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September 15, 1944

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This construction was accepted by Lloyd's Register of Shipping on the 24th May, 1935, and subsequently by all recognised engineering Insurance Companies, the Board of Trade, the Admiralty and the British Standards Institution (B.S.1113 : 1943). This is no small testimonial to the willingness of legislative bodies to alter their Regulations permitting legitimate progress based on sound engineering principles.

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September 15, 1944

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September 15, 1944





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September 15, 1944

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The "Floating Contact" Fuseboard (Patent) is fully described in our F. C. Leaflet.

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24

September 15, 1944



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Their fine smooth finish makes them suitable for fulfilling constructional needs of many different kinds.

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Higgs Gear Units are available with constant or variable speed, in all classes of enclosure.

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> Cord and Copper Braided Type, British Patent No. 339,104 (B.S.S. 708. No. 3)

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The theory of bearing lubrication

HE diagrammatic model illustrated above represents the three dimensional picture of the oil pressure wedge developed by a rotating shaft in a bearing in accordance with the Hydro-dynamic theory of Lubrication. When OSBORNE REYNOLDS proved by mathematics that, given certain conditions, the rotational effect of a shaft in a bearing will generate an oil film that will support the shaft he gave Engineers a positive clue for bearing design. Practice shows that the oil film can be developed in accordance with the Theory, but the maintenance and continuity of this film depends mainly upon the method employed to feed fresh lubricant to the bearing surfaces. POWDER METALLURGY approaches this problem by making it possible to construct a strong bronze bearing with porous walls through which the lubricant can be fed direct to every part of the bearing surface including the point of maximum load. The 'COMPO' oil-retaining bronze bearing made by the Powdered Metal process possesses a microporous structure which is charged with lubricant. Thus the oil supply is retained in exactly the right place to generate, not only the required oil film but to ensure also the maintenance and continuity of it. since the film is superimposed upon. and forms an integral part of the oil reservoir in the body of the bearing. This constitutes a highly efficient method of lubrication 'COMPO solves innumberable bearing problems from slow intermittent or oscillatory motion to high speed rotary motion

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in the Electrical Industry, the pre-war pre-eminence of GENTS' of Leicester will not be forgotten when Peace is once more proclaimed and Industry demands the products they manufacture.



GENT & CO. LTD., Faraday Works, LEICESTER GLASGOW BELFAST DUBLIN



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The M.E.M. factory is ready to turn over its great producing capacity to meet this demand immediately post-war reconstruction begins.

QUALITY IN QUANTITIES — In the self-contained M.E.M. factory electrical gear and equipment of high quality can be turned out in vast



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M.E.M. "Mennoy " Switchforte.

quantities at low cost. This is the New Craftsmanship which maintains high standards by good design and vigilant testing, at the same time cutting out waste by mechanisation and good management.



SWITCHGEAR · MOTOR STARTERS FUSEGEAR · ELECTRIC FIRES

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In 1867 a ship sailed from Glasgow . . . bound for Canadian Shores. With her went a Scot and his family.

The young father was the late T. L. Mollat, who had served his apprenticeship on the Civile and was an expert pattern maker and moulder. Fattern years later, in the small Ontario village of Markdale, the great Cooker business was founded.

A larger factory was soon a necessity, and this was built at Weston, a suburb of Toronto. World-wide connections demanded further expansion, den 1932 a complete manufacturing plant was established at Blackburn, Lancashire, for the production of Cookers and Refrigerators.



In 1867 a ship sailed from Glasgow-

-loound for Canadian shore ... With her went a Scot and his fermion

-bound for Canadian shore. With here seen it Store and his ferrors seeking firsts opportunities in the new seried. The young failure was the late 1. L. Molfast. Boer at Crossford on the Clyde, he served his apprenticeship in one of the basy Clyde foundries. An expect pattern maker and number, be turned to his trade in the new band, and some fifteen years later, with his seas, founded the great cacker human with the set in nume. The small Cattrino vibles of Markdan was the site of the first factory, but the greating since some demonsted a larger field of operation, and a factory was also the set of a subset of Toronto. Development of a set of such a subset of toronto and and for some years new Molfast. Limited have had a complete manufacturing plant at Black and Langester, to provide cookers and entrigerators for the firstich masses.

the founder of Moffats Linuted Throughout its long history, the firm has always been under the active management of the Moffat

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ELECTRICAL REVIEW

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Independent of current, voltage frequency or temperature variations met with in commercial practice.

Low voltampere consumption.

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A.C. SWITCHBOARD-INSTRUMENTS ACCURACY FIRST-GRADE,

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ORDINARY OR TRODICAL PROJECTING, FLUSH, OR CONTROLLER-TYPE

EAD

36

Time flies – Backwards !

A man we know has worked out by means of a slide-rule and a bit of snooping that 351,429 man-hours were lost to industry on February 17th, 1944 by drilling holes with hand drills instead of Desoutter power drills. He says that the result of this immense loss of time was that when the workers came to work next day it was *really* February 18th, 1903. After a bit of a pause while our eyes stopped rolling, we said we thought there was a catch in it. We said wouldn't it be February 18th, 1985. Like British Summer Time, first you put it on and then you take it off. He said, no, it was 1903 like he said and what a terrible waste of time. He said the British were always getting ready for the previous war and this proved it. Well, we wouldn't stand for that so we slung him out and his slide-rule after him. But it's a shaking sort of a thought, isn't it ? And nothing you can do about it because Desoutter Tools weren't invented in 1903.

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C.R.C. 146



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It enables a single measurement to determine precisely the light output and luminous efficiency of any electric lamp; it is just one of many

PHOTOMETER

scientific devices employed in the BTH Laboratories in their unremitting effort to maintain and improve the quality of Mazda Lamps.

BTH RESEARCH AIDS INDUSTRY BTH Research Laboratories have made an intensive study of both the physical and psychological aspects of lighting in wartime industry and their knowledge and experience are at the disposal of the principals of industrial undertakings through the Mazda Lighting Advisory Service.

AMPS LIGHTING ADVISORY SERVICE



The British Thomson-Houston Co. Ltd., Crown House, Aldwych, London, W.C.2.



Managing Editor :						
September 15, 1044	Hugh S. Pocock, M.I.E.E.					
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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER --- ESTABLISHED 1872

Vol. CXXXV. No. 3486.

SEPTEMBER 15, 1944

9d. WEEKLY

Easing the Black-out

Problems for Lighting Authorities

[INTS of an early relaxation of lighting restrictions have been prevalent for three or four weeks and it may thus be said that Mr. Morrison's announcement last week was not unexpected. Nevertheless, the announcement when it came caught lighting authorities unawares for it was apparently made with no prior consultation with them or with other interested bodies. Even the Ministry of Home Security itself seemed to be in a state of indetermination and just about to start considering the implications. The morning of the announcement found the electrical organisations most closely concerned with the matter and local authorities wondering what it was all about and clamouring at the Ministry for something tangible to work upon.

Indefinite Compromise

But even now a great deal of uncertainty exists. It was widely thought that when relaxation came it would be of a "total" nature-at least where central control of lighting was employed and in the "safer" areas. Actually it has been decided to institute a halfway stage (or rather less than halfway) and this has naturally presented lighting authorities with a pretty problem. They are now torn between anxiety to satisfy the public desire for as much light as possible and reluctance to embark on expenditure which may prove in a very short time to have been unnecessary. Added to this is the difficulty of finding labour to carry out the alterations and adjustments required to step up existing starlighting to the new permitted standards

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or to adapt normal street lighting fittings for the purpose.

Moreover, it seems as though there is to be no general ruling but that each authority's case will be considered separately. A great deal of dissatisfaction is likely to be engendered by this procedure.

Possible Dangers

It was stated by Mr. Morrison that where street lighting was controlled by a master switch a standard " comparing favourably with much of the pre-war street lighting be allowed; apparently the would maximum permitted will be 0.2 ft.-candle at ground level. This will be a considerable improvement on the 0.0002 ft.-candle of "starlighting" and it raises a question. The lighting must be switched off in the event of an air-raid warning. So that, unless it is backed up by an emergency system, there will be a sudden black-out which may prove dangerous to traffic and pedestrians. This prompts the suggestion that possibly there would be no greater danger (from the air-raid point of view and as regards a sudden cut-off) if normal lighting were permitted; its restoration would certainly eliminate much present and future trouble.

