be in the form of British Transport Stock issued by the Commission of a value equal, in the opinion of the Treasury, on the date of issue to the amount of compensation. As already announced, compensation for railway and canal undertakings will be based on the average market values of securities at certain dates.

Compensation for road haulage undertakings will be based on the net value of the assets plus, in certain cases, sums in respect of compensation for cessation of business and severance, and for local authorities' undertakings payments will cover the interest and sinking fund charges on the debt of the undertaking.

These are the principal provisions of interest to the electricity supply industry (as a possible precedent) and to electrical manufacturers as transport users. The Bill is obtainable from the Stationery Office, price 2s. 6d.

I.M.E.A. Activities

Preparations for 1947 Convention

ANY doubts as to the intentions of the Incorporated Municipal Electrical Association regarding the holding of a Convention next year are resolved by a statement in the Association's November "Journal" that consideration is being given to the venue for a Convention in 1947. Moreover, Mr. R. Birt (Ealing) has promised to prepare a paper on "The Law Relating to Electricity Supply" and Mr. F. W. Lawson (Birmingham) a paper dealing with "Recent Developments in Power Station Practice" for presentation at the Convention.

Compulsory Registration.—Members were recently circularized asking them to support the National Register of Electrical Installation Contractors by placing their wiring work with those on the Register. Some members have indicated that they find it difficult to adopt the suggestions made. Mr. E. A. Mills (Hackney) who was responsible for the letter, has emphasized in a report to the I.M.E.A. Council the desirability of this move and proposes that attempts should be made to secure renewed co-operation from the Electrical Contractors' Association. A sub-committee has been appointed to examine the matter and devise means for securing this co-operation.

Cables and Street Widening.—Responsibility for the cost of the removal of cables necessitated by street widening schemes has again been raised by a member of the Association. The position is that although a Joint Committee of both Houses of Parliament has recommended that the cost should generally be borne by the party responsible for initiating a road widening no legislation has been introduced and the prospect of such legislation is remote at present. The Conjoint Conference of Public Utility Associations has negotiated a clause suitable for inclusion in private legislation but unless it is so included it has no effect. In the absence of such a clause in any Act or Order the matter is governed by the particular Act under which the widening scheme is carried out and an undertaking's first step should be to ascertain what this is.

Remote Control Systems.—A memorandum is being prepared for circulation to members on the subject of remote control by superimposed currents. In view of the draft clause now being considered by the Electricity Commissioners for inclusion in their 1937 Regulations, it is proposed to discuss the matter with the Commissioners in an endeavour to secure their support for the circular before it is distributed.

Lead for Cables.—Representations have been made by the Council in the appropriate quarters that an increased allocation of lead should be made to cable manufacturers to enable them to improve deliveries. Although consideration is being given to the matter it is pointed out that an increased allocation could only be obtained at the expense of some other essential industry.

Shoddy Apparatus.—The matter of the poor-quality apparatus on sale in certain shops has again been considered by the I.M.E.A.-B.E.A.M.A. Joint Committee. It is pointed out that those responsible for the administration of the electricity regulations governing the safety of the public are placed at a disadvantage by the lack of legal restriction on the sale of these appliances. Although the setting-up of a proving house or the adoption of a distinctive mark have been under consideration for many years nothing has yet been achieved. The position is being considered by E.D.A. and the B.S.I. as well as by the Joint Committee.

London J.E.A. Estimates

No Increase in Charges

AT last week's meeting of the London and Home Counties Joint Electricity Authority the chairman of the Finance Committee (Mr. T. H. Jones, L.C.C.) presented the estimates for the year ending December 31st, 1947. Income from local distribution was put at £1,907,000 (against £1,801,000 for 1946). It was anticipated that there would be a deficit of £1,000 after meeting all expenditure, including interest, sinking fund contributions and taxation, reducing the accumulated surplus to £159,000. The Authority expected to sell 245 million kWh at 1·74d. per kWh average (against 228 million at 1·77d. in 1946). In addition to this it was anticipated that bulk supplies totalling nearly 700 million kWh would be sold at an average price of 0·75d.

Mr. Jones pointed out that domestic consumers on two-part tariffs, who comprised the vast majority, would pay less than 1½d. per kWh, including fixed charges. The cost of energy purchased in bulk by the Authority was nearly 1d. per kWh sold. Although costs were rising, no increase in charges to consumers was contemplated at present. Capital expenditure for 1946 was estimated at £338,000, but this was dependent on the availability of labour and materials.

Administrative expenses are estimated to require a precept of £6,000, as in former years.

Restoring Power Supply

Experiences with the Invading Armies

AT a meeting of the London Technical Group of the Electrical Power Engineers' Association on Tuesday evening an account of the restoration of power supply for the forces in France, Belgium and Germany in 1944 and 1945 was presented by COL. NORMAN ELLIOTT and MAJ. L. W. NEVILLE who were responsible for the work.

The account was in some detail and showed how by much hard work and clever improvisation jobs which appeared to be almost impossible were successfully carried through. Our limited space permits only a general review of the subject.

Operations at Caen

The first task was to get the supply going at Caen, Normandy, where it was necessary to operate the port. In the Caen station there was 30,000 kW of plant the principal units being two 12,500-kW turbo-alternators about twenty years old with four water-tube boilers and a flash-type Velox boiler. There were rotary convertors for d.c. supply to the docks and tramways. Aerial and artillery bombardment had caused considerable damage; only a 5,000-kW set had escaped serious harm. Practically nothing was available in the way of drawings or data and the repair party had to rely on visual inspection entirely in making their plans.

After three weeks' hard work one of the boilers was got going and later the 5,000-kW set was started up with a load of 500 kW. A great deal of labour and attention had to be given to the restoration of the water supply which was achieved by various improvised methods. Trouble with coal supplies had also to be overcome.

The next task was the reconditioning of one of the 12,500-kW sets which also proved tedious and laborious. As a new casting of a vital part could not be obtained a method of repair involving brazing with bronze alloy was resorted to, building up a muffle furnace of firebrick round the job and this proved efficacious. Eventually the set was got going and after a series of adjustments went on load.

To provide a d.c. supply for dock cranes a 250-kW mercury-vapour rectifier was obtained, necessitating also the provision of a rather complicated system of transformers. Although there were constant handicaps the supply was maintained for as long as military interest in the port persisted.

The second part of the discourse dealt with the authors' experiences in Germany where their task was to ensure a supply to the Ruhr coal mines. A survey was made of the power system. It was found that there was no shortage of generating plant, in view of the great reduction in the load, but the overhead distribution system had been badly damaged. As it had been the practice to run double lines it was found possible to rebuild one line from the remains of the original two which was accomplished with the aid of German labour, said to be competent and willing.

The Karnap station, near Essen, built just before the war, with four 55,000-kW sets, was attended to. Boiler-feed and make-up water were taken from the Rhine-Herne canal but this had been so badly damaged that it was practically empty, but by damming the canal near the station sufficient water was obtained for the operation of one of the sets. A spread-over of the mines' peaks was arranged to avoid overloading the station.

It was found that the Lunen station built for a large aluminium works, then out of action, was available. This had four 45,000-kW sets. The output of this was assisted by a supply from a smaller industrial plant.

Attention was then turned to the group of stations in the brown coalfield area north of Cologne. The five principal stations had an original capacity of 880,000 kW, but they had been heavily damaged, as had the lines from the stations to the Brauweiler substation, said to be the largest in the world. The authors noted the principal differences of German power station practice to British. Mention was made particularly of the extensive water-treatment plant and the strategic arrangement of outdoor transformers which were built in standard sizes and mounted on self-contained railway trucks to enable them to be easily moved to other positions.

Aswan Dam Tenders

COMMENTING on a statement made in the Egyptian Throne Speech that the Aswan dam hydro-electric project had passed to international contract, the *Egyptian Gazette* says: "It is true that tenders have been made for the preliminary civil engineering works, which are expected to be put in hand at any moment, but so far as can be discovered tendering for the main electrical scheme has been postponed until next January." "Some suggested," the paper continued, "that the authorities concerned were still not clear in their own minds as to what they really wanted, and that plans and specifications were being frequently changed. Others went even further and expressed the belief that despite technical advice to the contrary, the authorities would persist in demanding that the projected power should be conveyed to the Cairo area for use."—*Reuter's Trade Service* (Cairo).

COMMERCE and INDUSTRY

Engineers' Shorter Week.

AT a conference of representatives of the Engineering and Allied Employers' Federation and the National Engineering Joint Trades Movement last week agreement was reached by which a five-day week of 44 hours (against the present 47 hours) will be put into operation from the beginning of next year subject to approval by the two organizations mentioned. As a general rule there will be no reduction in wages as a result of the shorter week. The unions' original demand was for a 40-hour week.

Holidays with Pay

The Joint Industrial Council for the Electric Cable Making Industry has issued a circular deprecating certain cases brought to its notice by trade unions in which factories have closed down for a week's holiday, but in which some men have continued to work during the week, accepting a week's pay in lieu of the holiday. The Council points out that where a man is required to work during a week of closure, he should be given an alternative week's holiday.

Aluminium Sheet Production

On a 100-acre site at Rogerstone, near Newport, Mon., a continuous-type rolling mill is under construction for the mass output of aluminium sheet products in quantities which, it is claimed, will be unparalleled in Britain. It is expected to be completed in 1948. At present the world's only continuous aluminium rolling mills are in the United States. The plant and equipment will entail an expenditure of more than £2,500,000 by the Northern Aluminium Co., Ltd., which is one of the largest associates of the Canadian corporation, Aluminum, Ltd.

An output of 50,000 tons of sheet products per annum is planned from the new equipment and this can be extended to 150,000 tons if necessary. The greatest annual rate of aluminium sheet production during the war from all plants in the United Kingdom was just over 100,000 tons.

New Stepney Flats

The first block of flats to be completed under Stepney Borough Council's post-war housing scheme was opened by the Prime Minister last Saturday at West India Dock Road. "West India House," as this new block has been named, contains 31 flats each with kitchen, living-room, and two or three bedrooms. Tenants' comfort and convenience have been given considerable attention by the provision of an extensive electrical wiring installation and an electric immersion heater is fitted in each flat's water tank. Other electrical apparatus—cooker, kettle, iron, wash-boiler, and radiators—may be hired under the Council's scheme. Electricity is supplied through a prepayment meter at ¾d. per kWh, plus a weekly charge, collected with the rent, of 6d. for the two-bedroom and 8d. for the three-bedroom flats. An electrical show flat is open to the public.

Large Aluminium Scheme.

Companies and Nationalization

On Monday last, representatives of the Incorporated Association of Electric Power Companies, the Provincial Electric Supply Association and the London Electricity Supply Association met the Minister of Fuel and Power, Mr. E. Shinwell. There was a discussion of the Government's plans for the nationalization of the electricity supply industry and the company representatives undertook to report back to their organizations.

Queen Mary at J. & P. Works

An informal tour of the cable works at Charlton was made by H.M. Queen Mary on November 25th. Accompanying her were Lady Cynthia Colville, Miss Caroline Haslett, C.B.E., and Major the Hon. John Coke. The party

Left to right: Seated.—Mr. S. J. Passmore, Mr. W. Glass, H.M. Queen Mary and Mr. G. Leslie Wates. Standing.—Mr. G. T. W. Whitehead and Miss Caroline Haslett

was met by Mr. G. Leslie Wates, J.P. (chairman and managing director), Mr. W. Glass (director and general manager) and Mr. S. J. Passmore (director). Mr. J. Wooldridge, M.B.E., cable works manager, conducted the party through the rubber cable works and explained the processes.

After the inspection of the Rubber Cable Works, Queen Mary drove to the directors' office where she signed the distinguished visitors' book. Her Majesty was very interested

in particulars given her by Mr. Wates of the origin and early history of the firm.

Mr. G. T. W. Whitehead, assistant general manager, then conducted the party over the paper cable works and the original plan was extended slightly to include an inspection of one of the switchgear erection shops.

Shortly before the party left the paper cable works, Mr. Kennett Boorn, who has been with J. & P. for 59 years, was presented to Her Majesty. At the end of the tour Mr. Russell, night shift superintendent throughout the war, was presented to Her Majesty and joined the party for tea in the Reception Room.

Building Licensing

Notes for the guidance of applicants for civil building licences are given in a leaflet "Building Licensing" which is being sent to all registered contractors by the Ministry of Works. Although this explains the Defence Regulation and Statutory Rules and Orders which apply to the licensing of civil building work it is not a legal document and should not be read independently of the orders to which it refers. Those classes of work which require no licence are defined; the difference between an "authorization" and a "licence" is made clear; and useful guidance is given on how and where to apply for a licence, a supplementary licence and a maintenance licence; what must be included in calculations of cost of works and procedure in case of emergency work. A brief note on the procedure for obtaining materials is included. There is an appendix giving the addresses of Regional Licensing Officers and their areas. A copy of the leaflet (P.I.49) is sent to all newly registered contractors with their certificate of registration and a copy of the earlier leaflet (P.I.40) on "Registration of Contractors."

Building Material Price Control

A statement has been published by the Ministry of Works on "Price Control of Building Materials and Components" (Stationery Office, 1d.). This sets out the principles on which control is exercised and the procedure adopted in assessing costs. It is noted that there is no fixed formula for settling the profit margin in view of the differing conditions in various industries. The Departments concerned do not accept prices fixed by associations as these do not always cover the whole of that industry. Cost is ascertained by departmental examination of the accounts and other information obtained from industrial producers. "Where producers outside an Association charge lower prices than the Association prices on account of particular factors such as low wages, sub-standard quality, inadequate provision for development or research, or a deliberate decision to sell at or below cost, their results are suitably discounted. The Departments do not regard the existence of low prices based on such factors as a reason for reducing prices below an economic level." The Departments recognise the need for dealing speedily with applications for price increases based on increases in costs but cannot agree that increase in costs should automatically carry a corresponding increase in price without regard to other factors.

Consumers' Preference for Electricity

The Portsmouth Electricity Committee recently asked the Housing Committee to send an inquiry to a proportion of the applicants for houses asking them whether they desired to use electricity for cooking and for wash-boilers. Using the well established sampling method the inquiry was sent to every tenth applicant on the list and 665 replies were received. Of these 75 per cent preferred electricity for cooking and 77 per cent favoured electricity for wash-boilers.

Reports on German Industry

Latest reports upon German industry prepared by British and Allied investigating teams include the following:—B.I.O.S.785. "The German Mica Industry (5s. 6d.). F.I.A.T. 419. "The Rohn Low-Frequency Induction Furnace (1s. 6d.). F.I.A.T.574. "Flywheel Magnetos." R. Bosch G.m.b.H., Stuttgart (1s.). A few copies are available from the Stationery Office at the prices stated, postage extra.

Television Lectures

A short course of about twelve lecture-demonstrations on "Television Practice" will be held at the South-East London Technical Institute, commencing on Thursday, January 16th, at 7 p.m. The fee for the course is £1, and application for admission should be made to Mr. C. W. Robson, head of the Electrical Engineering Department, from whom the syllabus can be obtained.

Radio Exhibition Next Year

The Radio Industry Council announces that Radiolympia—the National Radio Exhibition—will be resumed in 1947. Present plans envisage a pre-view on September 30th, the show to be open to the public from October 1st to 11th.

Valuation of Northmet Undertaking

Earlier this year the North Middlesex Assessment Committee approved a reduction in the existing values in respect of the Northmet Power Co. in accordance with a provisional agreement between the company's valuer and the panel valuer acting for the authorities concerned. The new values were acceptable to all the rating authorities except Enfield, in which case the apportioned value showed a proportionately larger reduction than the reduction in cumulo, and an appeal was made to Quarter Sessions, regarding what amount

should be apportioned to Enfield in respect of the Brimsdown power station. The Middlesex County Valuation Committee has now been informed that the company would be prepared to agree to an assessment in Enfield of £92,637 instead of the figure appealed against, £89,010.

New Chinese Import Restrictions

As a result of the Chinese Government's new import restrictions, which came into force on November 18th, all categories of goods now come under Government control. A "board for the temporary regulation of imports" has been established at Shanghai to supervise the enforcement of the new restrictions, under which certain categories of goods are prohibited altogether, and certain others importable either with "prior approval" of the Chinese Government or under the quota and licence systems. Meanwhile, all importers are required to register with the board to be entitled to apply for import licence forms.

Prior approval must now be obtained to import the following if their value exceeds 2,000 U.S. dollars:— Electrical machinery for power generating and transmission, such as dynamos, motors, transformers, convertors, etc., and parts thereof; machine tools and machine shop tools, and parts thereof; machinery and parts thereof; gas, oil and steam engines, hydraulic turbines, steam turbines, turbo-generator sets and other prime movers, combined with generators or not, and parts thereof; railway and tramway supplies; steam boilers, economizers, superheaters, mechanical stokers, and other boiler-room accessories, and parts thereof. Goods importable under licence include electrical appliances such as electric cookers, fans, flashlights, etc.—*Reuter.*

Heavy-Duty Cooking Campaign

During the past year the Eastbourne Corporation Electricity Department has been carrying out a special development campaign to popularize the use of heavy-duty cooking equipment. Hotel and restaurant managers proposing to re-open premises which had been closed since the early days of the war were interviewed by the development staff before bomb damage repairs, reconstruction, redecorations, etc., were put in hand. The majority of these establishments welcomed schemes for bringing the kitchen and still-room up to date, and a steady flow of orders has resulted for large double-oven ranges, steamers, roasting ovens, hotcupboards, café sets, etc. As a further aid to the campaign, an exhibition of this equipment was recently held in the showrooms. This was timed to take place at the end of the holiday season, when the managers of the hotels which had remained open during the war had time to consider improvements and prepare again for next season. The undertaking was fortunate in securing a comprehensive range of equipment, and orders resulting from the display totalled 300/400 kW, of which 200 kW has already been installed. As Eastbourne is largely a residential town with the maximum demand in winter almost twice that in summer, it is estimated that by pursuing development in this field, considerable improvement in load factor will be obtained, inasmuch as the peak of the hotel and catering businesses occurs in the holiday season.

Display of heavy-duty cooking equipment at Eastbourne Electricity Department's showrooms

Gauge and Tool Advisory Council

Mr. John Wilmot, Minister of Supply, announced in the House of Commons last week that a Gauge and Tool Advisory Council had been formed. The chairman is Mr. S. F. Steward (Bull Motors), who is also chairman of the Machine Tools Advisory Council. In addition there will be twelve members, including nine drawn from the gauge and tool industry, two representing the trade unions, and one independent industrialist. The Council will provide a means of regular consultation between the Government and the industry on measures

for promoting a gauge and tool industry capable of making the maximum contribution to security, industrial efficiency and export. The Council will be concerned with gauges, cutting tools, jigs and fixtures and engineers' measuring instruments. The members include Mr. F. W. Halliwell, chairman of the Gauge and Tool Makers' Association, Mr. S. J. Harley, Coventry Gauge & Tool Co., Ltd., and Mr. B. C. Westall, C.B.E., Thomas De La Rue & Co., Ltd. In addition, the Government Departments principally concerned will be represented.

Radio Valve Prices

A report by the Central Price Regulation Committee on the prices of radio valves has been published by the Stationery Office (2d.). The investigation, which arose out of a Parliamentary question on the subject, brought out the reasons why British valve prices were higher than American; among them were the facts that British manufacturers have favoured the use of dual-purpose valves while the Americans have preferred simpler types and that the American market is twelve times the size of the British. The structure of the valve-making industry and price arrangements were studied and it is shown that prices to the public are high because sales to radio set makers are at unremunerative prices.

In its conclusions the Committee says that if the level of profits earned by manufacturers is to be regarded as the objective test of the fairness of prices to the public then it is of the opinion that the prices at present charged for radio valves are fair. This has to be qualified by stating that if the sale of valves for replacement purposes is considered alone in some cases excessive profits are made but these are absorbed by losses incurred on sales to set manufacturers. Appreciation is expressed of the help received from the valve manufacturers by the Committee.

New Siemens Factories

Siemens Bros. & Co., Ltd., have established new factories in the North Eastern area which, it is stated, will in no way diminish the efforts of their Woolwich establishment.

At Spennymoor, County Durham, over 200,000 sq ft of factory space has been occupied, being the largest building of the former R.O.F. Establishment. Half of the factory is engaged in producing dry batteries; the whole output of these will in future come from Spennymoor, the Woolwich battery section having been already transferred. The remaining area at the Spennymoor factory will be devoted to output of a light engineering character, mainly connected with telephone exchange equipment and cable accessories. The total number of employees at Spennymoor when in full production will be about 1,800.

A factory is being built by arrangement with the Board of Trade and the North Eastern Trading Estate at Hartlepool. It will have a floor area of 200,000 sq ft, with space for extensions, and will be devoted to the manufacture of telephone exchange equipment, as an extension of the existing facilities at Woolwich. The capacity of the Woolwich factory is also being increased in view of future demands. The new Hartlepool factory will also employ about 1,800 people when in full production.

Russian "Wood Turbines"

On November 19th Radio Moscow, in its "Radio Newsreel" (in English), gave a report of a visit to a Russian factory in which "wood turbines" are built. These "turbines" were said to be made entirely of wood and to be extremely easy to construct. They are belt-connected to electric generators and, said the designer, they can be operated from the smallest streams. They are made in several sizes, ranging from 8 H.P. to 60 H.P. The small sizes provide energy for lighting up to one hundred houses, whilst the larger sizes are used for providing light and power to mills, saw-mills, etc. The factory manager, who also spoke, said that he had visits almost daily from collective farmers who were anxious to obtain information about the machines which, he said, were very cheap and were so simple that any farmer could operate them. He had already supplied twenty-six sets, totalling 500 kW, this year and he said that fourteen further sets would be delivered before the end of the year.