Indications of the position in some of the larger centres of population are given on another page. As the change is timed to begin on Monday and popular demand for more light is likely to be insistent it is to be hoped that by the time this issue appears the Ministry of Home Security will have issued definite guidance for the authorities who will have to meet the demand. In the meantime they can call upon their lighting fittings suppliers for help in making the necessary arrangements for effecting the improvement. But with so many authorities to attend to these suppliers are likely to be overwhelmed. We can only hope that this intermediate stage will almost immediately be followed by the restoration of full lighting and consequent relief from all the present uncertainty as to what may and what may not be done.

Hopes and Realities

HIGH hopes for the near future are being raised by reports, plans and exhibitions and it is no doubt

right that a much better future should be visualised. But with our heads in the air we must still keep a firm footing on the earth and realise that we are not starting de novo and not even from where we left off in 1939 and 1940. During the war years we have accumulated arrears of maintenance and replacement work which cannot be ignored. Much of the existing equipment will have to be scrapped but much more will have to be made good to meet the immediate requirements of the after-war years. Again, for providing new appliances we must make the best use of the production plant which still exists until we are in a position to replace it by something better.

BUT having due regard to these considerations it **Prototypes** is essential that thought should be given to new and improved designs for production as soon as circumstances permit. Some time must elapse between the conception of a new appliance and its appearance on the market during which much thought and work must be put in by designers, draughtsmen, development engineers and works managements. Most of these are still engaged in work connected with the war but there is a feeling among manufacturers that the attention of some of them could be diverted to this essential peacetime work without prejudice to the war effort. It is believed that while materials could easily be made available (for in any event the quantities are comparatively small) the Ministry of Labour is reluctant to permit any diversion of "man power" to this object. Manufacturers are making an endeavour to secure permission to proceed with the production of prototype machines Z

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and appliances and are giving an undertaking that war work will not be interfered with.

Electrical Accidents

FROM particulars sent us by the Electrical Branch of the Factory Department, it would appear that

the hope expressed last year, that accidents occasioned by electricity would become fewer as newcomers to industry grew accustomed to their surroundings, has unfortunately not been realised. Nevertheless the total is not altogether disproportionate to an increase of 50 per cent. in the output of electricity since Reportable accidents in factories 1939. in 1943 numbered 1,255 (58 fatal) compared with 1,042 (51 fatal) during the preceding twelve months; these figures do not include cases brought unofficially to the knowledge of the Department. The increase is attributed largely to trivial causes and should have been avoidable with more satisfactory methods of inspection and maintenance. We propose to refer more fully to the subject in our next week's issue.

Overseas Trade Statistics THE resumption of publication of certain United States foreign trade figures raises the question as to whether there is

still any justification on security grounds for complete secrecy with regard to the United Kingdom's imports and exports. With an eye to post-war trade it would be of considerable value to manufacturers to be given what information there is available, even though many important markets are still excluded and conditions are still unstable. It is, in fact, because conditions are so constantly changing that the information would be so much welcomed. The war is moving so fast now that the risk of imparting any information of value to the enemy would appear to be negligible,

South American Trade CONFIRMATION of the fact that most of the South American countries are badly in need of electrical equipment which

they are unable to produce for themselves is provided in a booklet just issued by the Bank of London & South America. Although Argentina has embarked upon the production of some of her electrical

needs (including cables, fluorescent lamps and conduits) there are great arrears of work which will require imported material as soon as it can be obtained. Great Britain is favourably placed in the Argentine market by reason of the goodwill built up over a very long period and for other reasons. Brazil also has very great electrical requirements but it is thought that unless British exporters are in a position to resume trade rapidly after the war the best part of the import business will be secured by American concerns. These two great countries have considerable accumulated dollar and sterling balances which will influence future trade; the dollar balances predominate. It is imperative that the Government should afford every encouragement to manufacturers desiring to resume or commence trade with South America.

IN the removal of "De-Selected" the Ashton-under-Lyne power station from the "selected" list, there is

an illustration of a trend in the evolution of grid interconnection. The plant consisted in 1939 of two 6,000-kW generating kWh per annum. While it may be economical to run relatively small units because they happen to be in existence in order to deal with local peaks, unless the site is suitable for the installation of turboalternators of 30,000 kW and upwards it is not worth while to keep the station on the effective list on the expiry of its useful life. In this view the Corporation concurs and the Central Electricity Board has received from the Electricity Commissioners an amended Scheme (copies of which are obtainable from the Stationery Office) for North-West England and North Wales.

A SERIOUS anomaly of War the War Damage Act, Damage 1943, is that while repairs Payments necessary to restore damaged premises are paid for in full, owners of buildings which have been destroyed or rendered irreparable will receive only the amount of the depreciation in the pre-war value of their property due to war damage. To meet special cases of hardship, it is true, there is a clause which provides that the

War Damage Commission may recommend higher value payments and the Treasury can then, if it agrees, direct the higher payments to be made. The position is very indefinite, however, and consequently the War Damage Committee of the Association of British Chambers of Commerce recommends, among other things, that *all* owners of property who receive value payments should as a matter of right be placed in as good a financial position as if they received a cost of works payment, with due safeguards against unjustifiable claims.

ALL authors, actual and would-be, should read a pamphlet by Mr. George Unwin on "Publishing in

Peace and War" (Geo. Allen & Unwin, 40, Museum Street, W.C.1, 40 pp., price 6d.), and so should all M.P.s. Authors, because it shows very clearly that reputable publishers are not Barrabases but good servants of writers and the reading public; M.P.s because it puts very well the case for better treatment of an industry which deals in ideas in a world which demands the free exchange of thought. Much of Mr. Unwin's exposition and argument can be equally well applied to the publication of technical and trade journals which have also been badly hampered by myopic Government policy. Referring to the export of books, Mr. Unwin asks :---" Is it not more than probable that foreign nations brought up on British scientific text-books would want the British instruments and machines therein described rather than others of which they had not the same intimate knowledge? And is this not equally true in varying degree in other directions than science? Certainly the Germans have acted on this assumption."

> Pylons Ever since the grid was projected electrical purists have discountenanced the

use of the term "pylons" to describe transmission line towers but so far as the public is concerned they have battled in vain and we are surprised to see the point resuscitated in *The Times* at this late date. We suppose that it was unreasonable ever to expect people to use the threebarrelled description and, like the gas people who have to hear their landscape improvers called "gasometers," we shall just have to put up with it. ELECTRICAL REVIEW

High-Voltage Circuit Breaking

MANY attempts have been made to express in precise terms the relationship between inter-

New Air-Blast Design for 132-kV Operation

rupting ability of an air-blast breaker and the factors involved. Insufficiency of information regarding the physical conditions existing in the arc column during the period of zero current make it difficult to arrive at more than general conclusions, and it still remains essential to carry out comprehensive tests to ensure that rated breaking capacities are achieved. Nevertheless, an appreciation of



Fig. 1.—Air flow of nozzle contacts when fully open. Thickness of arrows represents pressure and length represents velocity

the basic principles of arc interruption is of fundamental importance to switchgear designers.

The process of arc extinction consists in the reduction of conductivity of the arc column by many magnitudes and the dielecSeptember 15, 1944

By E. M. Dakin, A.M.C.T., and W. A. McNeill, B.Sc.Tech., A.M.I.E.E.

tric strength of the gap must be restored at a rate greater than that of the increasing dielectric stress

following the current-zero pause. Restoration of dielectric strength in an air-blast breaker is effected by the high-speed scavenging and cooling action of the outflowing high-pressure air through nozzle contacts which result in deionisation of the gap.

For the most favourable conditions of arc extinction, volume cooling, as distinct from surface cooling, of the arc column must be achieved, and for this purpose a high component of air velocity at right angles to the axis of the arc is essential. That is to say, the radial component of the air velocity must be of a high order.

Although the diameter of the arc is a function of the instantaneous value of the current, the diameter cannot become zero at the instant of zero current, as the arc gap remains partially ionised (post-arc conductivity). The remaining arc column must therefore be physically displaced and the efficiency of this displacement is a function of the air velocity in the nozzle.

Results of Investigations

According to the work of many investi-gators, as supported by data obtained by the authors, there is evidence that the breaking capacity of an air-blast breaker is a function of air pressure, nozzle size and circuit severity. Owing to test-plant limitations the exact relationship over the whole range of breaking capacity ratings cannot be proved. Furthermore, there are difficulties in assessing quantitatively for many circuits the factor to be used for circuit severity. The product of MVA and circuit severity may, however, be considered approximately constant within limited ranges of both factors. Rate of rise of restriking voltage has been widely accepted as a measure of circuit severity. The associated voltage peaks must, however, be taken into account, more especially in the case of multifrequency transients. The investigations of the Electrical Research Association into the subject should be of great assistance to the industry.

By suitable choice of contact nozzles that take account of the foregoing principles, air-blast breakers can be designed which are capable of high breaking capacities over a wide range of voltages. There will be however, a maximum fault current, which can be interrupted by a single nozzle of given size.

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The dielectric strength of the gap will also set the upper limit to the voltage which can be cleared for constant conditions of circuit severity and air pressure. For voltages of the order of 66 kV and above, the authors



Fig. 2.-Diagrammatic arrangement of (A) "Duo-Blast" nozzle with two arc roots only, both well outside the effective gap; and (B) two single-nozzle contacts in series, with four arc roots, two of which generate metal vapour within the effective gap.

have found it advantageous to utilise a double nozzle, whereby improved dielectric conditions are obtained in the interrupting gap without necessitating an appreciable increase in the length of the gap. The latter point is of importance, as for optimum performance the gap must be kept within fairly circumscribed limits.

The Duo-Blast Interruptor

The principle of operation of the "Duo-Blast" circuit-breaker described below is illustrated in Fig. 1. In place of the solid retractable contact used in a single-nozzle design, a second hollow nozzle is provided. After separation of contacts the flowing air exhausts equally through each nozzle, thereby subjecting the arc products to both radialand axial-flow conditions. It is apparent that the scavenging action is considerably intensified by the divided blast, whilst both arc roots are initiated in a zone of high velocity outflowing air. A special feature of the design is the rapid transfer of the arc roots to points on the down stream side of the nozzles, thus effectively reducing the quantity of metal vapour drawn into the arc zone, Fig. 2 (A). This advantage is not obtained by the use of two single nozzles in series, as shown in Fig. 2 (B) where elimination of the metal vapour in the gap is only possible from two of the four arc roots.

By careful correlation of gap, nozzle flaring, and nozzle diameters, optimum conditions of air flow are obtained, giving high radial and axial velocity components and at the same time ensuring that the air pressure in the region between the two nozzle throats is still of a sufficiently high value to maintain adequate dielectric strength after current zero. These optimum proportions have been confirmed by exhaustive tests.

A single-phase unit of the 132-kV outdoor



Fig. 3.-Single-phase "Duo-Blast" breaker for 132-kV outdoor service

circuit-breaker which may be mounted either on a framework or on the floor is shown in Fig. 3. Each unit consists of two main vertical porcelain insulator pillars at the top of which is an interrupter head. Each supporting pillar houses a glazed porcelain inlet pipe supplying air to the head, the latter

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being complete with retractable upper nozzle contact, fixed lower nozzle contact, arc probes and exhaust ports. The isolator blade of each single-phase unit moves in a vertical plane and is operated by a vertical porcelain torsional drive, the operating mechanism being at earth potential.

The air reservoir forming the base of each single-phase equipment is of welded construction with inspection openings, and is hydraulically tested to twice maximum permissible working pressure. The main blast valves controlling the air flow to each interrupting head are situated at the base of each pillar and are arranged to facilitate access for inspection and maintenance.

The servo-blast valves are operated by means of an intermediate valve which, together with the main control valves, is located in a kiosk in the supporting framework. The electrical control equipment is in a separate kiosk. Access is provided to all parts which may require inspection and maintenance. Fixed and moving contacts of the interrupter head (Fig. 4) can be dismantled in less than five minutes.

Interlocks are incorporated in the control scheme which have the following functions:— Prevention of circuit-breaker operation at insufficient air pressure; completion of opening and closing operations irrespective of the time for which the operating impulse is maintained; ensuring precedence of closing operation over tripping until the closing operation is complete, the breaker then immediately becoming trip-free; elimination of hunting; provision of time delay to ensure that the isolator opens only after extinction of the arcs in the main interrupter heads.

Test Results

Whilst the performance of an air-blast breaker is in some measure more predictable than that of an oil circuit-breaker, it is essential that full-rating short-circuit tests should be carried out to justify a given rating. Operation in service has justified the reduced test voltages permitted in B.S. 116, Part 2, for oil circuit-breaker ratings exceeding 500 MVA.

The performance of an oil breaker fitted with arc-control devices is greatly influenced by the short-circuit current to be dealt with, whereas the interrupting ability of an air-blast breaker is a function of an independent air supply resulting in entirely different characteristics. It does not necessarily follow, therefore, that an air-blast breaker tested to B.S. 116, Part 2, will perform satisfactorily at the full-rated breaking capacity at full recovery voltage. On the other hand, where multi-breaks are incorporated the total interrupting capacity can be demonstrated by tests on the most stressed break. Careful control of the voltage distribution and also

of the air-flow conditions is, however, important in such designs. The individual breaks are tested at the maximum rated breaking current and at the proportionate recovery voltage of the unit (unit testing).

The significance of circuit severity has already been referred to in connection with

the rating of air-blast breakers and it should be noted that the unit-testing method is also of assistance in taking account of this factor. The rate of rise of restriking voltage across a multi-break design will be reduced across each unit in proportion to the voltage distribution, and advantage can be taken of this when testing and rating the breaker.

The breaker here described has been subjected to many hundreds of making- and breakingcapacity tests. A single phase of the breaker was satisfactorily tested up to the maximum plant breaking capacity of 4 kA with full single-phase recovery voltage of 115 kV, and on a single interrupting head (i.e., one interrupter unit only) short-circuit currents up to 8.3 kA have been interrupted at recovery voltages in excess of that

Fig. 4.-Interrupter head details

A, exhaust cover and cooling stacks. B, complete retracting contact. C, retracting nozzle contact (upper). D, fixed nozzle contact (lower). E, porcelain weather shield protecting finterrupting chamber. F, air inlet and lower exhaust ports at this end

appropriate to the single head. In addition nozzles have interrupted currents up to 16 kA at lower voltages.

Extensive tests have also been carried out at currents ranging from 20 to 400 A and under conditions more severe than could arise in service in order to demonstrate the suitability of the 132-kV breaker for interrupting transformer magnetisation currents.

All the tests have been carried out at the maximum available test-plant severity, and under these conditions a three-phase breaking capacity of 1,500 MVA has been demonstrated. For normal service conditions where the severity will be appreciably reduced, the (Concluded at foot of next page) 53

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ELECTRICAL REVIEW

Welding Load Extensions

Meeting the Requirements of a Large Shipyard

NCREASED output at a well-known shipbuilding yard made it necessary to build a large welding bay. In this connection regard had to be paid to recommendations contained in a memorandum on facilities for shipbuilding issued by a joint committee of the Admiralty and the Machine Tool Control. As the space available for electrical gear was restricted the layout could not conform strictly to the best modern practice, but the compactness and design of the gear supplied made possible a reasonable compromise.

Electricity is supplied to the yard by a public authority through 12,000-kVA trans-formers stepping down to 3,300 V and by 10,000 kVA of existing 3,300-V generating plant arranged for coupling to the mains supply, thus providing for a total load of 22,000 kVA. To limit the short-circuit current under fault conditions, the main distribution busbars were sectionalised.

The existing 3,300-V main distribution system included a number of substations. Further substations, however, were required for housing switchgear for the control of energy from the main switchboard and of transformers stepping down to 440 V three-

High-Voltage Circuit Breaking

(Continued from preceding page)

breaking capacity can be increased to 2,500 MVA within the confines of the existing frame size.

The authors thank the directors of Ferguson, Pailin, Ltd., for permission to publish the photographs and test results, and their colleagues for assistance and helpful criticism.

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phase three-wire or four-wire. Calculations of the short-circuit capacity at the various substations indicated that the new equipment should have a breaking capacity of 100 MVA. The switchgear installed was of the compound-filled vertical isolated type, the protective system consisting of overload releases with time-limit fuses.