Deutz Engine Spares

Arrangements have been completed between British Deutz, Ltd. (controlled by Associated British Oil Engines, Ltd.), and a company which, before the war, was the agent in Great Britain for the marketing of Deutz engines and replacement spares, whereby the British Deutz company will carry out repairs to Deutz Diesel engines and supply replacements. Correspondence should be addressed to the company at 32, Duke Street, St. James's, London, S.W.1.

Mica Directorate

The Board of Trade announces that Mr. R. A. Heywood has succeeded Mr. G. H. Tipper as Director of Mica. Mr. Tipper, who has resigned on health grounds, will, however, act as the Board's consultant on mica. The address of the Directorate of Mica is now:— Lansdowne House, Berkeley Square, W.1. (Telephone No. Grosvenor 4060.)

Contractors' Annual Dinners

Great changes which the future would bring to the electrical industry were referred to at the annual dinner-dance of the Stoke-on-Trent branch of the Electrical Contractors' Association, which was held at the Grand Hotel, Hanley, on November 22nd.

Mr. C. Linnell (chairman of the branch

presided and among the large gathering were the Lord Mayor and Lady Mayoress of Stoke-on-Trent (Alderman and Mrs. H. Leason), Mr. R. A. Parsons (vice-president of the E.C.A.), Mr. F. Favell (chief engineer and manager, North-West Midlands Joint Electricity Authority), Mr. T. Lockett (general manager Stoke-on-Trent Electricity Supply Department), Mr. L. Goodall (distribution engineer, Stoke-on-Trent), Mr. A. J. C. DeRenzi (Newcastle-under-Lyme borough electrical engineer), and Mr. A. Gould (branch hon. secretary).

Mr. T. Lockett proposed "The E.C.A. and Allied Associations," and Mr. R. A. Parsons and Mr. C. Linnell responded.

Among the guests at a dinner organized last week by the Lancaster branch of the Electrical Contractors' Association were the Mayor and Mayoress, Councillor F. Clayton, chairman of the Lancaster Electricity Committee, the Lancaster electrical engineer, Major G. C. Milnes, and Mr. F. Westwood, borough electrical engineer of Morecambe. The speakers included Major Milnes, Mr. Westwood, Mr. J. D. Green, a vice-president of the E.C.A., and Mr. C. J. B. Barlow, chairman of the North-West Counties Section.

Statistics in Industry

Mr. W. J. Jennett, hon. secretary of the Industrial Applications Section of the Royal Statistical Society informs us that a North-Eastern Group has been formed, centred on the Tyne and Wear areas, and including a Tees-Side sub-group. The hon. secretary is Mr. J. Elliott, Lemington Glass Works, Lemington-on-Tyne, Northumberland; and of the sub-group, Mr. J. T. Richardson, Research Department, Imperial Chemical Industries, Ltd., Billingham, Co. Durham. Further details may be obtained from the Assistant Secretary, Royal Statistical Society, 4, Portugal Street, London, W.C.2.

Paris Aviation Exhibition

At the Aviation Exhibition which was recently held in Paris, the Metropolitan-Vickers Electrical Co., Ltd., displayed its jet engine and the ducted fan thrust-augmentor.

Marconi Brochure

In the description of the electrical equipment of the Royal train in our last issue we referred to the wireless apparatus which Marconi's Wireless Telegraph Co., Ltd., has installed. The company has now sent us a well-produced, illustrated brochure which it has prepared, giving full technical details of this equipment.

Control Gear for Russia

Brookhirst Switchgear, Ltd., has recently dispatched another large consignment of control gear to the U.S.S.R. The gear was designed and manufactured specially for boiler house auxiliaries in a large power station, as one of a series for which the company has supplied switchgear. The equipment includes over one hundred starters, controlling motors of from ¼ H.P. to 290 H.P.

Regional Auction Sales

Included in the goods to be sold by the Ministry of Supply at an auction sale at the Ministry's 98 Depot, Tower Bridge Road, London, S.E., between December 16th and 18th are emergency battery lighting sets.

B.S.I. Year Book

The latest edition of this year book contains a subject index and synopsis of each of the 1,300 standard specifications applicable to 44 different industries. It includes lists of members of the general and divisional councils and industry committees as well as other useful information about the work of the B.S.I. The book is obtainable for 2s. post free, from the British Standards Institution, 28, Victoria Street, London, S.W.1.

Trade Publications

Metway Electrical Industries, Ltd., King Street, Brighton, 1, Sussex.—Priced leaflet (OE. 28/W) illustrating a toaster made of aluminium.

C. A. Parsons & Co., Ltd., Heaton Works, Newcastle-on-Tyne, 6.—Two illustrated brochures describing (A.1) multi-cylinder and (A.2) single-cylinder steam turbines.

Caufields Corp., 150, Charing Cross Road, London, W.C.2.—Price list of electrical and radio equipment and accessories.

Thorn Electrical Industries, Ltd., 105, Judd Street, London, W.C.1.—Booklet entitled "Light Through The Ages," written and illustrated for children.

[Applicants for copies should write on their firms' business notepaper.]

Trade Announcements

The General Electric Co., Ltd., announces that as from December 30th the trade counter of its Service Depot in Greycoats Street, London, S.W.1, will be open from 8.30 a.m. to 5.30 p.m. Monday to Friday (closed for lunch between 12.30 and 1.30 p.m.) and from 8.30 a.m. to 12.30 p.m. on Saturdays.

The Hoffman Manufacturing Co., Ltd., has opened a new branch office at 59, Queen Square, Bristol, 1. An emergency stock of bearings will be carried (telephone: Bristol 20561).

Britannia Batteries, Ltd., has removed to Trafalgar House, 9, Great Newport Street, London, W.C.2 (telephone: Temple Bar 2354).

Change of Name

Be-Be Engineering, 3, Retreat Close, Kenton, Middlesex, has changed its name to the Electro Power Co., Ltd.

Forthcoming Events

Monday, December 9th. BRISTOL.—The University, 5 p.m. I.E.E. Western Centre. Lecture summarizing papers given at the Radiolocation Convention, by Dr. R. A. Smith.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "Development of the Gas-Cushion Cable System for the Highest Voltages," by T. R. P. Harrison.

BIRMINGHAM.—James Watt Memorial Institute, 7.15 p.m. Institute of Rubber Industry (Midland Section). Forum on "Electrostatic Hazards in Industry." (Several short papers).

MANCHESTER. — College of Technology, 7.15 p.m. Society of Instrument Technology (North-Western Section). "Organization of an Industrial Instrument Department," by Messrs. J. O. C. Vick, Lamond and Lindsey.

NOTTINGHAM.—Corporation Gas Showrooms, Parliament Street, 6.30 p.m. Nottingham Society of Engineers. "Engineering and Electrical Services in Hospitals," by P. A. Moore and F. Quail.

Tuesday, December 10th.—LONDON.—Institution of Electrical Engineers (Radio Section), 5.30 p.m. Discussion on "The Design and Performance of Receiving Aerials for Television," opened by E. C. Cork.

At E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6 p.m. Illuminating Engineering Society. "Railway Lighting: Some Lessons from Experiences and Views on the Future," by A. Cunnington and G. W. Golds.

Institute of Marine Engineers, 5.30 p.m. "Marine Auxiliaries Driven by A.C. Supply," by A. Porter.

GLASGOW.—The University. Institute of Physics (Scottish Branch). "Betatrons," by Prof. L. Oliphant.

The Royal Technical College, 6.15 p.m. I.E.E. (Scottish Centre). "Degaussing," by W. C. Potts and I. S. Fraser.

MANCHESTER. — Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Centre (Installations Group). "The Analysis of Vibration Problems," by A. J. King.

LEEDS.—Corporation Electricity Department, Whitehall Road, 6 p.m. I.E.E. North Midland Centre (Installations Group). Discussion on "Earthing of Low and Medium Voltage Installations, including Telecommunication Systems."

Wednesday, December 11th.—LONDON.—Institution of Electrical Engineers (Transmission Section), 5.30 p.m. "Lightning Surges on Transmission Lines in Ireland," by R. C. Cuffe.

I.E.E. London Students' Section, 2.30 p.m. Visit to the works of J. & E. Hall, Ltd., Dartford.

BIRMINGHAM.—Grand Hotel, 7 p.m. Electrical Power Engineers' Association (Midland Technical Group). "Domestic Electric Water Immersion Heaters: Their Proper Installation and Use," by S. S. Galloway.

Thursday, December 12th. — LONDON.—Institution of Electrical Engineers (Installations Section), 5.30 p.m. "Growing Importance of Plastics in the Electrical Industry," by G. E. Haefely.

L.C.C. South-East London Technical Institute, 8 p.m. Electrical Engineering Society. "The Power Transformer," by R. V. Darton.

BIRMINGHAM.— Botanical Gardens, Edgbaston. Institution of Heating and Ventilating Engineers (Birmingham and District). Annual dance.

MANCHESTER. — Engineers' Club, Albert Square, 6.30 p.m. Women's Engineering Society (Manchester Branch). "Motion Study," by Miss A. G. Shaw.

Friday, December 13th.—LONDON.—Institution of Electrical Engineers (Measurements Section), 5.30 p.m. "A Millisecond Chronoscope," by R. S. A. Spilsbury and A. Felton, and "A Sensitive Recording Magnetometer," by A. Butterworth.

The Royal Society of Arts, John Adam Street, W.C.2, 6.30 p.m. Junior Institution of Engineers. Presidential Address, "Inspection," by Maj. Gen. A. W. Sproull.

NEWCASTLE-ON-TYNE.—King's College, 6.30 p.m. I.E.E. North-Eastern Students' Section. Short papers on "Industrial Electronics," by Messrs. Finlay, Edgley and Richmond.

MANCHESTER.—Grand Hotel, 6.30 p.m. Institution of Heating and Ventilating Engineers (Manchester and District Branch). Annual dinner.

Saturday, December 14th.—MANCHESTER.—College of Technology, 6.45 p.m. Association of Engineers. Conversazione and dance.

COVENTRY.—Masonic Hall, Little Park Street. Coventry Electric Club. Annual dance.

LEEDS.—Corporation Electricity Department, 2.30 p.m. I.E.E. North Midland Students' Section. Problems afternoon.

CARDIFF.—Association of Mining Electrical and Mechanical Engineers (South Wales Branch), 5.30 p.m. "Light Alloys as Applied to Mining and General Engineering," by W. F. Fennell.

MIDDLESBROUGH. — I.E.E. North-Eastern Students' Section, 2.15 p.m. Visit to the works of the *Evening Gazette* newspaper.

Monday, December 16th.—MANCHESTER.—Engineers' Club, Albert Square, 6.45 p.m. I.E.E. North-Western Students' Section. "Motion Study," by H. G. McKenzie.

BIRMINGHAM.—Grand Hotel. Birmingham Electric Club. "Lightning and its Effects," by Dr. T. E. Allibone.

Tuesday, December 17th. — LONDON. — E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6.15 p.m. Association of Supervising Electrical Engineers. "Mercury Arc Rectifiers, with Particular Reference to the Application of Variable-Speed Control of D.C. Motors," by F. T. Cowley.

Coaxial Cables

THE high-voltage characteristics of coaxial cables insulated with polythene for 600 Mc/s radio-frequency pulse operation are recorded in a paper (an official communication from the National Physical Laboratory) jointly compiled by MR. R. DAVIS (N.P.L.), MR. A. E. W. AUSTEN (Electrical Research Association) and PROFESSOR WILLIS JACKSON (Imperial College) for the Radio Section of the Institution of Electrical Engineers. The N.P.L. made impulse voltage breakdown tests and the E.R.A. studied discharge effects. Details of the experimental methods were novel and hypotheses concerning discharge and breakdown phenomena are likely to be the subjects of separate future papers.

The calculated values of the temperature rise of the inner conductor when transmitting radio-frequency power have been experimentally confirmed at 600 Mc/s, indicating that even when so operated as not to cause general overheating the life of polythene cables may be short and vary considerably with voltage. Breakdown under such conditions is believed to be due to deterioration which is caused by discharges in voids.

In the case of cables of reliable make the inception voltage measured at 50 c/s corresponds to a stress greater than 50 kV/cm so that long lines should be obtainable at lower radio-frequency, or with pulses of voltage swing corresponding to a stress of 100 kV/cm.

More precise guidance to the performance of a particular cable may be obtained from discharge measurements, which should be of great assistance to manufacturers as a basis for the establishment of quality control during manufacture.

Electric Catapult

A DEVICE termed the "Electropult," developed in the United States during the war, was intended for launching heavily loaded aeroplanes from short runways on Pacific atolls and is at present used by the U.S. Navy for experiments on assisted-launching of aircraft.

According to the *Westinghouse Engineer*, the "Electropult" is an electric motor of the squirrel-cage type, except that instead of the stator being circular with the rotor revolving within it, the stator is unrolled and laid out flat forming the runway. The moving element becomes a car, running on the stator as a track. The plane is harnessed to the car and is brought up to take-off speed by the combined forward pulls of its own engines and the "Electropult." The track is made the "cage," or secondary, and the car the primary "winding" so that the energy is transmitted across an air gap between the moving magnetic field and a short-circuited winding.

In one device the track is 1,382 ft long and is made up of 76 sections, each 18·2 ft long, set flush with the ground. The active core width is 12 inches. The first 1,000 ft of the secondary track is progressively decreased in resistance, giving a wound rotor effect to enable the tractive force to be held substantially constant as the speed increases. The remaining 382 ft is used for the braking of the shuttle car, which is stopped at the end by a combination of dynamic braking and the application of direct current. The shuttle car that tows the plane projects 5½ in. above the runway surface, is 3½ ft wide and 12 ft long, and runs on countersunk rails.

The amount of power required during the launching run is about 10,000 kW. To collect the large current required at the maximum speed of 225 m.p.h. (about 7,000 A during acceleration and 10,000 A during dynamic braking) 12 shoes per phase made of sintered copper graphite on a copper base are held against the collector rails by spring pressure.

The power plant consists of a d.c. motor driving an a.c. generator and heavy flywheel. About 95 per cent of the energy for launching is taken from the flywheel, the remainder being provided by the engine drive.

The Heat Pump

THERE was a large attendance at last week's informal meeting of the Institution of Electrical Engineers in London to hear MR. J. A. SUMNER (Norwich) outline the theory and principles of operation of the heat pump, interest in which was being awakened by the increasing cost of coal.

He considered that there were great prospects for a manufacturing concern bold enough and having sufficient resources to exploit the method for industries requiring large amounts of heat at moderate temperatures. There was also the possibility of producing small units combining domestic space and water heating with refrigeration.

The heat pump was claimed to offer great possibilities as a load builder for the electricity supply industry. The installation at the Duke Street offices of the Norwich Corporation Electricity Department (described in the *Electrical Review* of May 3rd last) was working well; installations in Switzerland and America were mentioned. Mr. Sumner pointed out that manufacturing cost would depend upon design and method of construction, but it was not impossible to produce a heat pump outfit at a cost that would compare very favourably with that of an equivalent boiler installation with automatic firing.

Few speakers took part in the discussion; reference was made to the specifications that had been issued in America and the efforts being made there to have heat pump plant produced in quantity and of several sizes, manufacturers being asked to tender for 1,000 units at a time.

Export Conference

MR. LESLIE GAMAGE (G.E.C.) presided at a two-day conference arranged last week by the Federation of British Industries for the purpose of discussing problems encountered in export trade. Sir Clive Baillieu, president of the F.B.I., in his opening remarks reminded the Government that industry could not accomplish its duties unless the proper atmosphere was created. Referring to nationalized undertakings, he said that these would have to bear their fair share of taxation, and produce goods of the proper quality in sufficient quantity and at the requisite price.

Sir Stafford Cripps, President of the Board of Trade, urged the importance of exporting fully-finished rather than semi-manufactured goods. After referring to the " dollar " position, Sir Stafford suggested that it might sometimes be good policy to manufacture goods especially for an overseas market with an " overspill " into the home market. He warned the conference that the present " seller's market " was not likely to last long and only the most efficient methods would win permanent markets.

Mr. Leslie Gamage refused to be despondent about the export outlook. He insisted that we had unrivalled skill in our management, labour force and research staffs and we also enjoyed our customers' confidence. It was essential, however, that the appearance of our products should compare favourably with those of our trade rivals.

At the second day's session, Lt. Col. H. B. Riggall (president, British Engineers' Association) questioned the wisdom of exporting capital goods, badly needed here, to enable other countries to compete with us.

Other speakers at the conference included Lord Bennett, Sir John Woods (Board of Trade), Sir Norman V. Kipping (director, F.B.I.), Sir William Larke, Mr. E. A. Carpenter (Manchester Chamber of Commerce), Sir Frederick Bain (deputy-chairman, F.B.I.) and Mr. Ablett (Cooper Roller Bearings, Ltd.).

Civic Radio Service

WE have received from the Fulham Electricity Department (engineer, Mr. W. C. Parker) a statement on the Borough Council's decision to sell and service radio and television equipment, a decision which has been followed by a number of other municipal electricity undertakings.

The aims are said to be to provide the public with equipment of the highest quality at the earliest possible date and to institute a technical service, particularly for television, of a high order as for other electrical apparatus in the home of the consumer. The emphasis to be laid on quality may result in higher prices than for ordinary receivers. It is felt that " owners of radio and television equipment are at present not satisfied with the commitments that they are likely to incur under the present guarantee and servicing arrangements." It is therefore the intention of the Council, " within economic limits," to assist the owners of radio and television equipment in this respect as far as possible. The equipment sold bears the name " Civic Concord," " so that the public may gradually associate this name with radio equipment sold only by electricity undertakings."

It is stated that before the Council decided to market a range of radio equipment to its own specifications, it endeavoured to collaborate with existing manufacturers, who, however, found themselves unable to deal with municipal undertakings. It was made quite clear that municipal undertakings were prepared to collaborate with radio retailers and a letter to this effect was sent in the early days to the Radio Industries Council. Further, the secretary of the Radio and Television Retailers' Association was interviewed. As these offers were not accepted the municipalities were bound to proceed on their own lines.

Fulham Electricity Committee reports that the joint committee of local authorities concerned has considered the question of placing further orders for radio and television sets. To obtain the maximum quantity for the minimum price is essential that a bulk order should be placed for the provision of all the sets required by the participating authorities. It is estimated that about 5,000 sets will be needed over a period of one year and that the estimated cost of the Fulham allocation will be £10,000.

Batti-Wallahs' Society

COL. Norman Elliott, the recently-appointed general manager of the London and Home Counties J.E.A., was the speaker at the monthly luncheon of the Batti-Wallahs' Society last week at the Connaught Rooms.

Mr. Henly Howard, past-president, took the chair in the unavoidable absence of the president, Mr. P. V. Hunter, and referred with regret to the death the previous day of Mr. James McCaffery, president of the Society from 1939 to 1945.

He then introduced Col. Elliott who gave a brief but very interesting and " live " account of his experiences in restoring power supplies for the 21st Army Group in France and Belgium. (A somewhat fuller account given by Col. Elliott and Maj. L. W. Neville at an E.P.E.A. meeting appears on page 936 of this issue.)

The vote of thanks to the speaker was proposed by Mr. Alan N. East (Electricity Commission). Mr. M. Whitgift, the hon. secretary, announced that there would be no December luncheon; the next meeting would be on January 30th with Mr. Hugh Quigley, M.A., as speaker. At the February luncheon the speaker would be Sir Hartley Shawcross, the Attorney-General.

ELECTRICITY SUPPLY

Refrigerator Hire. Power Station Schemes.

Bedford.—REFRIGERATORS FOR NEW HOUSES.—Where it is still possible to carry out the necessary preliminary work, the Housing Committee proposes to install Electrolux silent built-in model refrigerators in new houses at Cardington Road. Half will be electric and half gas, the undertakings receiving a hire-purchase payment of 1s. a week for a period of years to cover the cost of each refrigerator (£16 10s.), installation and reasonable maintenance, but exclusive of the cost of service cables or pipes.

Bexhill. — CHANGE-OVER. — The Electricity Committee is to change over the supply in the St. Leonards Road area at a cost of £16,500.

Blackburn.—POWER STATION EXTENSIONS.—Important extensions to the Corporation power station at Whitebirk costing £1,250,000, have been approved by the Electricity Commissioners. The following plant will be installed, ready for operation in September, 1950:—One 40,000-kW turbo-alternator; three boiler units each with a maximum capacity of 150,000 lb of steam per hr; necessary buildings and civil engineering works; and a 1,800,000 gal per hr cooling tower. The Electricity Committee has decided to recommend that Mr. R. H. Harral, the borough electrical engineer, shall be the engineer in charge, and shall be paid an aggregate of £5,500 for services on the extensions, work on which will be considered to have started on December 1st, 1946.

Central Sussex.—MEETING NEW DEMANDS.—To meet large load developments Central Sussex Electricity, Ltd., and its associated companies are proceeding with the erection of two 33-kV overhead lines together with two transformer stations of 20,000-kVA and 10,000-kVA capacity respectively, at an estimated cost of approximately £150,000. Expenditure of a further £75,000 has been authorized for the provision of supplies for new housing, food production and other priority purposes. Orders to supply over 1,000 permanent houses in course of erection by the various local authorities in the area have already been received; a high proportion of these will have electric cooking and water heating. Numerous schemes have been prepared for extensions to remote parts of the area and to isolated premises but their execution has had to be postponed until materials become available.

Manchester.—CARRINGTON POWER STATION SCHEME.—Having received assurances from Sir Donald Fergusson (Ministry of Fuel and Power) regarding the reimbursement of the Corporation if and when the industry is nationalized, the Electricity Committee recommends the City Council to proceed with the construction of the Carrington power station. The proposal is to erect two sections of the new station at an estimated capital cost of £5,500,000.

Melton Mowbray.—EXTENSION OF TIME.—It was decided at the November meeting of the Urban District Council that application should be made to the Electricity Commissioners for the granting of an extension of time in which the Council can exercise its option of purchasing the undertaking of the Melton Mowbray Electric Light Co., Ltd.