Certain of the existing 3,300-V switchgear



Fig. 1,-Circuit for twelve-operator 440/173-100-V welding set

was known to be of insufficient rating to deal with the calculated short-circuit energy due to the increases in plant capacity. The short-circuit energy in these cases was reduced to a safe value by the installation of reactors. New power transformers were required to be interchangeable with existing units which had previously been standardised

at 550 kVA, that rating having been chosen in view of its suitability in dimensions and weight for transportation in the shipyard. No special consideration of the fault value in the 440-V system was necessary before the increases in plant referred to. In the case under review, two transformers of B.E.T. manufacture in parallel were required to



Fig. 2.—Methods of connecting and earthing transformer neutrals to the neutral bar in the switchgear and earth with (a) four-wire and (b) three-wire distribution

supply the m.d. on one section of the works and sectionalisation could not be resorted to.

The 440-V supply from the transformers was controlled by a Crompton Parkinson "Klad" form "A" type switchboard, having a breaking capacity of 25 MVA. The units are of the vertical isolation type, with integral winding gear for isolation and lowering of the switch tank. Full interlocks are provided. Both for transformers and feeder units, overcurrent protection is afforded by series overload coils fitted with adjustable oil dashpots. Earth-leakage indication was also fitted.

Outgoing 440-V circuits are taken to distribution pillars situated at building berths and in the various welding bays. The distribution pillars control 153-kVA twelveoperator welding transformers connected in star/interconnected star and having a phase-

ELECTRICAL REVIEW

to-phase secondary voltage of 173, thus giving a 100-V supply from phase to neutral to the welder's electrode. Cables from the neutral point are connected to the ship or work and those from the phase terminals are taken to a twelve-way plug-in welding distribution box, thus providing for four welders per phase, each having a regulator permitting of variations of welding current to a maximum of 300 A. Phase and neutral cables are spaced to reduce voltage drop. The diversity factor is such that the welding transformers are not overloaded.

It was decided, in view of stoppages likely with full earth-fault tripping, to incorporate only earth-leakage indication by means of a red light on the four- and three-wire board to which a faulty outgoing circuit was connected. Everett Edgcumbe "HS" leakage indicators are used, giving continuous indication of earth faults from 0 to 25 A and closing alarm contacts on any earth fault in excess of 37.5 A. The faulty circuit is then traced by selective tripping, aided by a knowledge of local conditions. The leakage indicator is operated by a current transformer in the neutral earthing conductor.

Flexible Couplings

CONFINED space is often met with when coupling motors to the machines they have to drive, more particularly when a flexible coupling has to be inserted because the latter's overall length is generally greater than that of a solid coupling. This problem should be eased by newly designed link type introduced by Silentbloc, Ltd., Victoria Gardens. Ladbroke Road, Notting Hill Gate, London, W.11, expressly for use when the distance between driving and driven machines is relatively small.

It is composed of two flanges machined to connect the linkages, in each of which are inserted two flexible bushes incorporating preloaded rubber. They are assembled simply by bolting the links to the flanges and any link may be withdrawn without disturbing the flanges, shafts, or machines. They are interchangeable with the makers' standard flexible bushes and flanges may be designed for 3, 4, 6 or 8 links per coupling, being capable of absorbing severe shock and of accommodating considerable misalignment. Wear is avoided by the absence of movement of metal upon metal or of metal upon rubber.

Soft Solders

U SEFUL information about the range of soft solders, flux-cored solders, fluxes, and pastes offered by British Insulated Cables. Ltd., Prescot, Lancs., is contained in a brochure (NSG.9) which describes the constitution of the various types, some of which are patented, and indicates the class of work for which each is most suitable. Advice is given on precautions to be observed in the use of active fluxes by the average operative who may not be too expert, the prime essentials that the unce the choice of fluxes being indicated.

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ELECTRICAL REVIEW

Suspension-Type Insulators

Effect of Earth Capacitance

THE effect of the earth capacitances of the several units By H. J. Booth, Assoc. M.C.T. lt is obvious that e₁ is the greatest voltage and is equal to of the several units

of a suspension-type insulator is such as to prevent the voltage applied between the cross-arm and the conductor being shared equally between the units. The breakdown voltage of the insulator is, therefore, less than the sum of the breakdown voltage of This the units.



Fig. 1

divided by the product of the breakdown voltage per unit and their number. There several methods

and formulæ for calculating the breakdown voltage (given the earth- and self-

are

gives rise to what

is known as string

efficiency, which is equal to the

breakdown volt-

age of the string

capacitances of the units), but most of them involve rather lengthy calculations. The only direct method is to evolve an expression for each individual case. As an example take the string of three units in Fig. 1 with a distribution of capacitance as shown in Fig. 2. The self-capacitances of the insulator units are equal so that the units may be interchangeable, *i.e.*, $C_1 = C_2 = C_3 = C$.

First calculate the induced charges at the joints Z and X. The point Z is the junction of the three condensers joined together, their charges being C3e3, Cde3, and C2e2. But the points Z and X are insulated, and therefore no net charge can gather at these points.

Thus, we can state,

$$C_3 e_3 + C_4 e_3 - C_2 e_2 = 0$$

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Dividing throughout by C, we have $e_3 + Ke_3 - e_2 = 0$ or $e_3 (1 + K) - e_2 = 0$.

The condition at the point X is C_2e_2

C_b $(e_2 + e_3) - C_1 e_1 = 0$. Let $C_b = RC$, then $e_2 + R(e_2 + e_3) - e_1 = 0$. We also have $e_1 + e_2 + e_3 = E$ (breakdown voltage of the string).

Therefore

$$\frac{c_2}{1+K} = \frac{c_3}{1-K} + \frac{c_1}{KK+2R} + \frac{c_1}{KK+1} = \frac{c_2}{E}$$

$$\frac{c_3}{K} + \frac{c_4}{K} + \frac{1}{K} +$$

 $E \frac{RK + 2R + K + 1}{RK + 2K + 2R + 3} = maximum peak$ voltage per unit.

E can now be found as follows, $E = c_1$ RK + 2K + 2R + 3 RK + 2R + K + 1

Applying this method in a practical example, take a string of suspension-type

insulators consisting of three units. The selfcapacitances of each unit is the same and equal to C(say). The earth capacitances (referring to Fig. 2) are $C_d = 0.12C$, $C_b = 0.1C$, $C_a =$ 0·1C.

It is required to calculate the breakdown voltage and efficiency of the string, when the maximum



Fig. 2

peak voltage per unit is not to exceed 30 kV. Here K = 0.12 and R = 0.1

 $\therefore e_1 = E \frac{RK + 2R + K + 1}{RK + 2K + 2R + 3}$ *i.e.*, $30 = E \frac{(0 \ 1 \times 0 \ 12) + 0 \ 2 + 0 \ 12 + 1}{(0 \ 1 \times 0 \ 12) + 0 \ 24 + 0 \ 24 + 0 \ 24 + 3}$ $E \frac{1 \cdot 332}{3 \cdot 452} \dots E = \frac{30 \times 3 \cdot 452}{1 \cdot 332} = 77 \cdot 74 \text{ kV peak.}$

We can now determine the string efficiency as follows :---

77.74 String efficiency $=\frac{17774}{3 \times 30} = 86.4$ per cent.

In writing the foregoing reference has been made to "Electrical Power" (Starr) and "Electrical Technology" (Cotton).

Inter-American Radio Conference

T a conference scheduled to take place in Rio de Janeiro next spring all countries in the western hemisphere will be invited to consider a number of important postwar communications problems, including the revision of the South American broadcasting agreement, the allocation of frequencies operating in the hemisphere and the reorganisa-tion of the International Telecommunications Union. A world conference on communications is expected to take place as soon as the war is over and western hemisphere countries may prepare joint proposals for presentation to that conference.—Reuter (Washington).

ELECTRICAL REVIEW

September 15, 1944

Infra-red Heating

Use of Dull-emitter Elements

HEAT is the manifestation of a kind of molecular motion, By E. C. Malins

which is vibratory; hence it represents transference of energy, made evident by elevation of temperature. Heat radiation takes place from a hot source to a cooler receiver through an intervening medium (air, of poor thermal conductivity) which transmits the energy emitted without materially absorbing it.