Middlesex.—HOSPITAL INSTALLATION.—The County Health Committee is to install electricity and radio at a cost of £3,425 at the Central Middlesex Hospital. The heating system is also to be improved.

Montgomery. — "CLAMOURING FOR ELECTRICITY."—At a conference attended by representatives of the County Council and other public bodies and organizations a comprehensive report was presented on the number of farm dwellings, dairies, churches, clubs and other premises which had made insistent demands for electricity. Mr. H. W. Grimmitt (Electricity Commission) described it as the most complete schedule of needs the Commission had had from any part of the country. He added that he had spent his life trying to persuade rural areas to use electricity; now everyone was clamouring for it.

Morecambe.—H.V. EXTENSIONS.—The Electricity Committee is to extend the high-voltage system, involving the provision of four substations, at a cost of £13,854.

Poplar.—NEW STATION APPROVED. — The Electricity Commissioners have notified their approval of the Council's proposal to erect a power station on the Brunswick Wharf site.

Seaham. — LOAN. — The Urban District Council has applied for sanction to borrow £8,471 for mains and services, meters, plant and buildings.

Southport.—LOAN APPLICATION.—The Electricity Committee is to make application to the Electricity Commissioners for sanction to borrow £14,000 for extensions in connection with the change-over of supplies in the Birkdale area from d.c. to a.c. Permission is also being sought to borrow £6,000 for erecting a substation in the Trafalgar Road area, and £2,609 and £3,386 for outdoor substations in Arundel Road and Carr Lane respectively.

Stockton-on-Tees.—INDUSTRIAL DEVELOPMENT.—Sanction has been received by the Town Council to borrow £5,785 in connection with the supply of electricity to the Dog Hill Farm industrial site.

Stoke Newington.—STREET LIGHTING.—The Borough Council is to proceed with the third stage of the new street lighting scheme at a cost of £9,900.

York.—LOAN.—The Corporation Electricity Committee is seeking sanction to borrow £22,340 in connection with the provision of cable for an increased load in the Haxby and Wiggington areas and to supply thirteen farms on the Wiggington road.

Overseas

Australia.—MELBOURNE REPORT.—A decrease in the average price paid for coal from 41s. 10d. a ton in 1944 to 40s. 7d. last year is shown in the annual report of the city electrical engineer of Melbourne (Mr. B. Woodfull). Between 1939 and 1943 the price rose from 28s. to 42s. Last year's price for coke and breeze, however, at 17s. 11d., was the highest yet recorded. Sales of electricity aggregated 165·8 million kWh, the average price per kWh sold being 1·373d. Total revenue was £948,672 against £921,451 in 1944 and there was a net profit of £188,427 before various appropriations.

Eire.—RIVER ERNE SCHEME.—The Erne hydro-electric scheme was the subject of a recent question in the Northern Ireland Parliament. The Parliamentary Secretary to the Minister for Finance, in replying, stated that no agreement has been yet arrived at between the Electricity Supply Board, the Board of Works, and the Northern Ireland Government with respect to the drainage works necessary for the project (a large part of the Erne catchment area is situated in Ulster). The preliminary work is, however, going ahead very satisfactorily.

India.—ELECTRICITY IN CENTRAL PROVINCES.—At the invitation of the Government of the Central Provinces and Berar, Sir Henry Howard, consulting engineer to the Government of Madras, recently studied the possibility of establishing a provisional power system. In his report he advocates the creation of a Department of Electricity (and Industry), the province to be divided into five power districts. No new licences for electricity supply should be granted and as existing licences expire the undertakings should be acquired. When possible a statutory electricity commission should be established.

Slovakia.—ELECTRIFICATION PROGRAMME.—Slovakia's programme of electrification has three main objects: the modernization and extension of industrial enterprises already in existence, the establishment of new industries, and the improvement of the standard of life of the people. The working plan has been divided as follows: 1. From 1946 to 1948 two large hydro-electric plants will be constructed, one on the Vah, the main river of Western Slovakia. 2. From 1946 to 1950 two other hydro-electric plants will be constructed, one on the Orava River. 3. From 1946 to 1952 a further three plants will be erected.

Reconstruction in France

UNDER a five-year reconstruction plan drawn up by the National Planning Council under M. Jean Monnet, General Commissioner for French Reconstruction it is proposed to spend 2,000,000 million francs. Of this total, some 180,000 million francs is required for the rehabilitation and expansion of the country's electricity system, and it is estimated that the present annual output of 24,000 million kWh will be raised to 38,000 million kWh by 1950. Mechanization of France's agriculture, including the construction of slaughter-houses and refrigerating plants would cost 150,000 million francs, and development of the transport system would account for a further 146,000 million francs. The plan provides for an expenditure of 65,000 million francs on the Lorraine coal industry, designed to raise the production from the 1946 level of 48 million tons to 64 million tons within five years. As to industry, it is hoped to raise the output of raw steel from four million to 11 million tons by the investment of 40,000 million francs in heavy industry undertakings, while a further sum of 160,000 million francs is required for the modernization of the mechanical and chemical industries. No details have yet been announced as to how the programme will be financed.—*Reuter's Trade Service.*

Lighting for Photography

AN exceptionally large audience of members of the Birmingham Centre of the Illuminating Engineering Society and their friends, heard a paper on November 2nd by Mr. George A. Jones, of Kodak Research Laboratories, on "Lighting for Photography." After showing how to light a subject to obtain certain results, Mr. Jones dealt with various light sources and their effect on the photographic emulsion.

By means of a step wedge diagram, the lecturer illustrated that exposure was not the simple product of lumens and time that it at first appeared. To double the amount of light and halve the exposure time did not necessarily produce the same result, as contrast would be affected. Even the type of electricity used for the artificial light source had an appreciable effect on the negative. A.C. and gas discharge lamps, with their more pronounced stroboscopic effect, tended to cause flatter results than were secured with lamps used on direct current.

Whilst dealing with arc lamps, Mr. Jones illustrated and discussed the high intensity flash discharge tube, which, by means of a condenser arrangement, a specially coiled lamp column, and a suitable stroboton circuit, gives a single brilliant flash for a very brief period of time. Infra-red and ultra-violet lighting for photography was illustrated by a number of slides.

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.

AEROVOX Corporation.—"Art of dielectrics." 3625/43. July 7th, 1942. (582281.)

Aktiebolaget Elektrolux. — "Air cooled absorption refrigerating apparatus." 17858/44. October 8th, 1943. (582311.)

Allmanna Svenska Elektriska Aktiebolaget.—"Electric slip coupling with short-circuited winding." 9247/44. October 25th, 1943. (582464.)

Automatic Telephone & Electric Co., Ltd., and C. F. Campbell.—"Calibration arrangements suitable for use in carrier telecommunication systems." 17645. September 15th, 1944. (582307.)

Bendix Aviation Corporation.—"Illuminating means for indicating instruments." 17979/44. October 22nd, 1943. (582315.)

C. Bevoort.—"Tapping circuits for communication lines." 22998/39. August 10th, 1938. (582401.)

Birmingham Small Arms Co., Ltd., and E. Poppe.—"Electrical systems for motor driven vehicles." 17365. September 12th, 1944. (582302.)

British Thomson-Houston Co., Ltd.—"Electromagnetic cores and method of forming same." 18102/44. September 22nd, 1943. (582319.) "Methods of and apparatus for flux measurement." 16611/44. September 1st, 1943. (582367.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—"Electric wave transmitting systems." 18163. November 2nd, 1943. (582328.) "Cathode ray tubes." 17945. October 29th, 1943. (582444.)

British Thomson-Houston Co., Ltd., and S. A. Choudhury.—"Dynamo electric machines for the remote transmission of angular motion and torque." 7487. April 21st, 1944. (582341.)

British Thomson-Houston Co., Ltd., and J. E. Stanworth.—"Glass compositions." 12009. June 23rd, 1944. (582353.)

British Thomson-Houston Co., Ltd., C. J. Milner and W. D. Sinclair.—"Output lead seals of high power hyper frequency electron discharge oscillators." 14547. November 11th, 1941. (582441.) "Output lead seals of high power hyper frequency electron discharge oscillators." 14548. November 11th, 1941. (582442.)

J. D. Cockcroft and P. E. Pollard.—"Radio apparatus for locating distant bodies." 3928. March 24th, 1942. (582325.)

J. D. Cockcroft, J. Ashmead, E. Coop, A. E. Kempton, P. G. Forsyth and B. Newsam.—"Radiolocation apparatus." 10653. June 30th, 1943. (582419.)

B. V. Cole and Plessey Co., Ltd.—"An electric multicontact switch mechanism controlled by vapour pressure." 8613. May 6th, 1944. (582283.)

Crypton Equipment, Ltd., R. Squire and A. G. Wheller.—"Systems of charging batteries." 7338. April 20th, 1944. (582454.)

B. J. Edwards and Pye, Ltd.—"Means for reproducing X-ray images." 17502/44. August 13th, 1943. (Divided out of 580687.) (582304.)

English Electric Co., Ltd., G. Chadwick and J. E. Salthouse.—"Systems for supplying electric current impulses suitable for welding." 1027. January 19th, 1944. (582335.)

P. X. Fox.—"Contact device for potentiometers and other like electrical apparatus." 10653. April 27th, 1945. (582476.)

General Electric Co., Ltd., and V. J. Francis.—"H.p.m.v. electric discharge lamps for optical projection apparatus." 10092. August 8th, 1941. (582408.)

General Electric Co., Ltd., and A. W. Highfield.—"Holders for arc-welding electrodes." 17478. September 13th, 1944. (582369.)

General Electric Co., Ltd., and E. Kettlewell.—"Devices comprising sealed envelopes of quartz." 3343. March 13th, 1942. (582412.)

General Electric Co., Ltd., E. H. Croft and H. Randall.—"Electrical protective apparatus." 9086. July 1st, 1942. (582413.)

A. S. Gush and H. L. Malan.—"Electrolytic device for the prevention of scale in boilers and like heat exchange apparatus." 4006. March 3rd, 1944. (582338.)

Hazeltine Corporation. — "Ultra-high-frequency tuning unit." 16655/43. October 3rd, 1942. (582424.)

Marconi's Wireless Telegraph Co., Ltd.—"Means for deriving an electrical potential and for utilizing said potential in signalling and indicating systems." 8030/44. April 29th, 1943. (582457.)

Marconi's Wireless Telegraph Co., Ltd., R. J. Kemp and D. J. Fewings.—"Electric impulse generator systems suitable for use in range-finding systems." 9363. May 28th, 1940. (582360.) "Electrical range-finding apparatus." 9371. May 28th, 1940. (582403.)

M. Milewski.—"Rotary blowers." 19216. October 6th, 1944. (582395.)

W. Partington and Metropolitan-Vickers Electrical Co., Ltd.—"Electric generating equipments." 18796. October 2nd, 1944. (582384.)

A. F. Pearce.—"Electron discharge devices employing hollow resonators." 13425. October 18th, 1941. (582440.)

Scophony, Ltd., and A. F. H. Thomson.—" Methods and apparatus relating to the precise determination of short time-intervals." 9312. May 15th, 1944. (582434.)

G. R. Shepherd (Westinghouse Electric International Co.).—" Overload released electric circuit breakers." 4255. March 7th, 1944. (582446.)

Standard Telephones & Cables, Ltd.—" Dry rectifier element and method of manufacture." 18895/44. October 7th, 1943. (582385.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—" High-frequency oscillators." 18081. September 21st, 1944. (582318.)

Standard Telephones & Cables, Ltd., and B. B. Jacobsen.—" Systems for locating aircraft by electromagnetic waves." 2026. February 14th, 1941. (582406.)

Standard Telephones & Cables, Ltd., and R. Kelly.—" Power supply systems for carrier communication systems." 4482. March 10th, 1944. (Addition to 559377.) (582447.)

Standard Telephones & Cables, Ltd., and H. P. Williams.—" Radio navigational systems." 9405. May 16th, 1944. (Addition to 546970.) (582466.)

Standard Telephones & Cables, Ltd., W. A. Beatty and L. W. Houghton.—" Electrical signalling systems." 16698. November 20th, 1940. (582405.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea and C. T. Scully.—" Time-modulated pulse communication systems." 15145. November 24th, 1941. (582324.)

Standard Telephones & Cables, Ltd., W. K. Weston and E. Baguley.—" Manufacture of electric communication cables." 10698. April 27th, 1945. (582477.)

A. H. Stevens (Electro Manganese Corporation).—" Electro-winning of manganese." 6645. April 11th, 1944. (582451.)

Swan, Hunter & Wigham Richardson, Ltd., and F. H. W. Haworth.—" Arc welding electrode holders." 9844. May 22nd, 1944. (582470.)

A. Thomson.—" Device for tuning or adjusting apparatus, such as radio apparatus to close limits." 2514/44. November 6th, 1942. (582336.) " Means for mounting radio apparatus." 26924/45. November 6th, 1942. (Divided out of 582336.) (582358.)

K. W. Todd and Metropolitan-Vickers Electrical Co., Ltd.—" Mechanical relays of the fluid jet type." Cognate applications 9378/40 and 13966/40. May 28th, 1940. (582322.) " Mechanical relays of the fluid jet type." Cognate applications 15051/41 and 15052/41. May 28th, 1940. (Divided out of 582322.) (582323.)

W. L. Watton, E. W. Bull and E. L. C. White.—" Electrical pulse separating circuits." 21679. December 24th, 1943. (582330.)

Westinghouse Electric International Co.—" Valve mechanism for compressed gas operated electric circuit interrupters." 4252/44. March 13th, 1943. (582445.)

M. P. Winther.—" Electrical inductive apparatus of the eddy current type." 12549/41. March 19th, 1941. (582409.)

Amended Specification

561160. Automatic Telephone & Electric Co., Ltd., and anr.—" Thermionic valve oscillators."

Trade Marks

APPLICATION has been made for the registration of the following trade marks. Objections may be entered within one month of November 27th :—

MIDGELYTE. No. B641583, Class 7. Electric generators and electric motors (not for land vehicles); engines for driving electric generators; steam boilers (parts of machinery) and fittings therefor (not included in other classes); and parts (not included in other classes).—Arthur Lyon & Co. (Engineers), Ltd., Africa House, Kingsway, London, W.C.2.

WATLIFF. No. 643,227, Class 7. Electric motors (not for land vehicles) and parts not included in other classes. Also No. 643,228. Electrical apparatus and instruments included in Class 9.—Watliff Co., Ltd., Commutator Works, Lombard Road, South Wimbledon, London, S.W.19.

MITRE (design). No. 639,090, Class 11. Electric radiators, electric fires and electrically-heated apparatus for airing towels.—Albany Sheet Metal & Engineering Co. (Oldham), Ltd., Albany Mills, Vulcan Street, Oldham.

RANALAH (design). No. 640,525, Class 11. Apparatus for heating air and water, and metal airing cupboards for linen, etc.—Ranalah, Ltd., Ranalah Works, Morden Road, Merton, London, S.W.19.

JENEX. No. 643,789, Class 11. Hair-drying appliances.—Michael Curry, 2, Chelmsford Square, London, N.W.10.

Shortage of Materials

IN a report to the Fulham Electricity and Lighting Committee the borough electrical engineer (Mr. W. C. Parker) calls attention to the acute shortage of raw materials, particularly those required for the manufacture of electrical domestic apparatus. As an instance, he mentions that the Electricity Department has been unable to obtain boiling plates for cookers although an order was placed in January last. It is also impossible to execute repairs to other domestic apparatus because the Council's stock of components is exhausted. The Committee proposes to write to the President of the Board of Trade and the local M.P.s pointing out the seriousness of the position and its consequences, particularly in regard to the housing programme. Other local authorities owning electricity undertakings and the representative associations are to be asked to support the Council's action.

NEW BOOKS

Theory of Wave Motion.

Wave Propagations in Periodic Structures. By Léon Brillouin. Pp. 247; figs; index. McGraw-Hill Publishing Co., Ltd., Aldwych House, London, W.C.2. Price 20s.

This is an excellent and scholarly book, but one designed more for the mathematical physicist than for the electrical engineer. It starts with the mathematical considerations of the propagation of wave motion in a continuous structure and describes how this was first attacked by Newton, considering the medium to be a one-dimensional lattice of a series of equal masses. From this he derived the well known equation for the velocity of sound which had to be corrected by Laplace in 1822.

The study of mathematics had not advanced enough in Newton's time to enable him to deal with wave motion in a continuous elastic medium. This method of investigation was pursued throughout the 18th and early 19th centuries and applied to several physical problems. In 1881 Lord Kelvin proceeded to discuss another form of one-dimensional lattice, where a series of small masses are attached to a series of larger masses. This gave him equations which he could apply to the refraction of light in a simple chemical crystal and led eventually to the Lorentz refraction formula. In 1887 Heaviside began his series of mathematical papers in which he compared these lattices to a series of inductances or inductances and capacitances. He developed the equations accounting for the band-pass filter, the high-pass filter and the low-pass filter.

The book pursues this line of investigation and applies it to a variety of phenomena and problems such as anomalous optical reflection, rest-rays, selective reflection of X-rays, loaded electric cables and two-dimensional lattices, the general theme being that waves always behave in a similar way, whether they are longitudinal, transverse, elastic or electric. The treatment is profound but some of the mathematics is very complicated.—W.C.A.

Electronics for Beginners.

An Introduction to Electronics. By Ralph G. Hudson. Pp. 97; 72 diagrams and 37 plates. The Macmillan Company, New York, 1946. Price 15s.

A few years ago the reviewer was taken to task for using the word "electronics" and was asked in scathing tones "What is electronics, anyway?" To-day, the term has firmly established itself both as a word and as a branch of electrical science. The author, who is professor of electrical engineering at Massachusetts Institute of Technology, defines it in the preface as ". . . that branch of science which describes the properties and control of electrons and other rudimentary particles. . . ." This, however, is a wider definition than would usually be accepted, since the branch is generally considered to deal with the *free* electron. The scope of the subject is perhaps better indicated by the contents of the book, which includes chapters headed "The Constitution of Matter," "The Flow of Electricity," "Radio Communication," "Reproduction of Sound and Picture," "Modern Sources of Light," "More Power to the Electron" and "Diverse Applications of Electronics."

The book does not contain any mathematics and no previous knowledge of physics is assumed. Nevertheless, the author is at pains to explain even complicated electronic apparatus from first principles, without any of the inaccuracies and half-truths which mar most books on popular science. Although intended for the lay reader, the book could be read with pleasure and profit by electrical engineers.

It is attractively produced and profusely illustrated. The reviewer's criticisms are few. The use of the word "ionosphere" on p. 33 to mean a *single* ionized layer is not in accordance with current practice; the ionosphere includes all the ionized layers. Some of the most recent developments could surely have been included, at least in footnotes. For example, the magnetron is not mentioned and the following statement should be revised: "It is perhaps a fortunate thing that no method has been found to release large amounts of atomic energy because such a reaction, once started, would be difficult to control and might result in a world-wide destruction of enormous extent" (p. 20). We know now that the control of the reaction is relatively simple due to the emission of delayed neutrons; it is the control of the politicians which presents the difficulty !—J.S.F.

Electricity in the Building Industry. By F. C. Orchard, M.I.E.E., A.M.I.Mech.E. Pp. 232; figs. 114. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 15s.

The title of this book does not quite convey its scope. It might give the impression that the contents were designed to give builders without electrical knowledge a survey that could be readily assimilated of the many ways in which the use of electricity could facilitate and cheapen construction.

Such information is given, but it has to be searched for amid a mass of electro-technical detail that is likely to be of more service to electricians engaged in the selection and installation of motors for particular purposes and in maintenance and operation. Men with practical experience of this kind would probably find the book a useful guide to general workshop practice and also to the fundamental principles of

electricity. The chapter on works power costs, which includes a section on tariffs, and an appendix on economic considerations are the parts of the book most likely to appeal to an enlightened management, which might also obtain some progressive ideas from the chapter on recent research, the applicability of which, however, could only be decided on expert advice.—C.O.B.

Marconi 1939-1945: A War Record. By George Godwin. Pp. 127. Chatto & Windus, 40, William IV Street, London, W.C.2. Price 10s. 6d.

It is generally recognized that our superiority in communications and developments of that art, including radar, were largely responsible for our success in the late war. This book sets out in an interesting way the important part played by Marconi's in various phases of the war from the Battle of France to the Battle of Germany—with particular emphasis on the Battle of Britain. It is profusely illustrated with beautiful examples of the photographic art.—J.H.C.

Radio Receiver Specifications, 1945-46 (24 pp., paper cover). The Trader Publishing Co., Ltd. (distributed by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1).

In this booklet are presented for quick reference, condensed technical specifications of radio receivers released since the war and marketed by leading manufacturers—a total of 138 sets by 55 makers. The information (which was compiled by the *Wireless & Electrical Trader*) is of equal value to those members of the public who want to buy new receivers as it is to those in the radio trade.

" Wireless World " Diary, 1947. Price 3s. 4½d. (including purchase tax). Iliffe & Sons, Ltd.

In this diary there is an 80-page reference section that will appeal to all those interested in radio, whether professionally or as amateurs. The information has been collated and checked by the *Wireless World* staff. All copies have been allocated by the publishers, but wholesalers may be able to supply them.

Survey Before Plan—2. The Hub of the House. Edited by E. M. Willis. Pp. 64. Illustrated. Percy Lund, Humphries & Co., Ltd., 12, Bedford Square, London, W.C.1. Price 6s.

Much has already been written on house planning, but most of the literature which has appeared has been intended for the guidance of those professionally interested in problems of construction. There is, however, a wide section of the general public which is interested in these problems and this series " Survey before Plan " has been devised to meet this need. Much of the material is drawn from broadsheets produced by the Association for Planning and Regional Construction, but it is presented in a less technical manner. The book is divided into three sections, with a prologue and bibliography. The first section deals with the planning of the kitchen in the town house, the second, cleaning the town house, and the third, planning for the small country house.—H. B.