It is more efficacious to utilise radiation from beyond the red portion of the solar spectrum, either by employing a wavelength exceeding about 0.8μ , or by "converting" some section of the visible band by interposing light filters to absorb its luminous components. The so-called infra-red light



Sealing press with double bank dull-emitter infra-red heating (Plasticrete, Ltd.)

band has not been very sharply defined. Its emissive intensity varies with the wavelength. The maximum occurs in the green band between the red-yellow and blue-violet, so that the amount of energy absorbed from different wave bands depends upon the physical nature of the substance being heated, which affects its receptiveness of different emanations. Therefore equal amounts of heat radiated for a given time from the same source will not cause the same temperature rise in materials of different kinds. It is thus evident that radiant energy cannot simply be classed as heat.

Its utilisation needs to be properly specified to permit selection of the wavelength band most suited to the material to be treated if efficient heating, or satisfactory drying, is to be accomplished in the minimum of time. For instance, an intensity that will rapidly elevate the temperature of metals may destroy a substance of lesser density such as wood which is water bound to a marked degree, so that its moisture content cannot be expelled quickly by conversion to vapour without harmfully upsetting the compound structure of differently reacting elements. For the dehydration of pottery clays, for example, it is best to choose long wave

radiation that will penetrate the mass and drive the moisture outward, otherwise rapid drying at a high temperature may cause internal steam pressure to crack the priorhardened surface.

For similar reasons it is desirable to pre-heat complicated fabrications like a motor armature of appreciable mass, which is built up of several materials of different thermal conductivities. For this purpose direct infra-red radiation from dull-emitter sources is very suitable, enabling the initial drying to be effected with longer-wave emanations which can be shortened during the final baking period at higher temperature.

The success of rapid heat treatment of this kind can be assured only if the type of radiation is correctly selected and reflected on to the object in an efficient manner. Nondirected emission wastes too much energy, since free radiation is subject to severe loss by convection.

When a heat-ray source is first excited it commences to radiate on a relatively long wave, which becomes shorter as the temperature rises; at

500 deg. C. the first visible indication is noticeable of the emission of red light of very low intensity, the other spectral colours appearing in order (orange, yellow, green, blue, violet) with temperature rise, all of them combining to produce the so-called white light of high-temperature filament lamps. Dull-emitters of the less bright and invisible heating rays minimise the powerfully luminous components, which are wasteful in that they are often a hindrance and sometimes detrimental to heating processes.

When pre-heating the chemical pellets commonly used in the plastics industry, for instance, a powerful source of heat which also furnishes considerable light can injure the upper surfaces, whereas a dull-emitter element will raise the temperature of the mass more evenly throughout without

Removable reflector 700-W drying element and square reflector for closed panel construction

appreciably affecting the outside of the pellets.

An important use of infra-red irradiation is for pre-heating packets of resin-impregnated materials for constructing laminated sheets. One of the latest applications of dull emitters is to the "sealing" of low-density substances employed as the core for "double skin" construction in aircraft manufacture to improve the strength-

weight ratio (Amigo process) as developed in England.

Reflector Design

The reflectivity of surrounds of infra-red ray sources is of material importance. The effectiveness of polished metals improves as the emission wavelength increases. Thus polished copper reflects 48 per cent. of normally incident radiation from a 5,500 AU (yellow and green) source, whereas the same surface will reflect 97 per cent. of the 40,000 AU (infra-red) band from a dullemitter source; 90 per

when suitably lacquered, also gold, rhodium and anodised aluminium are all good reflectors when protected against oxidation.

The shape and design of reflecting surfaces also affect the efficient reception of heating energy. Some objects will require an even distribution while others will need concentration at focal points, both of which can be planned. The various "stages of reflectivity" of the substance being treated must also be allowed for, depending upon brightness of finish, mass, shape and its position in relation to the source of emission, coupled with the latter's wavelength.

The reflectivity of the object being treated will also influence the reception of radiant energy, particularly when protectively coated. Matt black surfaces absorb heat readily whereas glossy finishes and lighter colours generally involve longer drying times, especially when the emitting source is luminous. The thermo-setting variety of synthetic paints and lacquers are most suited to infra-red drying; thickness and degree of transparency are the determining factors.

If lacquer is applied to polished surfaces, as is often the case with scientific instruments, radiation projected on to it will pass through the clear coat and be reflected back from the bright metal, the temperature build-up being very small by comparison with pigmented lacquer finishes that are subjected to luminous radiation. For this class of work the dull emitter 30,000–50,000 AU waveband is recommended.

Section of built-up " tunnel " for rubber vulcanisation, 8.4 kW per section

cent. is the standard value for the 12,000 AU (tungsten filament) lamp band.

Chromium is very suitable for commercial usage with dull-emitter sources in the near infra-red band approximating to three microns wavelength. But copper and silver, A standard convection oven, lagged and closed, requires thirty minutes to reach 300 deg. F. A dull emitter infra-red model of similar shape, size and loading (2 kW) will reach the same temperature in less than three minutes and maintain it steadily with its front



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doors open. Planned reflection facilitates concentrated projection in contrast to the slower convection design, which is merely a non-directive air heater with its uppermost quarter hottest, making uneven distribution difficult to avoid.

Although dull-emitter elements with a maximum temperature approximating to

1,200 deg. K are less abundant sources of energy than tungsten filament lamps underrun at 2,500 deg. K. it has to be remembered that the latter generate a considerable luminous component which little advantage can be taken of because the " black reflectivity of most substances irradiated; also, operators are dazzled by it.

The wavelength dull-emitters may be changed by control of the source. which is not possible with

Treatment " oven " of 2.1 kW for temperatures up to 500 deg. F. tungsten lamps because their glass envelope

out disturbing the

is relatively opaque to the longer waves. electrical connections.

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Greater wattage can be concentrated in a given area without enlarging the heating elements, which can be supported in any position without fear of the filament sagging even for injection without reflective surrounds into the interior of gun shells. The risk of colour scorching is reduced and cemented elements are found to have a much longer

serviceable life than glass lamps.

Infra-red irradiators (Malins patents) are constructed in a variety of shapes by the Modinstal Electric Co., Ltd., with re-flectors of several forms for preheating, stabilising, drying, protectivecoat finishing, dehydration, evaporation, liquefying solids, incubation, germination and the treatment of chemicals.

The reflectors of these can be removed for cleaning simply by unscrewing wing nuts withelements, or their

American Post-War Prospects

ESULTS of an investigation among American manufacturers of electrical and Allied equipment regarding their views on post-war possibilities were reported in a recent issue of the *Electrical World*. Specific questions were put to manufacturers in various groups and the following seems to be a fair summary of the replies.

Producers of power plant and equipment expect to be able to commence deliveries as soon as priority restrictions are removed. Most of them hope to get into full-scale production in less than two months, except in the case of circuit-breakers and domestic appliances. In fulfilling orders preference may have to be given to old customers and excessive orders will be

Unless control is continued prices will rise, although competition may be expected to prevent them going too far; uncertainty exists regarding post-war taxation policy.

With few exceptions the production of pre-war models will be resumed. A notable exception to this general rule, however, will be lighting fittings in which there will be discon-tinuance of old designs and many improvements. Generally, while there will be improvements in the design of appliances little that is radically new is contemplated. Tooling and skilled labour shortage is expected to delay the pro-duction of many new peacetime products.

Nevertheless many new devices are ready and will be put on the market as soon as the necessary materials are available: others will probably be delayed for as much as three years.

It is not expected that many of the wartime substitute materials will be continued in use although some synthetic materials which have proved to be superior to the originals will be retained, particularly in the wire and cable industry. Some of the new alloys will also be embodied in post-war products. There is expected to be a much greater, use of light metals and plastics at a later date. While attempts will be made to standardise

and simplify products most of the manu-facturers adopt the attitude that the customer is entitled to have what he wants. It is thought. however, that fewer types and sizes of domestic appliances will be available owing to the need special designs. Indeed it is considered that these should be discouraged by the quotation

There appears to be general optimism as to the outlook. Much better business than before the war is anticipated. It is expected that some of the Governmental controls will be maintained for a time to prevent over-production and runaway prices. A great many manufacturers runaway prices. A great many manufacturers appear to favour this continued control, at least until the initial rush is exhausted.



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ELECTRICAL REVIEW

Institution Centres-I

Biographies of the New Chairmen

THE chairman of the South Midland Centre of the Institution of Electrical Engineers for 1944-45 is Mr. F. W. Lawton, chief engineer and manager, Birmingham Corporation Electric Supply Department. Mr. Lawton is a native of Audlem, Ches., where he was educated at the Grammar School before going to Ruther-ford and Armstrong Colleges, Newcastle-on-Tyne. After serving an apprenticeship with C. A. Parsons & Co., Ltd., at their Heaton

Works he went in 1912 to Stoke-on-Trent where for two years he served as mechanical assistant to the city electrical engineer. For the last thirty years he has been with the Birmingham undertaking, starting as constructional assistant and becoming special technical assistant to the city electrical engineer in 1930, chief assistant engineer in 1932, deputy chief engineer and



Mr. F. W. Lawton

manager in 1940, and "chief" last year on the retirement of Mr. F. Forrest.

In 1938 Mr. Lawton was awarded the Ayrton premium by the I.E.E. for his paper on "The Design and Operation of Hams Hall 'A' Power Station." He is also a member of the Institution of Mechanical Engineers.

For the past twenty-five years Mr. John Cormack, the next chairman of the Mersey and North Wales (Liverpool) Centre, has been engaged in technical education. From 1919 to 1926 he was lecturer in the mechanical en 1926 he was lecturer in the mechanical engineering department of the Heriot-Watt College, Edinburgh, and for the succeeding five years he was the responsible lecturer in electrical



Mr. J. Cormack

engineering at the chesterfield Technical College. In 1931 he became head of the electrical engineering department at the City College, Technical College, Liverpool, leaving that post in 1939 to take up his present position as principal of Bootle Municipal Technical College.

Mr. Cormack, who is a strong advocate of part-time day classes for apprentices, was born in Glasgow and

received his technical education and training on the "sandwich" system at the Royal Technical College, where he was awarded the college associateship and obtained the B.Sc. degree of Glasgow University. Further experience was gained during a year spent in the maintenance department of the Singer factory at Kilbowie. Besides his educational work Mr. Cormack's

activities include membership of the advisory committees on telecommunications and electrical installation work of the City and Guilds of London Institute. For many years he has been on the Councils of the Liverpool Engineering Society and the Association of Teachers in Technical Schools.

Mr. John Morgan, chairman of the Western Centre for next session, is at present chief regional engineer, S.W. Region, G.P.O., stationed at Bristol, but on October 1st he is taking up a new appointment as chief regional engineer and deputy to the regional director, Wales and Border Counties

Region, G.P.O., with headquarters at Cardiff.

Born at Sheerness in Kent, he was educated at H.M. Dockyard School in that town and served as an engineer apprentice at the dockyard from 1904 to 1910. He then went to the Royal College of Science, South Kensing-ton, of which he holds the associateship, and



the Imperial College of Science and Technology (City and Guilds of London). He is a Whitworth Exhibitioner. Since joining the G.P.O. in 1913 Mr. Morgan has held positions as assistant engineer at headquarters and Exeter (1913-29), executive engineer, Exeter (1929-34), assistant superin-tending engineer, Glasgow and Bristol (1934-38) and superintending engineer, S.W. District and Bristol (1938-39).

The North Midland Centre's next chairman is Mr. Edgar Lunn, who at the end of last year retired from the position of borough electrical engineer of Huddersfield but continues to serve in a consultative capacity. Mr. Lunn was born at Huddersfield in 1878, received his

technical education at the Technical College there and after a period of training in mechan-ical and electrical constructional engineering he was in 1900 appointed junior assistant in the Corporation Electricity Department. Between then and his appointment as "chief" in 1937 he successively held the positions of charge engineer, station superintendent and deputy borough electrical engineer.

In his younger days Mr. Lunn visited many electrical engineering works and power stations in Berlin and other parts of Germany in con-nection with a paper he read before the I.M.E.A. on "Condensing and Water Cooling Plants."



Mr. E. Lunn

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More Light

Relaxation of Black-out Regulations

LAST the Minister of Home week Security (Mr. Herbert Morrison) announced the Government's decision Security to alleviate the black-out as from September 17th when double summer time comes to an end. Except in a few coastal areas it will be no longer necessary to black-out windows; they need only be curtained sufficiently to prevent objects inside the building from being distinguishable from outside. If a raid warning is given, however, lights must be switched off or proper black-out arrangements reverted to. Restrictions on motor-car and cycle lamps are also to be eased.

As regards public lighting permission will be given to local authorities to raise the intensity considerably and the lighting of docks, shipyards and railway establishments will also be improved.

It has been difficult to secure definite guidance in connection with the matter of street lighting. In his statement Mr. Morrison said that where it was controlled by a master switch and could be immediately extinguished on receipt of an air-raid warning a standard "comparing favourably with much of the pre-war street lighting" would be allowed. Where street lighting was not so controlled a standard "roughly equivalent to pre-war side-street lighting" would be permitted. In all cases light would have to be cut off horizontally.

Permitted Illumination

Seeking some more specific particulars of these apparently rather wide concessions we are led to believe that the permitted maximum illumination at ground level will be 0.2 ft.candle where lighting is centrally controlled and 0.02 ft.-candle in other instances. No public announcement is being made yet as to which areas may be illuminated and which may not. In those areas which are generally precluded from adopting the higher standard applications from individual towns for permission to light up to the extent now permitted will be considered on the merits of their particular cases.

Adaptation of existing lighting equipment to provide the permitted illumination will be a matter for arrangement between the local authorities and their suppliers of lighting fittings. Members of the Electric Light Fittings Association have been acquainted with the technical requirements and are thus in a position to give advice and practical assistance. Generally speaking, the adaptation of existing street lighting fittings will be based on BS / ARP 20 and 21 for the 0-02 and 0.2 ft.- candle levels respectively. So far as "starlighting" is concerned (BS/ARP 37), the necessary adjustments can be made fairly easily.

We are informed that the materials for the work will be generally available and that stocks of low-wattage lamps are satisfactory. As a rule 15- or 25-W lamps will be needed, although larger sizes are required in some cases. For fuel economy reasons the use of low wattages is to be preferred.

Reports from Principal Centres

The relaxation has found local authorities in varied states of preparedness or otherwise, and Press Association correspondents have provided brief indications of the position in the principal cities and towns.

No general statement can be made about London for the many authorities concerned all have their own arrangements which differ considerably even in adjacent areas. It will be remembered that the London and Home Counties J.E.A. recently appealed for coordination in the resumption of street lighting in London, but there has been too little time for this to have had effect.

The city surveyor of Birmingham has stated that while the city was prepared to restore, in a large measure, normal peacetime lighting, a modified standard would present them with a difficult problem. There was no central control; in fact, three-quarters of the city's 40,000 street lights were gas.

Mr. J. Sellers, the lighting superintendent at Manchester, said that arrangements for improved street lighting were already in hand, but the standard would not be comparable with the peacetime lighting although an improvement on "starlighting." They were handicapped by a shortage of labour and materials and the work would take some time.

Glasgow has central control for over 21,000 electric street lights; the balance (about 14,000) are gas lamps. Preliminary arrangements have already been made for changing over to brighter lighting.

Bristol has been ready to improve street lighting for some time. It will be possible to adapt the existing "starlighting" for the purpose and if even more lighting is authorised the city will be able to fit higherwattage lamps to all the standards within three weeks.

The opinion of Mr. J. F. Colquhoun, Sheffield lighting engineer, is that it is not worth while introducing anything between the city's existing "starlighting" system and full normal lighting. The Watch Committee

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has decided not to do anything which involves a new type of fitting in view of the probable early resumption of full lighting.

At Leeds the electric lighting in the main streets in the centre of the city is controlled from a central point and the only problem facing the lighting department is the shortage of labour for replacement of lamps. Labour shortage will also delay improvement of the gas lighting in minor streets in the centre of the city and surburban main roads.

Mr. G. Whitaker, city engineer, has stated that in Cardiff's main streets electric lighting will go on as soon as the order takes effect, but much repair work will have to be done before lighting can be restored in outlying districts and there is a shortage of labour.