History of Air Navigation. By A. J. Hughes. Pp. 154; figs. 77. Geo. Allen & Unwin, Ltd., 40, Museum Street, W.C.1. Price 10s. 6d.

Starting with a chapter on the evolution of navigational technique at sea from the earliest days, the author traces its subsequent development in flight since the end of the first world war, with notes of the methods adopted by earlier pilots. Long-distance air navigation began with the first Atlantic crossing in 1919 by Alcock & Brown and a chapter is given to the most important flights onwards to 1935.

The remaining third of the book deals with instruments, in the making of which the author has spent half a century. These provide the main electrical interest, more especially in regard to compasses and wireless aids to navigation, the general purposes and principles of which, rather than the constructional details, are discussed.—C.O.B.

" The Autocar Handbook " by *The Autocar* Technical Staff. Nineteenth edition. Pp. 262; illustrated. Iliffe & Sons, Ltd. Price 5s. (postage 4d.)

For forty years " *The Autocar* Handbook " has been the recognized guide for the owner-driver who desires to have a general knowledge of the basic principles governing the operation and maintenance of his car. This nineteenth edition, the first to be produced since the war ended, has been brought up to date so as to give a fair indication of cars as they are being made to-day; and it includes notes on changes and improvements which are beginning to find their way into new designs as the result of experience gained in the hard years of war.

The treatment adopted in explaining the mechanism is essentially not highly technical, thus making the book suitable for those without theoretical knowledge or engineering training.

Books Received

Electrical Transmission in Steady State. By Paul J. Selgin. Pp. 427; figs. 100; index. McGraw-Hill Publishing Co., Ltd., Aldwych House, London, W.C.2. Price 25s.

Plastics—In the World of Tomorrow. By Capt. Burr W. Leyson. Pp. 95; illus.; index. Paul Elek (Publishers), Ltd., 36-38, Hatton Garden, London, E.C.1. Price 10s. 6d.

" The Autocar " Motorist's Diary, 1947, and **" The Motor Cycle " Diary, 1947.** Price 3s. 4½d. each (including purchase tax). Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. All copies have been allocated by the publishers, but wholesalers may be able to supply them.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Crabtree Electrical Industries, Ltd.—Providing no breakdown occurs in negotiations, the company proposes to extend its existing factory at Walsall by the provision of new buildings at an estimated cost of £120,000. This was stated by Dr. H. Schofield (chairman) at the annual meeting last week. It was being done, he said, in an endeavour to reduce to more reasonable proportions the "embarrassingly large" order book. The operating company, J. A. Crabtree & Co., Ltd., had negotiated the change from war to peace production very satisfactorily and was doing its utmost to satisfy the phenomenal demand for its products which came from all sides. The difficulties which they, in common with other manufacturers, experienced during the war were no greater than, if as great as, those they were encountering now. Referring to the accounts, he said that they had now reached the position where all their taxation liabilities had been provided for in the current accounts.

Pirelli-General Cable Works, Ltd., is repaying the 4¾ per cent guaranteed debenture stock (£501,400) at 105 per cent on March 1st and is issuing at 105 per cent £750,000 of 3¼ per cent guaranteed debenture stock. Holders of the old stock have the right to convert into the new and to subscribe in cash at 105 for any part not required for conversion purposes. The new stock is guaranteed by the General Electric Co., Ltd., and Pirelli Holding S.A., of Basle and is being underwritten by the British Trusts Association.

Laurence, Scott & Electromotors, Ltd.—We regret that the notice relating to the increase of capital of this company which appeared in our last issue was incorrect. The position is as follows:—The company is making an issue of 250,000 4½ per cent cumulative preference shares of £1 each and Laurence, Keen & Gardner and Shaw Loebel & Co., have agreed to subscribe for these at 20s. 6d. per share. The net proceeds of the issue will be used for the purchase of plant and tools which have been leased by the company from the Admiralty, and for the provision of additional working capital required to finance the largely increased value of raw materials and stocks.

The Associated Equipment Co., Ltd., in its accounts for the year ended September 30th last, shows trading profits amounting to £1,121,052, against £1,175,777 for the preceding year, but last year's figure included £273,292 from price adjustment provision no longer required. With a lower amount for taxation (£667,500 against £865,000) the net profit rose from £218,500 to £357,500. It is proposed to pay a final dividend of 10 per cent (against 5 per cent) tax free, making 12½ per cent (7½ per cent) tax free for the year.

Crompton Parkinson, Ltd., report a profit for the year ended September 30th last of £440,363, as compared with £434,283 for the preceding year. It is proposed to pay a final dividend on the ordinary and "A" ordinary stock of 7½ per cent making 15 per cent for the year and a special cash bonus of 7½ per cent. The dividend and the bonus are the same as for the previous year. A sum of £5,000 is paid to the central benevolent fund, and the balance carried forward is £797,902, as compared with £690,039 brought in.

The British Electric Transformer Co., Ltd., reports a profit for the year ended September 30th of £59,645, as compared with £29,674 for 1944-45. The final ordinary dividend is 6d. per share, making 50 per cent for the year (against 20 per cent), and the balance carried forward is £437 (against £323 brought in).

The Lincolnshire & Central Electric Supply Co., Ltd., reports a revenue for the year ended March 31st of £83,358, as compared with £83,633 for the preceding year, and a profit of £55,790 (against £54,842). The ordinary dividend for the year is maintained at 9 per cent, general reserve receives £2,500 and £49,933 is carried forward (against £42,768 brought in).

John I. Thornycroft, Ltd., report a net profit of £143,949 for 1945-46, as compared with £127,989 for the preceding year. General reserve receives £50,000, and it is proposed to pay a final dividend of 10 per cent and a bonus of 5 per cent, making a total of 20 per cent for the year. In the previous year the final dividend was 12½ per cent but no bonus was paid, the total for the year being 17½ per cent. The balance carried forward is £101,156 (against £101,707 brought in).

Heenan & Froude, Ltd., report a profit for the past year (before tax) of £97,434, as compared with £53,823 for the preceding year. The final dividend is 15 per cent, including 5 per cent (same) bonus, making a total distribution for the year of 20 per cent (against 15 per cent).

The Sun Electrical Co., Ltd., is paying a dividend of 4½ per cent for the year (against 2½ per cent). The profit for the year is £20,106 (against £18,916).

Aeronautical & General Instruments, Ltd., reports a profit for the past year of £30,500 as compared with £29,690 for the previous year. The final dividend is 10 per cent (against 8½ per cent), making 16½ per cent for the year (against 15 per cent). The company proposes to increase its capital to £400,000 by the creation of 150,000 shares of £1 and 400,000 shares of

5s. It is proposed to finance present production by an issue in the immediate future of sufficient shares to provide approximately £150,000. The terms of the issue will be submitted to the Capital Issues Committee and to the Committee of the London Stock Exchange. Preference will be given to existing shareholders in allotment.

Tube Investments, Ltd.—Subsidiaries' trading profits (after E.P.T.) for the year to August 3rd amounted to £2,403,429, an increase of £148,706 on the previous year. A sum of £355,007 (£227,528) is charged for depreciation, while income tax takes £902,069 (£968,233). Reserve for special depreciation receives £400,000 (£250,000), but there is no allocation to the reserve for research and development which last year received £100,000. After deducting £61,832 (£30,149) retained by subsidiaries and adding dividends from associated and allied companies, the parent company's net profit for the year ended October 31st was £838,281 (£808,195). The ordinary dividend for the year is maintained at 22½ per cent (last year there was also a special 10 per cent payment out of contingencies reserve). General reserve receives £300,000 and £328,978 (£290,145) is carried forward.

Edmundsons Electricity Corporation, Ltd., has declared an interim ordinary dividend of 3 per cent (against 2½ per cent).

Vactric, Ltd., is paying, on December 9th, the two half-yearly dividends on the 6 per cent preference shares up to September 30th.

The East African Power & Lighting Co., Ltd., is paying an interim dividend of 3 per cent (unchanged).

W. & T. Avery, Ltd., are maintaining their interim dividend at 5 per cent.

The Electric & General Investment Co., Ltd., is again paying an interim dividend of 3 per cent.

Hick, Hargreaves & Co., Ltd., are paying an interim dividend of 2 per cent (same).

New Companies

Aluminium Wire & Cable Co., Ltd.—Registered November 28th. Capital, £500,000. Drawers, rollers, weavers and manufacturers of, and dealers in, rod, wire, cables and transmission lines made from aluminium, magnesium or any other non-ferrous metals or alloys or compounds thereof, etc. Directors: Hon. Geoffrey Cunliffe and G. Boex (appointed by the British Aluminium Co., Ltd., of which they are directors); E. A. Reynolds, director of Tube Investments, Ltd., Reynolds Tube Co., Ltd., and Reynolds Rolling Mills, Ltd., and A. J. S. Aston, director of Reynolds Tube Co., Ltd. and Reynolds Rolling Mills, Ltd. (appointed by Tube Investments, Ltd.); and H. G. Herrington, director of Reynolds Rolling Mills, Ltd., Hidumium (British Exports), Ltd., High Duty Alloys, Ltd., Magnesium Castings & Products, Ltd., etc., and H. Burroughes, director of Hawker Siddeley Aircraft Co., High Duty Alloys, Ltd., A. W. Hawksley & Co., Ltd., H. M. Holeson, Ltd., etc. (appointed by Hawker Siddeley Aircraft Co., Ltd.). Registered office: Salisbury House, E.C.2.

Westwood Switchgear, Ltd.—Registered November 27th. Capital, £10,000. To acquire the business of the Westwood Manufacturing Co. Subscribers: W. F. Ellis and V. F. Pinhorn. Solicitors: Sturton & Sturton, 4, Lloyds Avenue, E.C.3.

Weston Electric Units, Ltd.—Registered November 26th. Capital, £1,000. Electrical, lighting, heating, wireless, mechanical and general engineers, etc. Directors: R. Sutton and Mrs. Doris Sutton. Regd. office: Station Road, Foulridge, Lancs.

Liquidations

Harrison & Co. (Electrical), Ltd., 6, Broad Street Place, Liverpool Street, London, E.C.2.—Meetings of creditors and shareholders under the compulsory liquidation of this company were held on November 22nd at the Board of Trade Offices, Columbia House, Aldwych, London, W.C.2, when it was reported that no statement of affairs had been lodged. It was understood that the liabilities amounted to about £1,700 against assets of £71. Resolutions were passed for the appointment of Mr. A. E. Attwood, 90, Queen Street, London, E.C.3, as liquidator with a committee of inspection.

Bankruptcies

S. Hancock, electrical engineer, carrying on business as G. Hancock & Co., at Clyde Street, Holt Town, Manchester.—Order made October 28th, 1946, suspending discharge for one month and granting discharge as and from November 28th, 1946. Last day for receiving proofs for dividend December 11th. Trustee, Mr. P. M. Milward, 20, Byrom Street, Manchester, Official Receiver.

C. C. Spong and **J. H. Trussell**, trading under the name of the C.C.S. Trading Co., 30, Western Mail Chambers, Cardiff, electricians.—First and final dividend of 3d. in the £, payable December 20th at the Official Receiver's Office, 34, Park Place, Cardiff.

L. E. Lawson, previously residing and carrying on business at 1, Northam Road, Six Dials, Southampton, under the name of Lawson's Radio as a radio and electrical engineer.—Public examination January 8th at the County Court, Castle Square, Southampton.

A. S. Britton, radio engineer and electrical contractor, 9, Moorside Road, Heaton Moor, Stockport, and 123, Higher Hillgate, Stockport.—First meeting December 10th at 20, Byrom Street, Manchester. Public examination December 20th at the Court House, Vernon Street, Stockport.

STOCKS AND SHARES

THE financial event of the past week has been the publication of the Transport Bill, giving the provisions for nationalization of the main line railway companies, long-distance road haulage and the London Passenger Transport Board. The effect was to cause a substantial recovery in Home Railway stocks which previously had been inclined to wilt under the pressure of numerous sales by stockholders who were realizing their interests, and putting the money into other stocks and shares.

Markets as a consequence, have remained very animated, and industrial prices continue their rising tendency. Side by side with the other issues, a crop of newcomers has sprung up. Their claims upon investment money have seemed to make practically no difference to the amount of capital available for employment in all the industrial sections. The House remains extremely busy, and, notwithstanding Government warnings as to the gravity of the situation at home and abroad, the demand for investment, permanent and speculative, continues unabated.

Home Railways and Traction

The immediate effect of the publication of the new Transport Bill, was to improve the prices of Home Railway prior-charge issues, and, to a smaller extent, those of the juniors. Southern preferred at 75 is 10s. higher; the 5 per cent preference at 119½ gained a point, following upon its rise of 5 a week ago. London Passenger Transport stocks show no material change. British Electric Traction deferred, after changing hands at 1,200, rose to 1,275, a gain of 55 on the week. The 8 per cent preferred at 198 is 6 points to the good, making 15 in a fortnight. Northern General Transport from 60s., advanced to 72s. 6d., and Thomas Tilling at 62. 6d. are 4s. 6d. up.

Electricity Supply

The prices of Home electricity ordinary shares make a mixed showing. Edmundsons at 29s. 6d. are up 1s. 6d. in response to the increase in the interim dividend. Small improvements have occurred in Clyde Valley, Metropolitan, Northmet and Yorkshire Electric. A few declines ranged from 6d. to 1s. 6d. In the Overseas group, Calcutta Electric fell ½ to 52s. 6d. and Cawnpore 1s. to 57s. 6d., both on selling from India.

The Rising Tide

Amongst manufacturing and equipment shares, International Combustions at 9½ are 5s. better. Tube Investments rose to 6½ on the company's acquisition of Hercules Cycle & Motor. Falk Stadelmann at 46s. 3d. are up ½. Telegraph Construction rose to 55s. Johnson & Phillips are 1s. higher at 82s. 6d; Reyrolle at £4 are half-a-crown higher. Walsall Conduits at 57s., and Vactric at 18s. 6d. have both put on 1s.

Cable & Wireless preference shed 2 points of its last week's rise of 8½, but the ordinary at 119 is 2 to the good. Globe ordinary and preference, at 46s. 6d. and 37s. respectively, are both better. Anglo-American Telegraphs continue their advance, the preferred at 145 and the deferred at 37 both being 30s. higher.

Cromptons and Austins

Interest is being attracted to Crompton Parkinson 5s. shares by the company's reported agreement with Austin Motors for the joint production and distribution of electric vehicles and trucks. A new company to be formed for the purpose is to take over and develop the business at present carried on by the Crompton Parkinson subsidiaries, A. E. Morrison & Electricars. Cromptons have declared the usual final dividend and bonus, both of 7½ per cent making 22½ for the year. At 34s. 6d., the shares yield 3½ per cent on the basis of the 22½ per cent distribution. Austins recently raised their annual dividend from 25 to 40 per cent.

New Issues

Laurence Scott & Electromotors are issuing 400,000 new 4¼ per cent preference shares. These will rank after the 5 per cent redeemable issue, which the directors expect to redeem as soon as this is practicable. Dictograph Telephone proposes to offer its shareholders 100,000 5 per cent preference shares at par, in the proportion of one for every 20 ordinary held. The company forecasts that the accounts due next month will show a maintenance of profits and dividend at last year's level. An early market introduction is expected of Aberdare Cables of South Africa preference and ordinary shares. The business of this company is to manufacture electric cable as made at present by the Glamorganshire company, Aberdare Cables.

" Emmies "

Net profits of the Electrical & Musical Industries group are shown by the full report to be £10,000 up, despite a drop of more than half-a-million in the trading profit. The accounts give another example of the manner in which industrial reconversion difficulties are being offset by reduced tax liabilities in their net effect on company earnings. E.M.I. liabilities this time are almost halved at £562,000, and leave a net profit of £195,800. This covers the 8 per cent dividend with the equivalent of about 3 per cent to spare. Since practically the whole of the company's capacity was previously devoted to production for the Services, the lower trading profits are readily understandable. The price of the shares eased off to 27s. 9d., at which the yield is still under 3 per cent. Decca Record full accounts tell a similar story. Substantial E.P.T. recoveries assisted the maintenance of net profits, and the dividend. The shares at 53s. 9d. are 1s. 3d. better.

Portugal's Import Trade

Britain's Increased Share

IN the electrical import trade of Portugal last year there were marked declines in a number of groups, partly offset by increases (of about 50 per cent) in power plant and in all but the lighter cables. Lamp imports were about halved and those of telephone installations decreased sharply. With regard to supplying countries, Germany's share, as was to be expected, dwindled to a fraction of the former figure, while Britain, Switzerland and Holland were all more active. Long-term prospects for the electrical trade are considered good, as the completion of the big hydro-electric contract recently placed will lead to a demand for much ancillary material. The exchange rate for the escudo is 100 to the pound sterling.

Class of Goods	1945 Escudos (000)	Inc. or dec. on 1944 Escudos (000)
Accumulators and condensers weighing per cell less than 8 kg.	1,825	— 519
From Germany	10	— 485
„ United States	823	+ 239
„ Spain	460	— 314
„ Switzerland	261	+ 67
„ Great Britain	174	+ 22
Other electrical accumulators and condensers and parts	2,314	— 2,576
From Spain	1,369	+ 244
„ United States	504	+ 145
„ Sweden	247	— 2,461
Batteries, dry	606	+ 292
From United States	265	+ 204
„ Great Britain	132	+ 123
„ Sweden	83	— 18
Batteries, other	31	— 33
From Great Britain	31	+ 2
Loudspeakers	371	+ 122
From United States	248	+ 172
„ Sweden	81	+ 28
Radio apparatus	8,848	— 1,975
From Germany	25	— 2,351
„ United States	412	— 722
„ Sweden	3,661	— 1,592
„ Switzerland	2,017	+ 413
„ Holland	2,294	+ 2,294
Telephone apparatus	2,712	+ 404
From United States	69	+ 51
„ Great Britain	475	+ 397
„ Sweden	1,912	+ 216
Telegraph apparatus	335	+ 90
From United States	99	+ 19
„ Great Britain	166	+ 88
„ Sweden	69	+ 69
Generators, motors, transformers and parts weighing up to 100 kg.	11,952	+ 4,208
From Germany	19	— 2,100
„ United States	921	+ 505
„ Switzerland	5,307	+ 4,074
„ Sweden	2,185	— 1,046
„ Great Britain	1,069	+ 689
Ditto weighing 100 to 500 kg.	5,606	+ 420
From Great Britain	395	+ 280
„ Sweden	601	— 150
„ Switzerland	4,176	+ 1,278
Complete installations for telephone exchanges (not including telephones, accumulators or dynamos)	1,713	— 2,063
From Great Britain	1,438	+ 1,421
„ Sweden	259	— 1,693
Insulating materials and porcelain insulators	2,600	— 580
From Germany	1	— 1,178
„ United States	390	— 207
„ Great Britain	479	+ 253
„ Sweden	680	— 19
„ Switzerland	527	+ 217
Vacuum cleaners	442	— 2,609
From Sweden	434	— 2,518
„ Great Britain	7	+ 7
Refrigerators	889	+ 319
From Switzerland	312	+ 312
„ Sweden	525	— 45
Insulated wire or cable, textile-covered, weighing up to 120 grammes per metre	637	— 714
From Great Britain	290	— 369
„ United States	154	+ 9
„ Sweden	69	+ 34
„ Spain	124	— 286
Ditto, weighing over 120 grammes per metre	3,649	+ 3,211
From Great Britain	3,484	+ 3,132
Ditto with other insulation and metal-protected	7,487	+ 1,395
From Great Britain	3,266	+ 831
„ United States	2,682	+ 2,081
„ Spain	1,182	+ 729
Lamps for lighting or heating	2,353	— 2,489
From United States	1,616	+ 1,174
„ Holland	376	+ 376
„ Great Britain	245	+ 186
Lamps, other electric	3,369	— 253
From Germany	236	— 690
„ United States	948	+ 146
„ Great Britain	1,096	+ 628
„ Holland	411	+ 411

Electrical Housecraft Advisers

AT the recent first annual meeting of the Association of Electrical Housecraft Advisers it was decided to seek registration. There was a general discussion on conditions and salaries, reference being made to the various grades of the National Association of Local Government Officers in which demonstrators had been placed. It was felt that fully-qualified electrical housecraft advisers should be regarded as technical and graded accordingly, but it was decided to make no further approach to, N.A.L.G.O. while meetings for the consideration of salaries was in progress. Miss M. Gosse was elected chairman, Miss M. Boyd, vice-chairman, and Mrs. T. E. Pavitt, treasurer. Mrs. E. A. Windsor (39, Sharon Gardens, South Hackney, E.9) agreed to continue as hon. secretary.

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 in given in parentheses.

Cleethorpes.—December 20th. Electricity Department. Four 500-kVA transformers. (November 22nd.)

Exeter.—December 30th. Electricity Department. Two 12,000-kVA transformers. (See this issue.)

Hastings.—January 13th. Electricity Department. Two 2,000-kVA Scott-connected transformers and two switch kiosks. (See this issue.)

Heston and Isleworth. — December 15th. Borough Council. One 10,000-kVA transformer. (November 22nd.)

Isle of Ely.—January 4th. County Council. Installation of electric lighting at the Orchards Nursery, Wisbech.—R. D. Robson, county architect, County Hall, March.

Manchester.—January 13th. Electricity Committee. 6·6-kV substation switchgear. (See this issue.)

Newport (Mon.).—December 31st. Corporation. Electrical installations in 134 houses, Alway Farm estate. (See this issue.)

North Scotland. — Hydro - Electric Board. Supply and erection of 132-kV transmission lines. (November 22nd.)

Orders Placed

Bedford.—Electricity Committee. Accepted. Busbar protective apparatus (£1,947). — A. Reyrolle & Co.

Bermondsey.—Works Committee. Accepted. Two electric hammers (£95).—Kango Electric Hammers.

Bexhill.—Water Committee. Accepted. Three motors and one generator (£123).—Industrial Electrical Co.

Essex.—Health Committee. Accepted. Seven electrically heated food conveyors for Wanstead hospital (£583).—Browne & Son.

Glasgow.—Electricity Committee. Accepted for transformers:—Six 800-kVA (£4,518), six 400-kVA (£2,520) and four 200-kVA (£1,036).—Bruce Peebles & Co., Ltd.; three 600-kVA (£2,259), three 400-kVA (£1,260) and two 200-kVA (£518).—British Electric Transformer Co.

Transformer Committee. Accepted. Switchboards.—Yorkshire Switchgear & Eng. Co. Dry cells (annual contract).—Siemens Bros. & Co. Trolley-bus feeder pillars.—British Insulated Callender's Cables. Boiler instruments for Pinkston.—George Kent.

Poplar.—Contracts Committee. Accepted. Meters: 250 25-A prepayment (£1,397).—Sangamo Weston. 100 25-A ordinary type (£238) and 92 special meters for industrial consumers (£683).—Ferranti. 500 wash-boilers (£2,300).—Universal Boilers.

Rawtenstall. — Electricity Committee. Accepted. Installation of ripple control system.—Metropolitan-Vickers.

Rugby.—Town Council. Accepted. Electrical installations in 550 B.I.S.F. houses.—Alpha Manufacturing & Electrical Co.

Shipley.—Housing Committee. Accepted. Electrical installations in fifty-one Council houses.—J. V. R. Isaacs.

York.—Watch Committee. Traffic signals (£1,488).—Siemens.

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.

Alloa.—Tile factory for Scottish Tiles, Ltd.; manager.

Arbroath.—Factory at Easthaven, Angus, for Courtaulds, Ltd.; secretary of company.

Bedlington (Northumberland). — Houses (184) for U.D.C.; surveyor, U.D.C. Offices.

Biggleswade.—Houses (187), on 17 sites; R.D.C. surveyor, Ladbrooke House, London Road.

Bolton.—Primary schools at Bury Road and Withins Lane, for Education Committee; C. Herbert, borough engineer, Town Hall.

Works canteen, Union Street; Dart Mill Co., Ltd.

Brighton.—Permanent houses (100), Parkside, Coldean; D. J. Howe, borough surveyor, Town Hall.

Broadheath.—Offices and works, Viaduct Road; Lancashire Motor Traders, Ltd.

Chesterfield.—Houses (117), Newbridge Lane, Whittington; borough surveyor, Town Hall.

Chester-le-Street.—Additions to nurses' home at the Isolation Hospital, for the Joint Hospital Board; E. M. Lawson, architect, Barras Buildings, Barras Bridge, Newcastle-on-Tyne.

Chichester.—Orlit type houses (154), Spitalfield Lane; borough surveyor, 61, North Street.

Clackmannan.—Houses (148), for County Council at Sauchie; county clerk, Alloa.

Dalbeattie.—Additional glove factory for Irvine Valley Hosiery Company; manager.

Darlington.—Garage and furniture warehouse for T. Backhouse & Son.

Houses (100); borough surveyor.

Doncaster.—Factory extension for Crompton Parkinson, Ltd.; A. E. Gregg, manager.

Durham.—Factory in Co. Durham for British Celanese, Ltd., London; North Eastern Trading Estates, Ltd., Low Fell, Gateshead.

Ealing.—Two primary schools, Downe Manor and Islips Manor; Middlesex county architect.

Ecclesfield. — County Secondary School (£112,564), for West Riding E.C.; H. Bennett, county architect, County Hall.

Edinburgh.—Central bus station for Scottish Motor Traction Company; J. Amos, traffic manager.

Enfield. — Extensions at four schools (£22,967); Middlesex county architect.

Essex.—Police houses (16), at Witham, Stansted and Hornchurch (£22,592); county architect, Chelmsford.

Falmouth.—Houses (75), Penwerris; H. E. Tresidder, borough surveyor, Municipal Offices.

Gateshead.—Alterations to factory for the W. Huwood Mining Co., Ltd.; Couves & Partners, architects, Carliol House, Newcastle-on-Tyne.

Factory on the Trading Estate; W. Hall, Ltd., Derwent Joinery Works.

Extensions to printing works at Low Fell, N. Ward, Ltd.; W. Norman, 3, West Lane, Chester-le-Street.

Glasgow.—Cigarette factory at Alexandra Parade for W. D. & H. O. Wills; manager.

Factory for Corporation; city architect.

Glendale.—Houses (90) at Millfield for the R.D.C.; Reavell & Cahill, architects, Lloyds Bank Chambers, Alnwick.

Halesowen.—Houses (48), Olive Lane, for T.C.; A. T. & B. Butler, architects, 31, Priory Street, Dudley.

Additions, Hayley Green Hospital, for the North Worcestershire Joint Hospital Board; Folkes & Folkes, architects, 34, Hagley Road, Stourbridge.

Hampshire.—Maternity wards at various institutions (£43,000); county architect, Winchester.

Hawick.—Alterations and additions at Lynnwood Factory (£22,500), for Lyle & Scott, Ltd.; manager.

Hazel Grove & Bramhall.—Houses (56), Bramhall (£76,400); U.D.C. surveyor, Council House.

Lanarkshire.—Central repair depot at Bellshill for County Council (electrical work, heating, ventilating, etc.); Geo. Arthur & Son, architects, 12, Stirling Street, Airdrie, or road surveyor, Hamilton.

Lanchester (Co. Durham).—Factory for Sirus Products, Ltd.; Haddon & Hillman, 180, New Bridge Street.

Revised scheme for additions to Lanchester Isolation Hospital for the Joint Hospital Board; G. V. Hurd, architect, 3, Store Street, Shotley Bridge, Co. Durham.

Liverpool.—Additions to Garston Technical Institute, Wellington Street; city architect, Dale Street, Kingsway.

Manchester.—Central kitchen and dining room, Maine Road and Claremont Road, for E.C.; L. C. Howitt, city architect, Town Hall.

Mansfield Woodhouse.—Houses (106), Cox's Land, and houses (32), George Street, Forest Town; Lawrence Walker, surveyor, Council Offices, Manor House.

Middlesex.—Nurses' home (£97,000), Harefield County Hospital; county architect.

Mildenhall.—Three sewage pumping stations and sewage disposal works, Brandon, for R.D.C.; W. Herbert Bateman & Partners, consulting engineers, Chesterfield House, Batheaston, Bath.

Newcastle-on-Tyne.—Additions in Bath Lane for the Barry Manufacturing Co., Ltd.; C. Solomon, architect, 3, St. Mary's Place.

Extensions to factory for J. Bradburn & Co., Heaton Terrace; J. Oswald & Sons, architects, 68, Northumberland Street.

Extensions to General Hospital; city architect, 18, Cloth Market.

Conversion of old P.M. Chapel in Ropery Walk into a pickle factory for T. Dowson; J. R. Hindmarch, 10, Neville Street.

Nottingham.—Printing works, Station Street, for Boots Pure Drug Co., Ltd.; P. J. Bartlett, architect, Station Street, Nottingham.

Ogwen.—Residential school for retarded children at Treborth Hall, for Caernarvonshire E.C.; W. Ll. Jones, county architect, Caernarvon.

Oldham.—Additions, Victoria Saw Mills; Wm. Lees (Oldham), Ltd., Smith Street.

Oswestry.—Schools (£716,000), for Salop E.C.; A. Guy Chant, county architect, 5, Belmont, Shrewsbury.

Paisley.—Factory for Scottish Industrial Estates, Ltd. (£70,000); architect, Scottish Industrial Estates, Glasgow.

Houses (672); burgh surveyor.

Rochdale.—Extensions, Rochdale Infirmary, for Board of Management; secretary.

Rugby.—Factory for Long Buckley Shoes, Ltd., Southam.

South Mimms.—Nurses' home, Clare Hall Hospital (£110,000); Middlesex county architect.

Sunderland.—Factory for Embossers, Ltd., Nile Street; Matkin & Hawkins, architects, Barclays Bank Chambers, Fawcett Street.

Tewkesbury.—Houses (34), Priors Park Estate (£48,000), for T.C.; Espley & Co., Ltd., builders, 77, High Street, Evesham.

Ulverston.—Factory for Ashleys, Ltd., Morecambe Road.

Wood Green.—Factory for Barratt & Co., Ltd., Mayes Road; Archibald Leitch & Partners.

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to **First Post on Monday,** and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

THE CHARGE for advertisements in this section is 2/6 per line (approx. 7 words) per insertion: ***ONLY OFFICIAL AND GOVERNMENT ANNOUNCEMENTS CAN NOW BE DISPLAYED:***— 35/- 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.

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

Original testimonials should not be sent with applications for employment.

CHRISTMAS SCHEDULE

CLASSIFIED ADVERTISEMENTS

Latest time for receiving copy

DEC. 20 issue,	DEC. 27 issue,
First post on	First post on
FRIDAY, DEC. 13	FRIDAY, DEC. 20

Please address *your envelope . .*

CLASSIFIED
ADVERTISEMENT DEPT.

OFFICIAL NOTICES, TENDERS, ETC.

COUNTY BOROUGH OF NEWPORT

Tenders for Electrical Installations in Houses on Alway Farm Estate, Newport

THE Newport Corporation invite tenders from qualified electrical contractors for the provision of Electrical Installations in 134 houses on the Alway Farm Estate, Newport, Mon.

Copies of the specification and drawing giving full particulars of the work to be done, and all further information on the matter, can be obtained on application to Mr. T. H. Wood, M.I.Mech.E., A.M.I.E.E., Borough Electrical Engineer and Manager, Electric House, Dock Street, Newport, Mon.

A deposit of £1 1s. is payable for one copy of the specification with drawing, and, provided a bona fide tender has been submitted, this deposit will be returned after the contract has been placed. Additional copies of the specification, but not the drawing, will be supplied on receipt of a further payment of 5s. per copy, which payment is not returnable. All cheques should be made payable to "The Borough Treasurer, Newport (Mon.) Corporation," and should be crossed.

Tenders and accompanying documents must be enclosed in a sealed cover, which must not bear any name or mark indicating the sender. This cover must be addressed to the undersigned and endorsed in the top left-hand corner "Tender for Electrical Installations, Alway Farm Housing Estate," and sent through the post so as to be delivered not later than 10 a.m. on the 31st December, 1946. No tender received after that date will be considered, and the Corporation do not bind themselves to accept the lowest or any tender.

T. MERVYN JONES,
Town Clerk.

Town Hall, Newport, Mon.
26th November, 1946. 3814

CITY OF MANCHESTER

THE Electricity Committee invites tenders for the supply, delivery and erection, over a period of two years (with the option to terminate at end of first year), of 6.6-kV Substation Switchgear (Specification No. 883).

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 Monday, 13th January, 1947. The Committee does not bind itself to accept the lowest or any tender.

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester, 2.
28th November, 1946. 3800

COUNTY BOROUGH OF HASTINGS ELECTRICITY DEPARTMENT

TENDERS are invited for the manufacture, supply and delivery of:—

Two 2,000-kVA Scott Connected Transformers to Specification No. 133.
One Switch Kiosk for Guestling to Spec. No. 134.
One Switch Kiosk for Icklesham to Spec. No. 135.

Specifications and forms of tender may be obtained from the Borough Electrical Engineer and Manager, 12 & 13, York Buildings, Hastings.

Tenders, endorsed as instructed in the specification, should be addressed to the undersigned and delivered not later than first post on Monday, the 13th January, 1947. The Council do not undertake to accept the lowest or any tender.

N. P. LESTER,
Town Clerk.

Town Hall, Hastings.
29th November, 1946. 3856

BOROUGH OF KEIGHLEY ELECTRICITY DEPT.

TENDERS are invited for the supply and delivery of One Petrol-driven Tower Wagon suitable for the maintenance of street lighting. Specification, conditions of contract and form of tender may be had from the undersigned.

Tenders should be sent to S. Walker, Esq., Town Clerk, Town Hall, Keighley, by Saturday, 11th January, 1947, in sealed envelopes devoid of any indication as to sender and endorsed "Tender for Tower Wagon." The Corporation does not bind itself to accept the lowest or any tender.

G. F. MOORE,
Engineer and Manager.

Electricity Offices,
Coney Lane, Keighley.
27th November, 1946. 3753

CITY OF EXETER ELECTRICITY DEPARTMENT

TENDERS are invited for the supply, delivery and erection of 2 12,000-kVA Transformers. Copies of the specification, form of tender and general conditions may be obtained from the undersigned. One copy will be supplied free, and 10s. 6d. will be charged for each additional copy required.

Tenders must be delivered by not later than the first post on Monday, December 30th, 1946.

A. L. KEET, M.Eng., M.I.E.E.,
City Electrical Engineer.

Electricity Offices,
46, North Street, Exeter. 3767

SITUATIONS VACANT

ARMATURE Winder required. Fully skilled and used to all classes of repair work, fractional to 50 h.p. House available.—Box 3731, c/o The Electrical Review.

METROPOLITAN BOROUGH OF SOUTHWARK

Permanent Staff—Electricity Department

APPLICATIONS are invited for the following appointments:—

(a) CONSUMERS' ASSISTANT ENGINEER. Candidates must have had sound technical training, and have held a responsible position in the Consumers' Department of an Electricity Supply Undertaking. Experience in commercial development, with apparatus hire, and hire purchase, and assisted wiring facilities, as well as in the preparation of complete lighting, heating and ventilation schemes, and of D.C./A.C. change-over, are essential qualifications. Conditions and salary will be in accordance with the National Joint Board Schedule, Class E, Grade 5.

(b) ASSISTANT METER SUPERINTENDENT. Candidates must be thoroughly conversant with and have had practical experience in repairing and testing A.C. and D.C. meters, including prepayment types, and the requirements of the Electricity Supply (Meters) Act, 1936. Experience in the operation of a Class A testing station and a sound knowledge of the organisation and usual records of a meter department is essential. Conditions and salary will be in accordance with the National Joint Board Schedule, Class E, Grade 8b.

(c) TEMPORARY DRAUGHTSMAN. Candidates must have had a sound technical and practical training and experience as a draughtsman, conversant with modern drawing office practice and general mains records, with the design and layout of substations, H.T. and L.T. underground cable systems, and the building and structural works of an electricity supply undertaking. Prior practical experience in the distribution department of an electricity supply undertaking is desirable. Conditions and salary will be in accordance with the National Joint Board Schedule, Class E, Grade 9.

Each appointment is subject to the provisions of the Shoreditch and other Metropolitan Borough Councils (Superannuation) Acts, 1922-1937, to a medical examination, and to one month's notice on either side.

Applications, appropriately endorsed, stating age, qualifications and full details of experience, accompanied by copies of two recent testimonials, should be made on forms obtainable from me and should reach me by Friday, 13th December, 1946. Canvassing in any form will disqualify.

D. T. GRIFFITHS,
Town Clerk.

Town Hall,
Walworth Road, S.E.17.
18th November, 1946. 3710

COUNTY BOROUGH OF HASTINGS ELECTRICITY DEPARTMENT

APPLICATIONS are invited for the appointment of a Draughtsman experienced in the tracing and reproduction of ordnance survey maps, records of electricity mains and overhead lines, preliminary design of small buildings, and work generally done in an electricity supply drawing office.

Salary in accordance with the National Joint Board of Employers and Members of Staff for Electricity Supply Industry Schedule, commencing Grade 10, Class G, at present £312 per annum, rising to Grade 9a, at present £343, with increments for that grade. The appointment will be permanent and subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination.

Applicants should be under 46 years of age. Applications, stating age, present position and experience in drawing office work, should be forwarded not later than December 23rd, 1946, to the Borough Electrical Engineer and Manager, 12 & 13, York Buildings, Hastings, endorsed "Draughtsman." Canvassing will be a disqualification.

N. P. LESTER,
Town Clerk.

Town Hall, Hastings.
28th November, 1946. 3802

THE CITY OF LONDON ELECTRIC LIGHTING COMPANY LIMITED

Bankside Generating Station

A vacancy exists for a Young Assistant Engineer with suitable technical qualifications and experience of steam and mechanical plant. Commencing salary £422 per annum.

The successful candidate will be required to join the company's superannuation scheme. Applications, accompanied by full details of qualifications and training, should be addressed to the Station Superintendent, Bankside Generating Station, S.E.1. 3784

CITY OF BULAWAYO, SOUTHERN RHODESIA, ELECTRICITY DEPARTMENT

Generation Engineer

APPLICATIONS are invited from Chartered Engineers, preferably Corporate Members of the Institution of Mechanical Engineers, for the above vacancy, which involves responsibility to the City Electrical Engineer and the efficient maintenance and operation of the Council's two power stations one operating at 635 lbs. pressure.

The salary grade attached to the post is £770, rising by increments of £25 to £935, plus cost-of-living allowance, which at present amounts to £77 per annum, plus £24 for the first child and £18 each for the next two children.

The successful applicant will be required to occupy the house provided by the Council at a monthly rental of £8.

Applicants should, apart from possessing above minimum qualifications, have had satisfactory training and experience of modern power station practice. The successful applicant, if under 45, will, after serving a probationary period of twelve months, be required to join the municipal pension fund on obtaining a satisfactory certificate from the Council's medical officer.

If the successful applicant from Great Britain has his own passage money, it will be refunded by the Council, together with salary from date of sailing, and contract for minimum period of three years will be entered into.

Applications by air mail, giving full personal professional details, accompanied by one unmounted photograph, to reach the undersigned not later than noon on Friday, December 20th, 1946. Duplicate copy of application, not including photograph, should be addressed to Mr. R. H. Redman, c/o Rhodesia House, Strand, London, W.C.2.

The applications already received in response to the recently published advertisement will be considered and need not be re-submitted.

H. J. COOK, Town Clerk.
3750

CITY OF WORCESTER ELECTRICITY DEPT.

APPLICATIONS are invited for the following appointments:—

(a) SENIOR DRAUGHTSMAN to supervise personnel in the Drawing Office. Candidates must possess a sound technical education and have had practical experience in power station layout, building construction and structural engineering. Salary and conditions will be in accordance with the N.J.B. Schedule, Class G, Grade 8b, at present £408 per annum.

(b) MAINS ASSISTANT. Applicants should have had experience in the construction and maintenance of overhead and underground transmission and distribution systems, also in planning and estimating in this class of work. Experience in negotiating for wayleaves will be an advantage. Salary and conditions will be in accordance with the N.J.B. Schedule, Class G, Grade 9a, at present £343 per annum.

The appointments will be subject to the Local Government Superannuation Act, 1937.

Applications, stating age, training, qualifications, experience and present appointment, accompanied by copies of testimonials, and endorsed "Senior Draughtsman" or "Mains Assistant," as the case may be, must reach the City Electrical Engineer, Hylton Road, Worcester, not later than first post on Wednesday, 18th December, 1946.

C. H. DIGBY-SEYMOUR, Town Clerk.
3806

CROWN AGENTS FOR THE COLONIES

Colonial Government Appointments

APPLICATIONS from qualified candidates are invited for the following post: Sectional Engineer required for the Mauritius Government Electricity and Telephone Department for three years in the first instance. Salary, Rupees 5,250 rising to Rs. 7,000 a year; cost-of-living allowance Rs. 600 a year (Rupee = 1s. 6d.). Outfit allowance £30. Free passages and quarters. Candidates, not over 40 years of age, must have served an appropriate apprenticeship and had good subsequent experience with an electricity supply undertaking in the planning, construction and maintenance of three-phase distribution systems having underground cable working pressures up to 22,000 volts, overhead low tension networks, and protective and metering equipments. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/16941 on both letter and envelope. 3755

GOVERNMENT OF NORTHERN IRELAND

Electrical and Heating and Ventilating Engineering Staff

APPLICATIONS are invited for electrical and heating and ventilating engineering posts in the Ministry of Finance. The appointments will be temporary, but so far as can be foreseen will last for several years.

Remuneration: Successful candidates will be remunerated according to qualifications and experience within the salary range £350-£550 per annum, plus at present a war bonus varying between £78 and £90 per annum.

Qualifications: Candidates for the post of Electrical Engineer must be Associate Members of the Institute of Electrical Engineers and must be experienced in the design and erection of electric light, power and heating installations, inter-communication telephone systems, lifts, and be fully conversant with the applications of electricity in large buildings and modern factories.

Candidates for the post of Heating and Ventilating Engineer must be Associate Members of the Institute of Heating and Ventilating Engineers and must be experienced in the design and erection of steam and hot water heating installations, ventilating systems, air conditioning plants, and warm air heating systems in public buildings and modern factories.

In addition, skill in the preparation of working drawings and specifications and ability to supervise the work of installation are required for each post.

Preference will be given to suitably qualified candidates who served in H.M. Forces during the 1914-18 or 1939-45 war, providing the Ministry is satisfied that such candidates can, or within a reasonable time will be able to, discharge the duties of the posts efficiently.

Closing Date for Receipt of Applications: Applications, quoting S.B.195/46, should reach the Assistant Secretary (Establishments), Ministry of Finance, Stormont, Belfast, on or before the 18th December, 1946. Applicants should state date of birth, give full details of training and qualifications, and enclose copies of two recent testimonials. 3771

MARGATE, BROADSTAIRS AND DISTRICT ELECTRICITY BOARD

Appointment of Engineer and Manager

APPLICATIONS are invited for the appointment of Engineer and Manager to the above Board from qualified Electrical Engineers at a commencing inclusive salary of £1,000, rising (subject to satisfactory service) by three annual increments of £100 to £1,300 per annum.

Applicants must be Corporate Members of the Institution of Electrical Engineers and have had considerable experience in the management of an Electricity Supply Undertaking. Applicants must be conversant with the management of showrooms, hire and hire-purchase of apparatus, assisted wiring schemes, and the general administration of an Electricity Department.

The appointment will be terminable by three months' notice in writing on either side, and will be subject to the Board's Superannuation Scheme and satisfactorily passing a medical examination.