Although Newcastle-on-Tyne is without central lighting control Mr. H. C. Godsmark, general manager of the Electricity and Transport Departments, states that a simul-taneous "emergency" extinction of street lights could easily be arranged.

Mr. J. Eccles, the city electrical engineer

of Liverpool, says that the normal lighting on a number of the city's main roads is ready to be put into operation and that the modified lighting in the centre of the city can be improved immediately and extended.

In Derby, according to Mr. F. H. Pooles, borough electrical engineer, although the lighting in several of the main streets is centrally controlled it is not possible to switch them off suddenly because many special fittings-street bollards, shelter signs, etc., are on the same circuit. The "star-lighting" is to be stepped up to the new level authorised as soon as possible.

Chester has a starlighting system without central control and Mr. S. E. Britton, consultant electrical engineer and manager, has stated that it was hoped to have the permitted increased lighting in operation by September 17th.

Another "starlighting" town, St. Helens, hopes to have all the fittings adjusted to meet the new regulations in good time.

Stoke-on-Trent Jubilee

Reminiscences of Early Operations

A chambers, Kingsway, Stoke-on-Trent, last week the City Electricity Department celebrated the completion of fifty years of public electricity supply. Councillor W. Hancock, chairman of the Electricity Committee, presided and besides members of the Committee there were present a few guests representing the Corporation committees and departments and others closely associated with the work of the undertaking.

More particularly, the jubilee was that of the More particularly, the judnee was that of the Hanley undertaking which was absorbed when the county borough of Stoke-on-Trent was constituted in 1910. In Hanley the supply was commenced on July 1st, 1894, while the neigh-bouring boroughs of Longton, Stoke and Burstem followed rather belatedly in 1901, 1904 and 1905, respectively

A commemorative brochure relates that the system of supply which was adopted in Hanley half a century ago was single-phase, 100 cycles. Electricity was generated by steam engines in a small station in Park Road and 2,000-V feeders were laid to small transformer substations (mostly underground) in the centre of the town. Of one of these substations H.M. Inspector of Factories wrote in 1906 "Under existing cir-cumstances the chamber is not safe for anyone to enter unless the pressure has first been cut off from the outside."

The price charged was originally 6d. per kWh. Consumers pressed for this to be reduced, and in 1897 the maximum demand system was introduced, with an initial charge of 6d. and a follow-on rate of 3d. This little-understood system gave rise to considerable controversy, one complaint being that it unduly favoured public houses—long-hour users in those days. The systems later adopted in the other three undertakings were DC and only suitable for small loads in a small area, so that when they

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were taken over each had a system of strictly limited utility. The new Electricity Committee, under the chairmanship of Alderman H. Leese, J.P., who is still a member (the only survivor of the original committee), profited by experience of the past and proceeded to build a new central power station to serve the county borough as a whole; this station was in 1930 transferred to the North-West Midlands J.E.A.

From the central power station 6,600-V feeders were laid to the four separate works and a three-phase system of distribution commenced. By 1933 the single-phase system in Hanley had disappeared and so, by 1938, had the DC systems in the other towns. Tunstall had a supply from Burslem while Fenton, which Arnold Bennett did not include in his "Five Towns," had no public electricity supply before federation and was then provided with a three-phase system at the outset.

About the time that the change-over was completed work started on the laying of 33-kV trunk feeders. Two had been finished before the war, at the outbreak of which further develop-ment had to be stopped. Two other schemes projected are a 33-kV feeder from Burslem to Newcastle (Staffs), and from thence back to Stoke (constituting a ring main), with a similar feeder from Stoke to Longton.

From the formation of the amalgamated undertaking up to 1940 the late Mr. C. H. Yeaman directed its affairs as chief electrical Yeaman directed its affairs as chief electrical engineer (he had previously held the same position at Hanley). On his retirement he was succeeded by Mr. H. L. Mills as electrical engineer and Capt. T. Lockett, O.B.E., as manager, both of whom had previously served under Mr. Yeaman for many years. In giving the toast of "The Staff" Mr. P. E. Banks paid a tribute to their part in the successful development of the undertaking and referred to Mr. Mills's impending retirement.

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CORRESPONDENCE

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

Plugs and Sockets

AITH, as distinct from logical conviction, has been defined as the capacity to believe that which is known to be untrue. In spite of all that has been pub-lished, supporters of BS. 546/1934 are still to be found who believe fervently that three different sizes permit interchangeability, notwithstanding the known fact that some authorities have standardised on 5-A plugs, others on 15-A and quite a lot on mixed 2-A, 5-A and 15-A

The enthusiasts for BS. 546 raise their hands in horror at the idea of obtaining real interchangeability by washing out these three anachronisms and introducing one new size, viz., 3-kW, which is not much larger than the existing 2-A. There are some who have an idea that one size is better than three, but their fidelity to BS. 546 is such that they fall into the error of thinking that something beneficial would be accomplished if the existing 5-A size were up-rated to 10-A. We all know that a great many 5-A plugs will not carry 10-A, but, leaving all technical considerations on one side (and there are many), what would the position be if the upraters had their way? Some authorities would use the up-rated 5-A. Others who do not believe that the largest class of consumer should be limited for ever to apparatus of a maximum rating of 2 kW would use 15-A, and many who study appearance, together with all cheapjacks, would use as many 2-A as possible mixed with the larger sizes. We should be worse off than before.

I have purposely left out the question of a fuse at the plug point because the position of the up-raters is untenable even without the introduction of a fuse

London, E.C.4. R. AMBERTON, Director, Dorman & Smith, Ltd

Compressed-Gas Insulation

LTHOUGH I have not read the paper presented by H. M. Hobart before the American Institute of Electrical Engineers, the letter from Mr. Theodore Stevens in your issue of September 1st calls for some comments.

Assuming that the major part of electrical energy used in industry would be at a frequency of the order of, say, 1,000 cycles per second, then commencing from the generator end this would necessitate the building of alternators having outputs of the order of 60 to 100 MW operating at this frequency. The construction of rotors for alternators of the foregoing outputs and frequency would alone be a most difficult problem. Furthermore, the transmission of large powers at high frequency has obvious disadvantages from the aspects of voltage regulation.

other hand, assuming that the On generators and transmission are to remain at existing power frequency and that the energy is to be utilised at high frequency, then the only transformers operating at high frequency would be those at the consumers' end of the lines, and each transformer or group of transformers would have to have an associated frequency changer. The reduction in material in each consumer's high-frequency transformer would be far outweighed by the amount of material and in the cost of and attendant maintenance charge of its associated frequency changer. In addition to the foregoing, although high-frequency power has a limited application in industry, there are obvious disadvantages in the utilisation of power by means of high-frequency induction motors.

Mr. Stevens also mentions a possible core operating temperature for compressed-gas insulated transformers and quotes 300 to 325 deg. C. Surely the problem of obtaining an insulation capable of withstanding both high voltages and temperatures of the above order would be very great. Northwich. A. BERMAN, A.M.I.E.E.

Proposed Durham Station

R EFERENCE to the proposed £3,500,000 power station to be built at Kepier just outside Durham City by the North-Eastern Electric Supply Co., Ltd., was made by Mr. W. H. Rowell, M.I.Chem.E., of Birmingham, when addressing the Newcastle-on-Tyne Section of the Society of Chemical Industry.

Mr. Rowell stated that an objection to the plan was that it would waste millions of tons of coal during the next few years. The new station would convert about a quarter of the coal into

electricity, but the remainder would be wasted. If the station were moved a few miles across the county it could use the waste heat, unwanted gas, unsaleable coke and pitch from coke ovens as fuel. Mr. Rowell asserted that Britain could not afford to export raw coal. Coal products were of higher national value when made into high-priced chemical products. He urged that coal should be carbonised at the pithead to make suitable coke, stripped fuel gas, electric power from cheaper fuel, and raw material for chemical and plastics manufacture. The speaker said that if half of Britain's require-ments of petrol and lubricants were imported as crude petroleum and refined in this country another varied supply of raw materials would become available from the by-products,

PERSONAL and SOCIAL News of Men and Women of the Industry

WE learn that Mr. Norman Elliott, the borough electrical engineer of Gravesend, has been appointed lieutenant-colonel in the Royal Engineers to carry out some important the reason of the theorem of the theorem of the

work in France for the Army and Navy. He has been granted leave of absence for the purpose by the Gravesend Corporation. It will be recalled that Mr. Elliott was recently appointed to succeed Mr. A. E. McKenzie as borough electrical engineer of Wimbledon. He was expecting to take up his new duties in three months' time and still hopes to do so.