Applications, stating age, previous experience and present position, accompanied by not more than three recent testimonials, must be delivered to me not later than Wednesday, the 18th December, 1946. Envelopes should be endorsed "Engineer and Manager." Applicants are required to state in their applications whether to their knowledge they are related to any member of the Board or to the holder of any senior office under the Board. Failure to disclose this information will disqualify. Canvassing members of the Board, either directly or indirectly, will also be a disqualification.

P. T. GROVE,
Clerk to the Board.

40, Grosvenor Place, Margate.
25th November, 1946. 3761

STAFFORDSHIRE EDUCATION COMMITTEE

Cannock Chase Mining College

APPLICATIONS are invited for the full-time post of Lecturer in Electrical Engineering, to commence duties as soon as possible. Candidates should possess a degree in science or equivalent qualification. Salary in accordance with the Burnham Technical Scale.

Form of application (returnable by 1st January, 1947), together with further particulars relating to the appointment, may be obtained from the undersigned.

F. A. HUGHES,
Director of Education.

(Department F.E.)
County Education Offices,
Stafford. 3700

METROPOLITAN BOROUGH OF STOKE NEWINGTON

Appointment of Borough Electrical Engineer

APPLICATIONS are invited for the appointment of Borough Electrical Engineer of the Council's Electricity Undertaking from persons experienced in the management and administration of such undertaking.

The salary will be in accordance with the agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers dated 9th July, 1941. In pursuance of Clause 10 of that agreement, 85% of the salary may be paid in the first year, and 92½% in the second year, and the full salary in the third and subsequent years. On the present unit assessment of the undertaking this would be £831, £905 and £978 per annum respectively, but the salary for this appointment will commence at the step appropriate to the successful candidate's qualifications and experience.

Applicants must be Corporate Members of the Institution of Electrical Engineers. Recent experience in electricity supply undertaking is essential, and applicants must have a thorough knowledge of design and operation of 11-kV and L.T. underground distribution networks and A.C. and D.C. substations. Applicants must also be thoroughly conversant with the management of showrooms, hire and hire purchase, assisted wiring schemes, and the general administration of an electricity department. The appointment will be terminable by three months' notice in writing on either side, and will be subject to the Council's Superannuation Act, and to a satisfactory medical examination.

Applications, on forms to be obtained from the Town Clerk, and accompanied by copies of three recent testimonials, must be delivered to the undersigned by 1st January, 1947. Canvassing, directly or indirectly, will disqualify, and any relationship to officers or members of the Council must be disclosed.

C. KENT WRIGHT,
Town Clerk.

Town Hall,
Stoke Newington Church Street, N.16. 3780

LONDON AND HOME COUNTIES JOINT ELECTRICITY AUTHORITY

APPLICATIONS are invited for the appointment of Assistant Substation Superintendent, Twickenham district. Candidates must have had technical training up to Higher National Certificate standard, and had experience in the construction and maintenance of 11-kV and L.V. substation equipment on A.C. and D.C. networks.

Salary in accordance with N.J.B. scales, Grade 9, Class G, at present £380-£395 per annum, plus 5% for London area.

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

Applications, stating age, qualifications and experience, and endorsed "Assistant District Substation Superintendent," accompanied by copies of not more than three recent testimonials, must be sent to the District Manager of the Authority at 42, York Street, Twickenham, so as to reach him by not later than the 12th December, 1946. Canvassing, directly or indirectly, will be a disqualification.

A. L. BURNELL,
Clerk to the Authority.

5-6, Lancaster Place,
Strand, W.C.2.
25th November, 1946. 3762

CITY OF PETERBOROUGH ELECTRICITY DEPT.

Meter Tester and Repairer

APPLICATIONS are invited for the above position. Candidates should have a sound experience in repairing and testing all types of single-phase and polyphase meters. Wages will be in accordance with the D.J.I.C. Schedule (No. 8 Area), at present 27.69d. per hour.

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

Applications, stating age, details of education, training and experience, accompanied by copies of two recent testimonials, should be delivered to the City Electrical Engineer, Albert Meadow, Peterborough, not later than Saturday, the 14th December, 1946.

ARTHUR J. REEVES,
Town Clerk.

Town Hall, Peterborough.
19th November, 1946. 3684

COUNTY BOROUGH OF BIRKENHEAD ELECTRICITY DEPARTMENT

Engineering Assistant

APPLICATIONS are invited for the position of Engineering Assistant in the Mains and Distribution Department, at a salary in accordance with Class H, Grade 8, of the National Joint Board Schedule of Salaries, commencing at £481 per annum, and subject to a deduction in respect of the Local Government Superannuation Act, 1937.

Applicants, who should preferably be Corporate Members of the Institution of Electrical Engineers, must have had a sound technical and practical experience in the construction, operation and maintenance of 3-phase E.H.T. and L.T., A.C. and D.C. distribution systems, including fault location, transformers, mercury-arc glass bulb and steel-tank rectifiers, rotary and motor convertors, switchgear, substations, E.H.T. and L.T. overhead lines in rural areas with all types of protection.

The selected candidate will be responsible to the mains and distribution engineer for the preparation of detailed layouts, estimates and programmes of schemes involving underground cables, overhead networks and substations, also change-over from D.C. to A.C., and will be required to undertake full responsibility during standby duties.

Members of H.M. Forces are eligible to apply for the position. The successful applicant will be required to pass a medical examination and reside within the area of supply.

Applications, stating age, whether married or single, present appointment and salary, experience and qualifications, accompanied by copies of not more than three recent testimonials, are to be delivered to the Borough Electrical Engineer, Craven Street, Birkenhead, not later than 12 noon on Saturday, the 21st December, 1946. Canvassing, directly or indirectly, will disqualify.

E. W. TAME,
Town Clerk.

Town Hall, Birkenhead.
26th November, 1946. 3860

COUNTY COUNCIL OF THE COUNTY OF LANARK

Assistant County Lighting Engineer

APPLICATIONS are invited for the appointment of Assistant to the County Lighting Engineer. Applicants should have extensive knowledge of the design, erection and maintenance of public lighting installations, both by gas and by electricity, and should have experience in the preparation of specifications and schedules of quantities, and should be neat draughtsmen. The salary for the post will be £400 per annum plus cost-of-living bonus, which at present is £78 per annum.

The successful candidate will be required to pass a medical examination and contribute to the County Council's Superannuation Fund.

Applications must be in writing and should state: (1) Full name; (2) date of birth; (3) education, training and qualifications; (4) details of past experience, and (5) present appointment. The applications should be accompanied by three recent testimonials, and should be posted to reach the County Clerk, Lanarkshire House, 191, Ingram Street, Glasgow, C.1, not later than Tuesday, 17th December, 1946.

Lanarkshire House,
191, Ingram Street, Glasgow, C.1. 3846

GRAMPIAN ELECTRICITY SUPPLY CO.

Meter Department

APPLICATIONS are invited for the position of Meter Engineer to take charge at the Company's new Class A Polyphase Testing Station, now being brought into operation. Salary £500 per annum.

The new premises are self-contained and comprise the offices, stores, workshop, testing room, potentiometer room, etc., directly associated with the department. The situation offers excellent prospects for the right candidate.

Applicants should be familiar with the operation of Class A Polyphase Testing Station complying with the requirements of the Meters Act (1936), and must be conversant with the repair and calibration of D.C. meters, A.C. single-phase and polyphase meters, including re-active K.V.Ah. meters, and maximum demand indicators, and must be capable in the calibration of substandard instruments by potentiometer.

Applications, stating age, details of training and experience, and accompanied by copies of testimonials, must be submitted within the next fourteen days to—The Area Manager, Grampian Electricity Supply Co., Blackfriars, Perth, Scotland. 3854

BOROUGH OF LUTON ELECTRICITY UNDERTAKING

APPLICATIONS are invited for the following appointments:—

(1) SHIFT CHARGE ENGINEER. Candidates must have had experience with the efficient running of a selected generating station operating in parallel with the C.E.B. grid. The existing station comprises 24.5 M.W. of generating plant. Salary in accordance with the N.J.B. Schedule, Class G, Grade 8, at present £467 rising to £476 p.a.

(2) SUBSTATION CHARGE ENGINEER. Candidates must have had experience in operating C.E.B. supervisory control equipment, H.T. and L.T. switchboards, and the operation and maintenance of rotary converting plant. Salary in accordance with the N.J.B. Schedule, Class F, Grade 8b, at present £386 rising to £401 per annum.

(3) SWITCHBOARD ATTENDANT. Candidates must have had experience in the control of H.T. and L.T. switchboards, and the operation and maintenance of rotary converting plant. Salary in accordance with the N.J.B. Schedule, Class G, Grade 9a, at present £343 rising to £358 per annum.

The successful candidates will be required to pass a medical examination and to contribute to the Corporation's Superannuation Scheme.

Applications, giving age, details of training and experience, and accompanied by copies of three recent testimonials, should be delivered not later than Friday, 20th December, 1946, to C. T. Melling, M.Sc.Tech., M.I.E.E., M.I.Mech.E., Borough Electrical Engineer, Electricity Offices, St. Mary's Road, Luton. Canvassing, directly or indirectly, will be a disqualification.

W. H. ROBINSON,
Town Clerk.

Town Hall, Luton.
29th November, 1946. 3833

COUNTY BOROUGH OF HASTINGS ELECTRICITY DEPARTMENT

APPLICATIONS are invited for the appointment of an Assistant Engineer, Mains Department, with experience in the installation and maintenance of underground mains, overhead lines and substations, including fault localisation and operation tests on cable network and transformer protection systems.

Salary in accordance with the Schedule of National Joint Board of Employers and Members of Staff for Electricity Supply Industry, Class G, commencing at Grade 8b, £408 per annum, rising after one year's satisfactory service to Grade 8a, £437 per annum, and after two years' service to Grade 8, £467, with grade increments provided in the schedule. The appointment will be permanent and subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination.

Applicants should be under 46 years of age and should possess theoretical qualifications equivalent to the Higher National Certificate in Electrical Engineering.

Applications, stating age, qualifications, training and experience, in that order, together with copies of recent testimonials, should be forwarded not later than Monday, December 23rd, 1946, to the Borough Electrical Engineer and Manager, 12 & 13, York Buildings, Hastings, endorsed "Assistant Engineer." Canvassing will be a disqualification.

N. P. LESTER,
Town Clerk.

Town Hall, Hastings.
28th November, 1946. 3803

BOROUGH OF KING'S LYNN

Shift Charge Engineer

APPLICATIONS are invited for the position of Shift Charge Engineer at the Corporation's Generating Station. Candidates must have had a good practical and technical training in mechanical and electrical engineering and experience in the operation of a generating station plant, including turbo-alternators, water tube boilers and E.H.T. switchgear.

Salary in accordance with the N.J.B. Schedule, Class E, Grade 8 (£413 per annum). The appointment will be subject to the provisions of the Local Government Superannuation Act, 1922, and to the passing of a medical examination by the Council's Medical Officer.

Applications, endorsed "Shift Charge Engineer," giving full particulars of age, technical training and experience, together with copies of recent testimonials, should be delivered to the undersigned, not later than the 20th December, 1946.

FRANK G. REEVES,
Town Clerk.

Town Hall,
King's Lynn. 3849

CITY OF WINCHESTER ELECTRICITY DEPT.

APPLICATIONS are invited for the following positions: (A) Appointment of MAINS ASSISTANT. Salary in accordance with Grade 8a, Class D, of the National Joint Board Schedule (at present £368 per annum). Candidates must have had a sound technical and practical training, experience in the installation and operation of H.V. and M.V. underground mains and overhead lines for A.C. transmission and distribution, also the installation and operation of transformer substations. Graduate membership of the Institution of Electrical Engineers or equivalent qualification is essential.

(B) Appointment of CONTROL ENGINEER (working a shift rota) at a salary in accordance with Grade 8a, Class D, of the National Joint Board Schedule (at present £368 per annum). Candidates should have a technical knowledge of alternating current transmission and distribution, and some experience with an electricity undertaking in the operation of a high-voltage ring main system supplying transformer substations, together with the operation of modern cable protective systems and high-voltage switchgear.

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

Applications, stating age, and giving full details of technical and practical training, with previous experience, also copies of not more than three recent references, should be endorsed "Mains Assistant" or "Control Engineer," and delivered to the City Electrical Engineer, Electricity Department, Gordon Road, Winchester, not later than Friday, the 20th December, 1946. Canvassing, either directly or indirectly, will disqualify.

F. W. KEMPTON,
Town Clerk.

Guildhall, Winchester.
30th November, 1946. 3855

BOROUGH OF SCUNTHORPE ELECTRICITY DEPT.

Junior Technician

APPLICATIONS are invited for the appointment of Junior Technician in the above Department. The salary will be in accordance with the N.J.B. Schedule, Grade 10, Class F, at present £306 per annum rising to £310 per annum in four years.

Applicants should have practical experience in the installation and maintenance of E.H.T. and L.T. switchgear and underground and overhead distribution schemes, and preference will be given to candidates holding National Certificates in Electrical Engineering.

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

Applications, endorsed "Junior Technician," stating age, particulars of education, qualifications and experience, accompanied by copies of three recent testimonials, must be delivered to me not later than Friday, December 20th, 1946.

W. P. ERRINGTON,
Town Clerk.

Municipal Offices,
34, High St., Scunthorpe.
26th November, 1946. 3832

CITY OF LEEDS ELECTRICITY DEPARTMENT

Demonstrators

APPLICATIONS are invited for the following positions: SENIOR DEMONSTRATOR. Candidates should preferably possess a recognised Diploma in Domestic Science and the E.A.W. Certificate in Electrical Housecraft, be competent to organise and conduct lecture-demonstrations, and to advise on the selection and use of all domestic apparatus. Salary in accordance with the Clerical Division of the National Scales for Local Authorities' Administrative, Professional, Technical and Clerical Services, £252 to £288 per annum, plus war bonus at present £48 2s. per annum.

JUNIOR DEMONSTRATOR. Salary in accordance with the General Division of the above grading scheme.

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

Applications, giving full particulars of training and experience, to be received by 14th December, 1946.

F. NICHOLLS,
General Manager & City Electrical Engineer.

1, Whitehall Rd.,
Leeds, 1. 3799

WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

Appointment of Sales Representative (Male)

THE above-named Authority invite applications for the position of Sales Representative in their Shropshire Distribution Area.

The salary will be in accordance with the Authority's revised scale, which, including the present cost-of-living allowance, is £220 per annum at 21 years of age, rising by annual increments to £360 at 30.

Candidates must hold the British Electrical Development Association's Electricity Salesmanship Certificate and have had experience in the showroom of an electricity supply undertaking. He should also possess a sound knowledge of the principles of electric cooking, water heating, and illumination, and the use of electricity in agriculture. Experience in practical installation work will be an advantage.

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

Applications, giving age and details of education and experience, should reach me not later than 16th December, 1946.

H. F. CARPENTER,
Clerk and Manager.

Phœnix Buildings,
Dudley Road, Wolverhampton.
29th November, 1946. 3861

CORPORATION OF ALDERSHOT ELECTRICITY DEPARTMENT

Meter Mechanician

APPLICATIONS are invited for the above permanent position. Applicants must have had practical experience in the repair and overhaul of all types of A.C. quarterly, prepayment and two-part-tariff meters, D.C. quarterly and prepayment meters, time switches, maximum demand indicators, synchronous clocks.

Wages and conditions in accordance with the D.J.I.C. No. 11 Area, at present 2s. 3.04d. per hour for a 47-hour week. A two-bedroom non-parlour type house owned by the Corporation will be available for the successful applicant.

The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the selected applicant will be required to pass a medical examination to the satisfaction of the Council's Medical Officer of Health.

Applications, in writing, stating whether married or single, age and experience, together with copies of two recent testimonials, should be addressed to the undersigned and marked "Application, Meter Mechanician," so as to be received not later than 13th December, 1946.

L. W. GEORGE,
Borough Electrical Engineer and Manager.

Electricity Offices,
87, Victoria Road,
Aldershot, Hants. 3842

LONDON COUNTY COUNCIL

REQUIRED at South-East London Technical Institute, Lewisham Way, S.E.4, in the Electrical Engineering Department, Full-time Teachers to commence in January, 1947, as follows:—

(a) Candidates must be graduates, or hold equivalent qualifications, and have had good industrial experience either in the manufacture of electrical machinery or in the generation and distribution of electrical energy.

(b) Candidates should have had good industrial experience in the manufacture of scientific instruments and be capable of giving instruction in workshop practice and engineering drawing. A good knowledge of electrical instruments will be an advantage. The work includes Ordinary and Higher National Certificate courses for part-time day and evening students, and some teaching in the Secondary Technical School.

Salary: Burnham scale for teachers recognised, as qualified, £300 × £15 to £525 (men), £270 × £12 to £420 (women), plus London allowance (minimum £36), a year, and additions for training and qualifications as applicable. Commencing salary according to teaching and industrial experience. Other things being equal, preference will be given to registered disabled persons.

Application forms, from the Education Officer (T.1), County Hall, S.E.1 (stamped addressed foolscap envelope necessary), returnable by 4th January, 1947. H.M. Forces personnel abroad should apply by letter. 3874

METROPOLITAN BOROUGH OF POPLAR

Appointment of Senior Draughtsman, Electricity Dept.

APPLICATIONS are invited for the position of Senior Draughtsman in the Electricity Department of the Council, at a salary in accordance with Class G, Grade 8, of the scales of salaries of the National Joint Board for the Electricity Supply Industry (at present £490 per annum inclusive).

Applicants must be fully qualified draughtsmen, familiar with building and structural engineering, and a knowledge of general power station and substation work is essential.

The successful applicant will be required to pass a medical examination and the appointment is subject to the provisions of the Poplar Borough Council (Superannuation) Acts, 1911-1937.

Applications, stating age, particulars of qualifications and experience, accompanied by copies of three recent testimonials, should be addressed to the undersigned, endorsed "Senior Draughtsman—Electricity Department," and should be received not later than 9 a.m., Tuesday, 24th December, 1946. Canvassing members or officers of the Council in any form will disqualify.

S. A. HAMILTON,
Town Clerk.

Poplar Town Hall,
Bow Road, E.3.
27th November, 1946. 3851

NORTH WALES POWER COMPANY LIMITED

Appointment of E.H.T. Plumber-Jointer

APPLICATIONS are invited for the position of E.H.T. Plumber-Jointer. Experience on 33-kV and 11-kV lines, sealing ends and joints essential.

Wages in accordance with D.J.I.C. rates. The successful applicant will be eligible to join the Company's Staff Pension Scheme after a probationary period of service, and will be required to pass a medical examination.

Application in writing, stating age and details of training and experience, should be submitted to Electricity House, Rhostyllen, Wrexham, envelopes being endorsed "Plumber-Jointer." 3793

A British firm of telephone manufacturers in India has vacancies for Engineers capable of assisting in the planning of automatic telephone exchange networks. Applicants should have some knowledge of the assessment of traffic data, area layouts, and the general technical requirements of exchange networks. The position offers good prospects to young single men, good salary with kit and travelling allowances, and usual leave. Write, giving full details of experience and age, to—Box No. 206, Dorlands, 18/20, Regent Street, London, S.W.1. 3751

A vacancy has arisen in the pump and motor section of a firm in the Birmingham area for a Leading Draughtsman to take charge of the production of schedules and drawings for centrifugal pumps and electric motors. Previous experience in this work is desirable but not essential, provided that the applicant has a sound knowledge of modern drawing office organisation and workshop practice. This position provides excellent opportunities for advancement. Applications in writing to—Chance Bros. Ltd., Smethwick. 3754

AIR Ministry. A temporary Experimental Officer is required in the Technical Repair and Development Section at the Royal Air Force Medical Equipment Depot, Chessington. Men only are eligible, and candidates should be between the ages of 32 and 50. The most suitable applicants will be interviewed by a selection board in London. Minimum qualifications are an A.M.I.E.E., Inter-Science degree or Higher School Certificate in Science subjects and considerable electrical experience and knowledge of all workshop engineering practice. The appointment is for a maximum period of two years and will not be pensionable. The salary will be within the following range: £370-£520, plus a consolidated addition of £82-£90. Commencing salary will be determined in relation to qualifications and experience. Applications, by letter only, giving date of birth, present employment, full details of qualifications and experience, should be sent to the Under Secretary of State, Air Ministry, S.2(q), Cornwall House, Waterloo Bridge Road, London, S.E.1, not later than 14th December, 1946. 3862

AN old-established engineering company in the London area, employing approximately 1,000, requires a Works Manager with experience of works and production organisation and control of personnel. The prospects are excellent and a salary commensurate with the experience and qualifications of the selected applicant will be paid. The appointment is permanent and pensionable.—Box 3598, c/o The Electrical Review.

APPLICATIONS are invited for the post of Development Engineer in a laboratory in High Wycombe working on radio frequency heating and transmitting equipment. Applicants should be A.M.I.E.E. or equivalent. Sound knowledge of machine design principles is essential. Experience should have covered several of the following subjects: R.F. induction heating, metallurgical engineering, electrical power distribution and switchgear, mechanical or production engineering, workshop practice or high power radio transmitting equipment. Salary would be between £550 and £650 p.a., according to qualifications. Applications should be addressed to—The Personnel Manager, P.R.T. Laboratories Ltd., Commonwood House, nr. Chipperfield, Herts. 3768

ARMATURE Winders required, experienced in A.C. and D.C., for repairs and rewinds. Apply with full details of experience to—Box 3613, c/o The Electrical Review.

ARMATURE Winders and Improvers urgently required. Top rates and good conditions.—Box 113, c/o The Electrical Review.

ARMATURE Winders and Improvers urgently required. Top rates and good conditions.—Collins Electrical Ltd., 22, St. Alban's Place, London, N.1. 85

ARMATURE Winders and Improvers wanted for general repair works, A.C. and D.C. Top rates.—Phillips & Sons Electrical Ltd., 40, Waterford Road, S.W.6. 3757

ASSISTANT for sales department of company manufacturing heat-treatment furnaces and electrical equipment to prepare quotations and technical specifications and assist in publicity work, preparation of catalogues, etc. Young man preferred. Replies should give fullest details of education, previous and present positions and salary required.—G.W.B. Electric Furnaces Ltd., Dibdale Works, Dudley. 3847

ASSISTANT Librarian (Male) wanted by the Institution of Electrical Engineers to act directly under the Librarian in the management of the Reference and Lending Libraries. Candidates must have a sound electrical engineering training and be Graduate I.E.E. or hold an equivalent qualification. A knowledge of French or German is essential; library experience is desirable. Age 25 to 30; salary £350 to £550 depending upon age and qualifications. Applications should be addressed to—The Secretary of the Institution, Savoy Place, London, W.C.2. 3778

BATTERY Erectors (lead stationary). Must be fully competent and prepared to travel and assist on contracts in all parts of the country.—Box 5001, c/o The Electrical Review.

CAPABLE man or woman of good education as personal assistant to owner-manager of soundly-established London radio and electrical business. State age and full details of career.—Box 5017, c/o The Electrical Review.

CENTRAL Electricity Board. Vacancies exist in the Central England district for Electrical Fitters experienced in the maintenance of E.H.T. switchgear, transformers and auxiliary plant. Applicants, who must be under 40 years of age, can obtain further particulars from—The Manager, Central England, Central Electricity Board, 53, Wake Green Road, Moseley, Birmingham, 13. 3759

CEYLON. Engineer Assistant required for general engineering works, must have served regular indentured apprenticeship and possess mechanical and electrical engineering higher certificates, or equal technical training, with drawing office experience, age 28/35. Required for inside and outside work of general nature, supervising erection, factory and marine repair work, interviewing and advising clients, securing orders for work and supplies, correspondence and estimates connected therewith. Four years' agreement, salary Rs. 700/850 per month, provident fund bonus, passage out and home, six months half-pay leave, low income tax, address with copies of references, stating school and technical qualification, and experience in chronological order, also present salary and if married, family, to—Box 3848, c/o The Electrical Review.

CHIEF Electrical Engineer (plant construction) required by Messrs. Dorman Long & Co. to be responsible for the design and installation of the electrical equipment in their major plant development schemes. First-class technical qualifications essential, and previous experience in similar work desirable. Salary will be in line with qualifications. State approximate figure required. Apply, giving full particulars of training and experience, to the Chief Engineer, Dorman Long & Co., Middlesbrough. 3637

CHIEF Inspector required by a large factory situated in North Wales, manufacturing electrical meters and instruments. Applicants must have held a like position and be fully conversant with this type of apparatus. Also must be good disciplinarian. Write, stating full particulars, experience and salary required, also when free, to—Box 3794, c/o The Electrical Review.

CHIEF Engineer. Transformers, small power, audio service requirements, London. Prospects for all-round sound man. State experience and salary required.—Box 9933, 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

COSTING and Progress Clerk required for electrical installation contractors' order office. Only man with previous experience should apply. Permanent. Letters first.—Etna Lighting & Heating Co. Ltd., 293/295, Broad Street, Birmingham. 3811

DESIGNER-Draughtsman, capable of taking charge of switchgear development up to 11 kV, required by firm in Midlands. Good salary and prospects. Housing accommodation for suitable man. Write—Box No. 324, 8, Serle Street, London, W.C.2. 3795

DESIGNER-Draughtsman required for electrical and mechanical design of small devices for mass production. Full scope for progressive man.—Box 3863, c/o The Electrical Review.

DRAUGHTSMAN with experience of H.T. and L.T. oil circuit breakers and metalclad switchgear required for South Midlands. Technical man preferred. Write, giving details of experience, technical education, age and salary required.—Box 3841, c/o The Electrical Review.

DRAUGHTSMEN required in N.E. London area. Two Seniors, with sound mechanical knowledge and experience in E.H.T. outdoor switchgear of the oil minimum type. One Senior with experience of steelwork, cable ducting, overhead lines, etc., for outdoor switching stations. One Intermediate with experience of control boards, indoor cellular gear and kiosks, knowledge of diagrams an advantage. Good salary offered to suitable men. Apply, stating age and experience.—Box 3243, c/o The Electrical Review.

DRAUGHTSMEN, preferably with telecommunications experience, required by large firm in the Midlands. Maximum salary £350 plus cost of living bonus. Write, giving details of experience, age, and salary required.—Box 11, 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

DRAUGHTSMEN required for transformer and switchgear drawing offices at either Stafford or Liverpool. Experience of this work preferred, but men with good general mechanical or electrical drawing office experience also required. Basic salary according to experience and ability, plus weekly staff war bonus of 29s. 6d. single, 32s. 6d. married. Good steady job for suitable applicants. Apply—The English Electric Co. Ltd., Queens House, Kingsway, London, W.C.2. 3779

DRAUGHTSMEN (Senior) required for large A.C. and D.C. machines, including turbo and waterwheel alternators, also for medium type A.C. and D.C. machines. Applications from men with suitable technical qualifications and good general mechanical drawing office experience will be considered. Salary dependent upon qualifications and experience. Apply, giving full details of qualifications, experience, age and salary, to Chief Draughtsman, Engineering Drawing Office, The General Electric Co. Ltd., Witton, Birmingham, 6. 3576

EFFICIENT Salesman wanted for electr. retail shop, prev. exper. and techn. knowledge essent., first-class refer. requ. as position is one of trust. Write, with copies of refer. to—Box 3870, c/o The Electrical Review.

ELECTRICAL Draughtsman-Estimator required for Central London office for the design and layout of factory electrification schemes, including substations, H.T. ring mains, transformers, L.T. switchboards, L.T. cabling, L.T. distribution boards, motors, starters and lighting. Applicants must be between 25 & 30 years of age and must hold the H.N. Cert. in Elect. Eng. Preference given to man holding the graduate examination of the I.E.E. Five-day week, superannuation scheme, salary £450-£525 per annum, according to experience. Successful applicant would have to pass the Company's Medical Officer. All applications (which should contain copies of two or more recent testimonials) would be treated in the strictest confidence, and should be addressed to—Box 3820, c/o The Electrical Review.

ELECTRICAL Installation Engineer required by London electrical contractors. Able to prepare schemes, advise, estimate, engage labour, and carry out small and large jobs to finality. Full particulars in confidence and salary expected to—Box 9994, c/o The Electrical Review.

ELEC. Motor Winding, Repair and Manufacture Foreman wanted, experienced fractional and medium sizes. Small shop, London district. Partnership basis could be considered.—Box 3749, c/o The Electrical Review.

ELECTRICIANS at N.F.E.A. "B" rates required in East Anglia. Only fully qualified men need apply to —The East Anglian Electric Supply Co. Ltd., Finborough Hall, Stowmarket. 3770

ENGINEER required by large firm in London area, with experience in the development of coil winding machinery. Write, giving full details of experience and qualifications, also salary required to—Box 3831, c/o The Electrical Review.

ENGINEER with the appropriate experience to take charge of development and production of laminated insulating tubes and cylinders. Reply, in confidence, giving age, experience, previous employers, salary expected, to—Labour Manager, Ferranti Ltd., Hollinwood, Lancs. 3774

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.

ESTIMATING and Supervisory Engineer required, previous experience essential. Also able to prepare specifications and estimates, and carry contracts through to completion. Write, stating age, experience and salary required, to—Contracts Dept., Giles Electrical Engineers) Ltd., Victoria Colonnade, Southampton Row, W.C.1. 3619

ESTIMATING Engineer (senior male or female), for large contractors in Birmingham to act as personal assistant to director. Previous experience essential, progressive and permanent position. Salary and qualifications to—Box 5024, c/o The Electrical Review

EXPERIENCED Draughtsmen required for electric cookers and water heating appliances. Applications to—South Wales Switchgear Ltd., Blackwood, Mon. 3676

EXPORT Sales Assistant required by Electric Motor Manufacturers, preferably technical/commercial experience 23-28 yrs., prospects good, state full details, present salary.—Box 3866, c/o The Electrical Review.

FIRST-class Electrician wanted, used to installation work. Permanent post for right man. Apply—R. J. Kemp & Co. Ltd., Coalville, nr. Leicester. 9926

FIRST-class man required to take charge sales of small group of companies, H.Q., London. Goods manufactured include thermostats, transformers, fluorescent, electronics, furniture, metal work, small tools. Expansion into other fields desired. State experience. Excellent prospects for right man.—Box 9934, c/o The Electrical Review.

FLAME-proof, Air Break, Switchgear Designer-Draughtsman, generous salary, good prospects, 5-day week. Assistance with housing. Write—Box No. 323, 8, Serle Street, London, W.C.2. 3796

FOREMAN for Armature Winding Department. Must have experience of the manufacture of fractional h.p. A.C. and D.C. motors. Good opportunity for right man. Good salary and bonus paid.—Box 3697, c/o The Electrical Review.

HIGHLY Qualified Electrical Engineer, primarily for research into audiometry and allied field; also hearing aid design.—Box 3765, c/o The Electrical Review.

HOUSEHOLD Appliances. Large light electrical firm in Middlesex requires the services of one or two Engineers for development work in this field. Electrical engineering or physics degree or equivalent qualifications, with some industrial production or design experience. Preferred age 25-30 years. Write, giving age, fullest details of education and experience, together with salary required, to—Box 3775, c/o The Electrical Review.

JUNIOR Assistant (Trainee) required for mains dept. of electricity undertaking in S.E.E. area. Technical education to H.N.C. standard essential, and engineering shop or supply authority experience desirable. Commencing salary £208 p.a. (including bonus). Good prospects of advancement. Apply, stating age and experience, to—Box 9999, c/o The Electrical Review.

LARGE electrical contractors (Eastern Counties) require first-class Estimating/Supervising Engineer. Must be fully conversant with preparing schemes, taking off quantities, costing, and supervising all types of electrical installation work. Commencing salary £400 p.a., with excellent scope and prospects of advancement. Give full details of age, qualifications, experience and previous employment to—Box 3763, c/o The Electrical Review.

LARGE electrical engineering organisation requires Public Address Equipment Engineers for service work in London and the Provinces. Applicants should have experience of public address work and should be capable of surveying proposed installations and planning the appropriate equipment required. Please give details of experience, age and approximate salary required to—Box 186, Dorlands, 18/20, Regent St., London, S.W.1. 3709

LADY Assistant required for clerical duties in electrical showroom. Write, stating age, previous experience and salary required, to—Sales Dept., Giles (Electrical Engineers) Ltd., 11, Victoria Colonnade, Southampton Row, W.C.1. 3620

LADY or gentleman required as Assistant to Export Manager by City firm. Must be good at figures. No Saturdays. Write—Box "Q.S.," c/o 95, Bishopsgate, E.C.2. 3570

LONDON County Council invites applications from qualified electricians and charge hands for positions as Inspectors for Electrical Work in the Chief Engineer's Department. Applicants must have had practical experience in good class wiring in houses, blocks of flats and other buildings, and should be conversant with methods of carrying out this work by contract on a large scale, and capable of supervising, inspecting and testing work on site. Ability to write clear and concise reports is essential. Rate of pay, according to qualifications and experience, up to £7 17s. 6d. a week, including variable allowances. Selected candidates will be subject to the provisions of the Local Government Superannuation Act, 1937. All other things being equal, preference will be given to registered disabled persons. Application forms obtainable by sending stamped addressed foolscap envelope to the Chief Engineer (quote 46/16), County Hall, Westminster Bridge, London, S.E.1. Completed forms are to be returned by not later than 16th December, 1946. Canvassing disqualifies. 3756

MAINS Draughtsman. Candidates to be experienced in production of plans from Ordnance Survey Maps, production of underground cable and overhead line route records and general drawing work. The salary payable will be on N.J.B. scale, Class F, Grade 9a, commencing at £327 per annum. Applications, stating age and particulars of experience, to—Divisional Engineer, Buckrose Light & Power Company Limited, Electricity Buildings, Middle Street South, Driffield, E. Yorks. 3821

MANAGER or Manageress of good appearance and personality required for high-class electrical and radio retail and art goods business, 30 miles from London. Must be thoroughly capable and able to take full control. Write with particulars, stating age, experience and salary required.—Box 115, c/o The Electrical Review.

OLD-established firm of electrical contractors, headquarters Glasgow, require first-class Estimator, accustomed to estimating for lighting and power contracts. Good salary to suitable person. Apply, giving particulars, to—Box 3798, c/o The Electrical Review.

REPRESENTATIVE required, E. and S. London area. Must have knowledge electrical and radio accessories. Good prospects right man. Apply, stating age and experience to—A. J. Evans & Son, 3, Fulbourne St., Whitechapel, London, E.1. 5015

REQUIRED, for extensive development programme, Electrical Draughtsmen with experience in steelworks H.T. and L.T. distribution schemes, substation design and layout, A.C. and D.C. heavy industrial control gear. Draughtsmen with similar experience in other industries would be considered. Apply by letter, stating age, experience and salary required, to—Chief Draughtsman, Dorman Long & Co. Ltd., Central Engineering Dept., Britannia Works, Middlesbrough. 41

RESEARCH Chemist required for development work on inorganic fluorescent materials. Experienced worker preferred, accustomed to carrying out original investigations. Salary according to qualifications. Write, stating age and particulars of experience, to—Personnel Manager, E. K. Cole Ltd., Southend-on-Sea, Essex. 3663

SALES Correspondent required London area, with company well-known in light electrical engineering industry. Applicants should give details of experience, age and salary required.—Box 3865, c/o The Electrical Review.

SENIOR and Junior Electrical Designers for large concern in Manchester area engaged in the manufacture of all classes of A.C. and D.C. dynamo-electrical machines. Applicants should state age, details of training, experience and salary required.—Box 3694, c/o The Electrical Review.

SWITCHGEAR & Cowans Limited require (a) Draughtsmen (Senior) with experience in H.T. metalclad switchgear; (b) Draughtsmen (Senior) with experience in mining type metalclad switchgear, G.E. switches, etc.; (c) Clerk for Switchgear Drawing Office to issue material schedules to shops, etc. Applications in writing, giving details of experience and salary required, should be addressed to—Elsinore Road, Old Trafford, Manchester, 16. 3789

TECHNICAL Sales Engineer required in London by manufacturers of f.h.p. motors. Previous experience essential. Write, with full details of qualifications, salary required, age, etc., to—Box 3827, c/o The Electrical Review.

SUPERVISORY Electrical Engineer with sound experience in the control of labour, and in the preparation of specifications and estimates, required by leading firm of contractors, Manchester district. Reply, stating age and full details of experience, also salary required, to—Box 5003, c/o The Electrical Review.

TEST Room Assistants required (North London) for wiring and testing of precision electrical instruments. —Box 3643, c/o The Electrical Review.

THE Hongkong Electric Company Limited, Hongkong, have vacancies for the following: (a) Shift Engineer with experience in power station boiler house, salary about £67 per mensem; (b) Mains Assistant with experience of distribution systems, salary about £64 per mensem; (c) Meter Assistant with experience of repairs and testing of meters and testing of consumers' installations, salary about £64 per mensem. First contract for three years, with prospect of further employment thereafter at increased salary. Passages paid; 8 months' leave with full pay and passages after five years. Single men age 25/30 preferred. Apply in writing, stating age, training and experience, and enclosing copies of any testimonials, to—The Representative of the Hongkong Electric Co. Ltd., 122, Leadenhall Street, London, E.C.3. 3653

TRANSFORMER Design Engineer required, experienced in all types up to 500 kVA. Promising and highly paid position. Write, stating age and experience to—Brentford Transformers Ltd., Windmill Road, Brentford, Middx. 3867

WELL-known electrical engineering company have vacancies for suitable lads, over 15 years of age, with Matriculation or General School Certificate, for Apprenticeship in the above industry. Good rates of pay and living accommodation provided.—Box 3784, c/o The Electrical Review.

WORKS Chemist required by company in N.W. London, engaged in the manufacture of sodium, mercury and fluorescent lamps. Dr.Sc. Hons. Physics and Chemistry. Man accustomed and able to deal with technical production problems. Salary according to age and experience.—Box 3864, c/o The Electrical Review.

WORKS Supervisor required by London manufacturers of electric control gear. Must have good practical experience, with comprehensive knowledge of production control and machine shop practice, allied with general electrical knowledge. Reply, giving details of experience, salary required, to—Box 3782, c/o The Electrical Review.

YOUNG Meter Engineers wanted for manufacturers' office in Home Counties. State age, training, experience, and salary required.—Box 9993, c/o The Electrical Review.

YOUTH required for office of well-known electrical engineers and contractors, Manchester district, preferably with clerical electrical experience. Position offers good prospects. Please state age, experience and salary to—Box 5004, c/o The Electrical Review.

5-Day Week. First-class Draughtsmen urgently required for radio and electrical engineers, Enfield district. Experience in radio apparatus and/or machine design essential. Write, stating age, experience and salary required, to—Box 3669, 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.

A.P.C.M. Ltd. Applicants for Sen. Asst. Elec. Engineer are thanked. Those selected for interview have been informed. 3823

SCOPHONY Ltd.—Sales Representative. All applicants are thanked.

SITUATIONS WANTED

A Works Manager desires change. Accustomed to complete charge of extensive factory producing telephone cables, cords and insulated wires. Position must command a salary in keeping with applicant's status.—Box 5002, c/o The Electrical Review.

ADVERTISER, wide all round business experience, used to management, finance, etc., desires change. Last few years also include buying and selling wholesale electrical goods. Excellent trade contacts. Seeks post branch manager, representation or similar, London area. —Box 5016, c/o The Electrical Review.

ADVERTISER with many years of experience in design, manufacture and selling of H.T. and L.T. joint boxes, pillars, etc., desires change. At present holding important position. Live connection throughout G.B.—Box 9941, c/o The Electrical Review.

ADVERTISER (30) seeks responsible position on maintenance and construction. No travelling. At present in charge of electrical maintenance of 8 works; 10 years' experience of installation and maintenance of automatic control devices and contactor gear.—Box 9957, c/o The Electrical Review.

ASSISTANT Contract Supervisor (25) requires progressive post with electrical contractors, preferably Southern England.—Box 9983, c/o The Electrical Review.

ASSISTANT, fully experienced wholesale and retail electrical trade, requires progressive position, London or Surrey.—Box 9977, c/o The Electrical Review.

ELECTRIC Lamps. Situation as Production Manager is sought. Thoroughly experienced in organisation, staff supervision and manufacturing routine.—Box 9991, c/o The Electrical Review.

ELECTRICAL Engineer, A.M.I.E.E., Hons.B.Sc., with wide experience in switchgear and machines, seeks responsible position with switchgear manufacturers, consultants, or as engineer to a large concern. Age 34. Sound health. Prepared to go abroad.—Box 9958, c/o The Electrical Review.

ELECTRICAL Engineer, B.Sc., Grad. I.E.E., age 30, experienced in high-class telecommunication receivers and meters, seeks progressive position in India.—Box 5014, c/o The Electrical Review.

ELECTRICAL Engineer, Grad. I.E.E., age 26, works apprenticeship motor and dynamo manufacturer, subsequent experience on design, manufacture and repairs, excellent testimonials, etc., desires progressive technical situation in U.K. Starting salary £350 p.a.—Box 9997, c/o The Electrical Review.

ELECTRICAL Engineer, Grad.I.E.E., A.M.J.I.E., with practical and sales experience, desires post. Outside Sales or Representative's position preferred. Midlands area. Electrical, mechanical and heating engineering experience.—Box 9996, c/o The Electrical Review.

ELECTRICAL Engineer, 15 years, workshop apprenticeship, D.O. 2 years, mechanical & electrical welding, switchgear, specialist transformer engineer, able teach electrical engineering or mathematics. Home or abroad. Progressive post.—Box 9968, c/o The Electrical Review.

ELECTRICAL Engineer (31), degree standard, specialising in the design and manufacture of all kinds of electrical instruments and allied equipment, offers his services, full-time or in an advisory capacity.—Box 9951, c/o The Electrical Review.

ELECTRICAL Engineer, 36, 5 years' college training, 12 years' experience technical sales, estimating tenders, orders, industrial motors and ancillary equipment, including fractionals, seeks progressive permanency.—Box 5023, c/o The Electrical Review.

ELECTRICIAN, good education, 30 years' first-class experience installations, all systems, maintenance, industrial and domestic, especially lighting, capable giving intelligent supervision, estimating, etc. Small contractor, London area preferred.—Box 9944, c/o The Electrical Review.

ELECTRICIAN-Fitter, 25 years' all-round electrical and mechanical experience A.C./D.C. power wiring, motors, erection mechanical-electrical apparatus and machines, good refs.—Box 5018, c/o The Electrical Review.

ENGINEER, 35, B.Sc., A.M.I.E.E., experienced automatic control gear and general electrical engineering, seeks situation of responsibility, maintenance large organization or manage small concern. Capital investment considered.—Box 9976, c/o The Electrical Review.

EX-Branch Manager of electrical wholesalers seeks post, sales, buying, manager, or travelling. Four years manager with Superlamp Ltd. Age 37 years, married, ex-R.A.F. Over 20 years' experience.—J. Banks, 63, Consfield Avenue, New Malden, Surrey. 9955

EXECUTIVE (39) seeks progressive permanency, preferably Southern Counties, South Coast or London area. Sound technical and commercial knowledge, works and D.O. training, extensive supervisory experience, fully conversant sales and purchasing of electrical equipment and raw materials. Specialised in production and inspection of rotating machines and cables. Moderate knowledge French and Spanish.—Box 9928, c/o The Electrical Review.

INSTRUMENT Engineer (31), A.M.I.E.E., seeks responsible position in design, development or testing of electrical instruments, protective gear and associated equipment; 5 years' apprenticeship, 9 years' subsequent experience with prominent manufacturer.—Box 5009, c/o The Electrical Review.

LADY, Ex-W.R.N.S. Draughtswoman, used to perspective drawing and tracing, requires post, demanding initiative and ability.—Box 9982, c/o The Electrical Review.

MECHANICAL Engineer, age 38, 10 years' Colonial Govt. service, comprehensive practical experience maintenance and operation of Diesel-electric generating plant, seeks position, preferably where housing available.—Box 9992, c/o The Electrical Review.

OVERSEAS employment. A.M.I.Mech.E., A.M.I.E.E., 5 yrs.' war service, R.A.O.C./R.E.M.E., O.C. base workshops, assistant director mechanical engineers, etc., excellent experience light engineering, general manufacture and plant maintenance, 42 yrs. young, desires exec./admin. post overseas, or would execute commissions E. Africa, S. Rhodesia and S. Africa early 1947.—Box 5010, c/o The Electrical Review.

PLUMBER-Jointer, skilled, all mains work to 33 kV.—Box 5022, c/o The Electrical Review.

POSITION on clerical, accounting or showroom staff of electricity supply undertaking, contractors or manufacturers, by experienced Sales Representative. Health impaired for outdoor work only by 6 years' war service (army). Excellent references, holder of E.D.A. domestic certificate and diploma; varied previous experience in accounts and office work. Linguist, widely travelled.—Box 5000, c/o The Electrical Review.

POSITION required by ex-R.A.F. communications N.C.O., 24. H.S. cable and wireless operating, point-point, air ground, etc.; teleprinting; maintenance radio equipment; laboratory experience; holds Xmitting licence; ed. matric, contg. studies.—BM/HWMO, London, W.C.1. 9952

PRODUCTION Engineer, Grad. I.P.E., A.M.I.E.E., seeks appointment as Works Manager, Production Manager or similar post. Sound industrial training, experienced in production electric motors, domestic appliances, aero engine components. Keen, energetic, possessing initiative and administrative ability. Available immediately.—Box 9918, c/o The Electrical Review.

PRODUCTION Engineer/M/c Shop Supt. (45), eight yrs.' executive, light enging., seeks re-engagement, capable of complete control of medium size m/c shop (300 employees). Rate fixing, production control, planning (methods) and some jig and tool design. Free Dec. 1.—Box 9979, c/o The Electrical Review.

PRODUCTION Executive (35), whose career has been entirely devoted to the production of precision instruments and domestic appliances and who can produce on own initiative through all stages any light electro-mechanical project, wishes to take a production appointment with a medium or small but established and expanding company. The most important feature to be the prospect over the next 10 years and a limited amount of capital could be invested. The advertiser is conversant with the latest production methods and processes and works office procedure. His record to date being really convincing.—Box 9975, c/o The Electrical Review.

REPRESENTATIVE, with large connection wholesalers over whole southern half England, wishes contact reliable manufacturing firm, domestic lines and accessories. Own car. Immediate sales guaranteed. Available at once. References.—Manby, Norman House, Westbourne, near Emsworth, Hants. 5008

SALES Executive (38) desires responsible technical sales appointment with large progressive firm of electrical engineers in Midlands; manufacturers of motors, switchgear, transformers, etc., but other equipment considered. High qualifications, considerable experience, selling ability, organiser, publicity, etc. Position must be of managerial capacity with good salary in keeping with applicant's status.—Box 9921, c/o The Electrical Review.

SALES Manager-Engineer, 39 years old, desires change; 23 years' experience cables, radio, electronics, installations, O.H. and U.G., construction. Good connections home and export. Minimum salary £1,000 p.a.—Box 9964, c/o The Electrical Review.

SENIOR Design and Development Engineer, 44, wide, varied experience light electro-mechanical design and production, Electronics, plastics, D.O. organisation. At present with large world-famous concern, seeks executive post with smaller, progressive firm. London or near.—Box 5026, c/o The Electrical Review.

STOREKEEPER - Trade Counter Salesman requires position. Long experience electrical trade.—Box 9927, c/o The Electrical Review.

WORKS Manager, A.M.I.P.E., M.I.E.C.E., specialising in economical mass production electrical and light mechanical parts, seeks responsible position. London area preferred; sound experience modern production methods; excellent references.—Box 5032, c/o The Electrical Review.

WORKS Manager desires change, accustomed complete charge extensive factory producing all classes paper cables, including 33 kV. wire-drawing experience, familiar manufacture V.I.R. cables.—Box 9930, 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.

CITY AND ROYAL BURGH OF EDINBURGH ELECTRICITY DEPARTMENT

THE Lord Provost, Magistrates and Council of the City of Edinburgh invite tenders for the dismantling and purchase of the plant scheduled below which will be available for disposal early in 1947:—

Item 1: 4 Tri-Drum Stirling Boilers 65,000 lbs./hr. 300 lbs./sq. in. 700°F. each unit being equipped with the following: Stirling economiser in two sections (steel tube); Stirling super-heater in two sections; Variable speed induced and forced draught fans; Soot-blowing equipment and dust extraction hoppers; All necessary instruments, valves and piping. Two of the units are each equipped with 4 B. and W. Chain Grate Stokers and Sprung Arches and the other two units are each equipped with two international "L" type stokers, suspended arches, and secondary Air Fans.

Item 2: 2 Steel Chimneys and bases with grit arrestors.

Item 3: 1 Coal Elevator (gravity bucket type) 60 tons/hr.

Item 4: 1 Brown-Boveri Turbo-Alternator, 14,700 kVA, 6.6/7.25 kV, 1,500 r.p.m., 3-phase, 50 cycles, complete with Allen Condensing Plant, Ventex Alternator Air Filter and motor operated Barring Gear

Item 5: 1 Parson's Turbo-Alternator 4,000 kW, 6.6 kV, 3,000 r.p.m., 3-phase, 50 cycles complete with condensing plant.

Item 6: 1 Fraser-Chalmers Turbine coupled to Siemens 1,580 kW alternator, 6-phase, 50 cycles, 3,000 r.p.m., 376/419 volts. This unit is non-condensing and exhausts to atmosphere.

Item 7: 1 Bruce Peebles Motor Generator 500 kW, 750 r.p.m.

Copies of the Specification containing other details of the plant, conditions of sale and particulars of the arrangements to be made for inspecting the plant, which is at present in operation and can be seen running at Portobello Power Station can be obtained from the Corporation's Consulting Engineers, Messrs. Kennedy & Donkin, 180, Hope Street, Glasgow, C.2, on and after December 12th, 1946.

Sealed tenders endorsed "Disposal of Plant" must be delivered to the undersigned not later than 10 a.m. on 31st December, 1946. The Corporation do not bind themselves to accept the highest or any tender.

J. STORRAR,
City Chambers, Edin. 1. Town Clerk.
30th Nov., 1946. 3858

MILLOM R.D.C. ELECTRICITY DEPARTMENT

THE Council have the following equipment for sale:—
3 Draw-out Truck Cubicles, 3-phase, 6,600 volts.
1 Ferranti Moving Coil Voltage Regulator, 5 kVA, 185 to 230 volts.
1 50-kVA Transformer, 3-phase, 50 cycles, 6,000/400/230 volts.
1 Air-cooled Transformer, 3 kVA, P 220/230/3 volts.
1 200-amps., 6,600-volts Changeover Isolator.
50 Slot Meters, 1s. coin.

Full details may be obtained from the Electricity Engineer, Wellington Street, Millom. Tenders for the whole or part of the equipment should be sent to the undersigned in a sealed envelope endorsed "Electrical equipment" not later than 31st December, 1946. The Council do not bind themselves to accept the highest or any tender.

W. N. KITCHEN,
Council Offices, Clerk to the Council.
Millom, Cumberland. 3812

A. Cooksley & 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

A Diesel Generating Set by Davey Paxman, 25 h.p., single cylinder, vertical, cold start with belt-driven alternator, 15 kVA, 400/3/50, 1,000 revs. Cheap for quick clearance.—Box 3816, c/o The Electrical Review.

A Superior Streamlined Toaster in one-piece die-cast aluminium, with attractive mirror finish. Price 39s. 6d. subject. Immediate delivery. Sample, 31s. Cash with order.—Metropolitan Distribution Ltd., Truro. 94

ABOUT 10,000 yards unused 44/.012 single-core T.R.S. Flexible Cable in 100-yard coils, ideal for temporary connections, etc., £17 10s. per 1,000 yards.—Barlow-Whitney Ltd., Coombe Road, Neasden Lane, N.W.10 (Tel. Gladstone 1152/3). 3786

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

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WEE Meggers, 500 v., in case, £12 5s. 6d.; Record 500-v. Test Set, £11, C.O.D. (new).—Robins, 222, West End Lane, N.W.6 (HAM. 0879). 82

1-h.p. Motors, 230-250 volts, 50 cycles, split-phase, starting torque 225%, sleeve bearings, automatic thermal protection. These motors are brand new and manufactured by English Electric. A few are available for immediate delivery at £7 10s. each net. Carriage paid for lots of 12 or more.—Waltman Electrical Co., The Mall, Chiswick, W.4 (Chiswick 4542). 3718

1 Cent. Multi-vane Fan coupled to 3½ h.p. motor, 400 v. 3/50; 1 do. 2½ h.p. motor, 500 yards 18" and 9" ducting. Dynamo 100 v., 150 amps. All modern and in good order.—Box 3633, c/o The Electrical Review.

1 240-h.p. L.D.M. Slip-ring Motor, 400/3/50, 725 r.p.m., complete with oil switch and liquid type rotor starter. —Oldfield Engineering Company Ltd., 96, East Ordsall Lane, Salford, 5. 3787

2 Berry-type Air-cooled Transformers by British Electric Transformer Co., 2,000 volts to 200 volts, 2-phase, 50 cycles. 200 kVA output.—Box 5030, c/o The Electrical Review.

2 200-h.p. Crompton Motors, 960 r.p.m., 3,000 volts, D.C.—Box 3687, c/o The Electrical Review.

4 Anodising Vats, 5 ft. × 3 ft. × 10 ft. deep, with heating coils and filter boxes and ventilation system. 5 Tanks, 5 ft. × 2 ft. × 10 ft. deep, with heating coils. (These tanks could be reduced in size should they be too deep).—Scottish Electromill Ltd., 51, Lanark St., Glasgow. 5011

5 h.p., 960 r.p.m., 440/3/50; 10 h.p., ditto. Both Oil-ring Type Motors in very good condition. Price £47 10s. the two, delivered to any address.—Box 3805, c/o The Electrical Review.

5-kW and 2½-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

12" Double Bollard Winch, direct coupled 15-h.p., 415-v., 3-phase slip-ring motor with Ellison oil-immersed control gear. Apply to—Express Dairy Co. Ltd., Elec. Dept., Claremont Road, Cricklewood, N.W.2. 3804

45-kW Laurence Scott 210-volt, compound wound Generator, 440 r.p.m., £120, or near offer.—Daltons, Canal Street, Nottingham. 3681

75-h.p. "Brittain" 960-r.p.m. Squirrel Cage Motor for 415/3/50, with oil-immersed starter.—Thos. W. Ward Limited, Lancaster Place, Strand, London, W.C.2. Telephone No. Temple Bar 9631. 3869

100 Unused Flat Top Bogie Trolleys, oak platforms, 5′ × 3′ × 15½" high, oak bearers, swivelling bogie with 36" drawbar; with 4 iron wheels, 11" dia., £7 10s. each; with 4 solid rubber-tyred wheels, 12" dia., £10, delivered. Also 100 Unused Samson Type Trolleys for machinery handling, oak, 22" × 17" × 5½" high, 4 iron wheels 3" dia. and central wheel 3½" dia., 70s. each, delivered. Inspection works, 40, Cuba Street, Millwall (East 3958).—Reed Brothers (Engineering) Ltd., Bevis Marks House, London, E.C.3. 3752

100-kW Generating Set, 150-h.p. Ruston vertical 4-cylinder Diesel Engine direct coupled to 100-kW, 460/480-volt, 375-r.p.m. Crompton Parkinson Generator; 60-kW Generating Set, 90-h.p. Fielding & Platt vertical 3-cylinder totally enclosed Diesel Engine, 428 r.p.m., and 60-kW, 230-volt Generator; 62.5-kVA Alternating Set, consisting of a 90-h.p. Fielding & Platt multi-cylinder vertical totally enclosed Diesel Engine and 62.5-kVA, 400/440-volt, 3-phase, 50-cycles, 1,000-r.p.m. Alternator; 47.5-kW Generating Set, consisting of an 80-h.p. National 4-cylinder Engine, direct coupled to a 47.5-kW, 460-volt, 800-r.p.m. Generator by G.E.C.; 30-kW Generating Set, National 5-cylinder vertical Diesel Engine, 1,000 r.p.m., direct coupled to 30-kW, 230-volt Harland D.C. Generator, complete with switchboard; 30-kW Generating Set, Ruston 5-cylinder vertical Diesel Engine, 1,000 r.p.m., direct coupled to 30-kW, 230-volt Lawrence Scott D.C. Generator and switchboard (two duplicates available); 27.5-kVA Alternating Set, Dorman 4-cylinder vertical Diesel Engine, 1,000 r.p.m., direct coupled to 27.5-kVA, 3-phase, 50-cycles, 400/230-volt Mawdsley Alternator, complete with switchgear; 15-kW Generating Set, consisting of 30-h.p., 3-cylinder Lister Engine, direct coupled to 15-kW, 220-volt Mawdsley Generator (five available); 15-kVA Alternating Set, Lister vertical 3-cylinder Diesel Engine, 1,000 r.p.m., direct coupled to 15-kVA, 1-phase, 50-cycles, 230-volt Mawdsley Alternator, complete with switchgear (three equipments available); 5-kW Generating Set, consisting of 9-h.p. Lister Diesel Engine, direct coupled to 5-kW English Electric 220-volt D.C. Generator (two available).—Newman Industries Ltd., Yate, Bristol. 3790

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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

400 cub. ft., 100 lbs. per sq. inch, Vertical Compressor by Jackman, driven by 80-h.p. Crompton Slip-ring Motor, 440 volt, 3-phase, 50 cycles; 170 cub. ft. per minute, 100 lbs. per sq. inch pressure, Air Compressor by Ingersoll Rand, driven by 42½-h.p., 400/440-volt, 3-phase, 50-cycles Slip-ring Motor by Lancashire Dynamo; 160 cub. ft., 80 lbs. per sq. inch, Tilghman Air Compressor, driven by 35-h.p., 400-volt, 3-phase, 50-cycles Motor by Crompton Parkinson; 130 cub. ft., 100 lbs. per sq. inch, Vertical Air Compressor by Broom & Wade, belt-driven by 4-cylinder Lister Diesel Engine; 12 cub. ft. per minute, 3,000 lbs. per sq. inch, Hamworthy 3-stage Air Compressor, driven by 10-h.p. Slip-ring Motor by Flather.—Newman Industries Ltd., Yate, Bristol. 3791

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530-volt D.C. Motors, from 2 h.p. to 30 h.p. Enquiries—Clerkenwell 3000—Ext. 19. 5013

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ACETATE and other thermoplastic scrap; polythene and P.V.C. in any form; also scrap cable and insulated wire; urgently wanted.—Elton Levy & Co. Ltd., 18, St. Thomas Street, S.E.1. 30

A Chapman Armature Winding Machine, or similar.—Max Electric Co. Ltd., 190, Thornton Rd., Croydon. 43

A.C. and D.C. Motors and Transformers urgently wanted. Burnt-out machines acceptable.—Max Electric Co. Ltd., 190, Thornton Rd., Croydon. 12

ALTERNATOR, 100 to 150 kW, 400 volts, 3-phase, 50 cycles, suitable for belt drive and complete with control gear.—Box 3785, c/o The Electrical Review.

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METERS, 3 Prepayment Meters wanted, for pennies, 220-250 volts, 50 cycles A.C.—Gilmour, Bank Street, Slamannan, Stirlingshire. 3810

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[*Continued on page 78.*]

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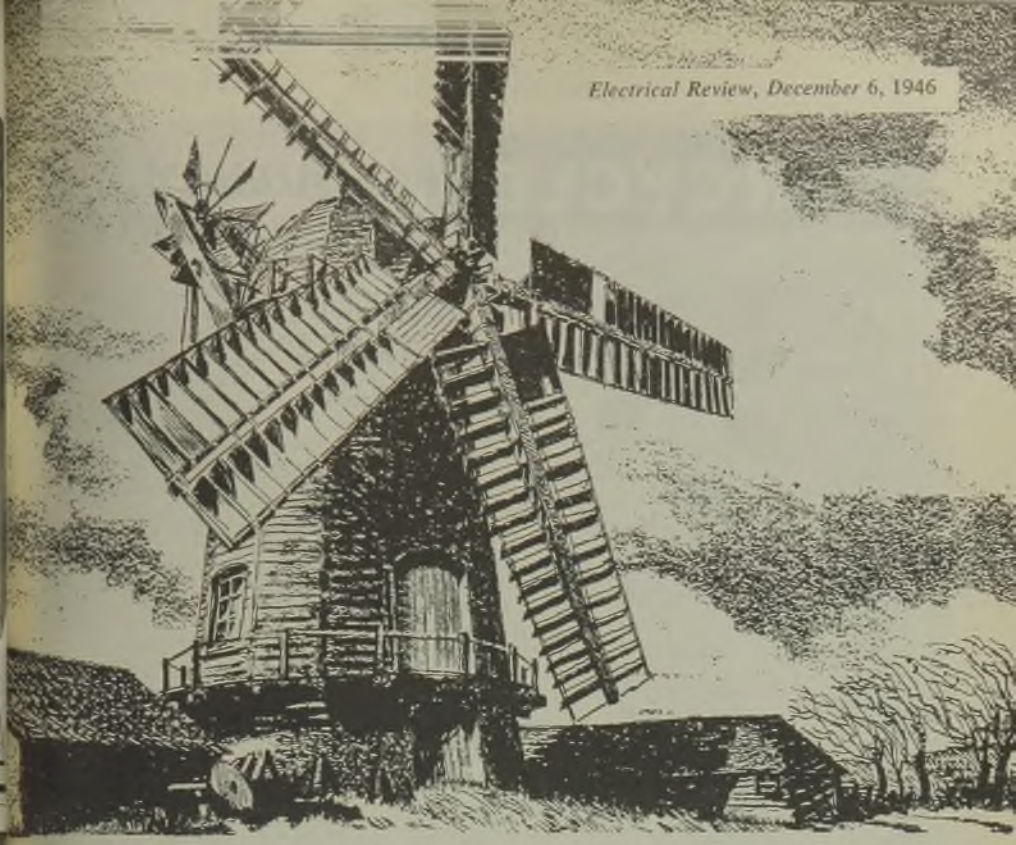

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OVERHEAD
LINE FUSES

Four main applications of the Aeroflex Line Fuse are (*a*) Overhead House Service Fuses. (*b*) Street Lighting points from overhead feed. (*c*) Distribution fuses for Branch Circuits. (*d*) Low voltage protection for pole-mounted Transformers—yet the same basic design is equally applicable to all these duties.

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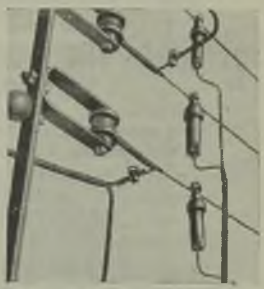

Aeroflex Line Tap type Fuses on a 3-phase 4-wire service tee joint forming house service cut-outs.

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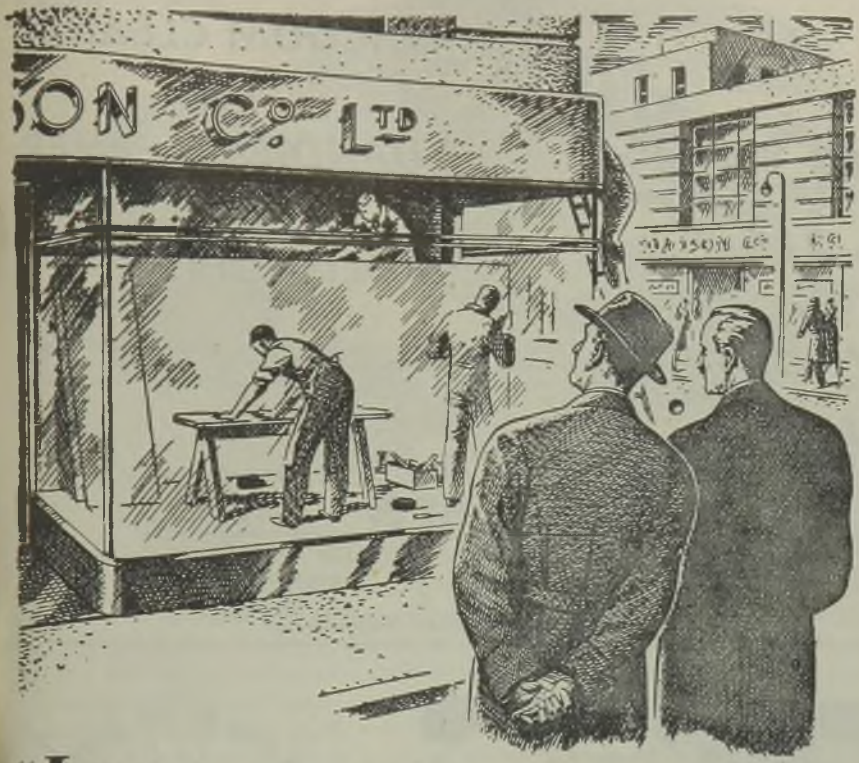

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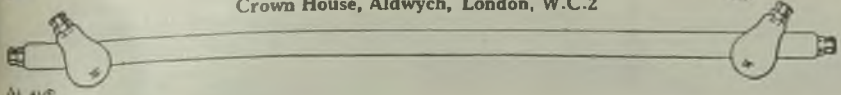

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