On September 8th. Mr. A. Andrews completed fifty years' association with F. Reid, Ferens & Co. He joined the firm as an apprentice and upon the retirement of Mr. Frank Reid he took over his interest and continued in partnership with the late Mr. W. H. Ferens and the late Mr. J. H. Love until 1934 when it was formed into a company. He was then appointed chairman and managing director which positions he still holds. Mr. Andrews is one of the original members of the Electrical Contractors' Association which was formed in 1904. He became a M.1.Mech.E. in 1902 and an A.M.I.E.E. in 1918.

A.M.I.E.E. in 1918. The firm of F. Reid, Ferens & Co. can be considered one of the oldest electrical engineering firms in England. It was founded in 1876 by the late Mr. Frank Reid who was an employee of the A.B.C. Telegraph Co. and went through the siege of Paris during the Franco-Prussian War; upon his release he joined the Engineering Section of the Post Office which had taken over the A.B.C. Telegraph Co.

Mr. F. R. Stagg, M.I.Struct.E., assistant managing director of Thos. W. Ward, Ltd., since 1938, has been appointed a joint managing director of the company. Mr. H. W. Secker, who has been a director since 1938, has been appointed an assistant managing director.

Mr. E. B. Sawyer who has been acting manager of the Lighting Service Bureau, Savoy Hill, W.C.2, for some time past has now been



Mr. E. B. Sawyer

appointed manager in succession to the late Mr. H. Lingard. Mr. Sawyer has been a member of the Bureau staff for many years and to him has fallen the main task of adapting the organisation to wartime needs. He has also been active in the industrial lighting field in connection with the National Industrial Electric Lighting Service which, with its headquarters at the Bureau, has done much valuable

work in improving lighting standards in wartime factories. Apart from his work at Savoy Hill Mr Sawyer has been an enthusiastic Home Guard: he is senior training officer, with the rank of captain, in a Middlesex Battalion. The recent relaxation of lighting restrictions

marks the beginning of a new lighting era and opportunities for bold development giving Mr. Sawyer ample scope for the exercise of his experience and abilities.

Mr. H. Dobson has been appointed temporary electrical engineer to the East Grinstead Urban District Council in succession to the late Mr. J. B. Morgan.

Mr. Frank G. Quance, A.M.I.E.E., manager of the accessories department of the General Electric Co., Ltd., last month completed fifty years' continuous service with the company. To mark the occasion Sir Harry Railing, chairman, and Mr. Leslie Gamage, vice-chairman,

of the company, presented him with a set of matched golf clubs as a token of their esteem. It is an interesting

It is an interesting fact that Mr. Quance is the only remaining member of the company's original engineering department which, at that time, operated at 71, Queen Victoria Street, with works in Upper Thames Street, where he received his early training. In 1903 Mr. Quance was selected by Mr. Hirst (the late



Mr. F. G. Quance

Lord Hirst) to take up an appointment in the Cardiff area, and, after representing the company in Bristol for two years before the opening of the Bristol branch, he returned to the Cardiff branch of which he was later appointed manager, and in which capacity he served up to the year 1913.

From that time to 1926 Mr. Quance served in various administrative positions at the Liverpool, Sheffield and Manchester branches, being then appointed to his present position at Magnet House. It is in no small measure due to his energy and resourcefulness that this department has developed into one of the most important in the G.E.C. organisation.

Mr. Quance is a member of the Association of Supervising Electrical Engineers and served on the executive council for some time. During the past twenty-five years he has been responsible for a large number of patents and designs mainly concerned with electrical accessories and wiring devices. He has served as a member of numerous B.S.I. committees and panels and is still an active member of the Standing and Technical Committees of B.E.A.M.A. (Accessories Section).

Mr. W. J. Markham, who is retiring from active business, has decided not to offer himself for re-election as a director of Berry's Electric, Ltd., at next week's annual meeting.

Mr. E. R. Hudson, the newly-elected national president of the Institution of Mining Electrical and Mechanical Engineers, began his official tour of the branches on September 2nd by attending a meeting of the Midland Branch, of which he is a member and was for over thirty years hon. secretary. This, the opening meeting of the session, was held at the Mansfield Technical College, Mr. T. M. Muirhead presiding in the absence, through illness, of Mr. J. W. Wright, the branch president. After Mr. Hudson had addressed the members on "Certification," the branch president's address on "Retrospect and Prospect" was read by the secretary.

Major R. W. Anderson, B.Sc., the newly elected president of the North of England Branch of the Association, served in the Tyne Electrical Engineers in the last war and was twice mentioned in despatches and awarded the M.C. Major Anderson is in practice in Newcastle as a consulting mining engineer.

Mr. E. Cope, manager of Chatterley Whitfield Collieries, Ltd., is the new president of the North Staffordshire Branch.

Alderman William Bird, J.P., M.I.E.E., an ex-Mayor of St. Albans, and managing director of the Engineering & Lighting Equipment Co., Ltd., was married at Ayr Old Church on Tuesday, September 5th, to Miss Elizabeth Macdonald, formerly of Ayr, and a director and secretary of the same company.

Among the numerous presents were an antique silver coffee service and salver from the staff of the company and two entrée dishes and a sauce boat from the works personnel.

Owing to illness, Mr. E. W. Johnston is resigning from the position of joint honorary secretary of the Diesel Engine Users' Association, in which capacity he has for a considerable time past dealt with the secretarial work connected with the Association. For twenty-six years he has taken a prominent part in the affairs of the Association, of which he is an honorary member and past-president. He is succeeded as secretary by Mr. Hamish Ferguson, who for some months has been assisting him in the work. Mr. Johnston's many friends will be glad to know that he is making a good recovery.

Sir Felix J. C. Pole has been elected chairman of Ferguson, Pailin, Ltd. Mr. H. C. Pierson and Mr. J. S. Ramsden have been elected directors.

Major General K. C. Appleyard, O.B.E., M.I.Mech.E., has accepted an invitation to become president of the Junior Institution of Engineers for the 1944-45 session. Sir Maurice Denny, Bt., C.B.E., the retiring president, will induct Major General Appleyard at a meeting to be held in the Institution Lecture Room on December 9th.

Councillor John Minto has been nominated as Leicester's next Lord Mayor. In 1924 he became vice-chairman of the Electricity Committee and since-1931 he has been chairman. He also served on the East Midlands Electricity Advisory Board, which was dissolved in 1942.

In a talk on "Modern Electric Light Sources" before the Coventry Electric Club on September 5th, Mr. R. O. Ackerley (General Electric Co., Ltd.), past president of the Illuminating Engineering Society, sketched the progress in development which had been made during the last twenty-five years.

Mr. Harry Bell, chief engineer with the Post Office at North Shields, has retired after more than forty-six years' service. Mr. Bell, who went to North Shields from Newcastle-on-Tyne in 1902, was awarded the British Empire Medal for gallantry during an air raid on North Shields in 1941 when he carried out telephone repairs to keep the Civil Defence lines open. He has also received the Imperial Service Medal. His colleagues have presented him with a gold watch and a wallet of notes.

Mr. E. H. Jones, of the Liverpool Electricity Department, has been appointed generation engineer at the Tir John power station of Swansea Corporation at a commencing salary of £802 per annum.

Appointments Vacant.—In this issue the Swansea Corporation is advertising for a deputy chief engineer for the Electricity Department (salary £900-£1,100). Other appointments offered include power station superintendent for the West Midlands J.E.A. (£654); engineer and general manager of the Hutt Valley (N.Z.) Electric Power Board (not less than £1,000); and electrical engineer for the Nigerian Government Public Works Department (£600-£840-£1,000).

Obituary

Mr. W. H. Wilson.—We have learned with regret of the death at the age of sixty-six of Mr. William Hamilton Wilson, M I.E.E., whose name will be familiar to many who served in the 1914-18 war as the inventor and manufacturer of the Wilson wireless receiver with which some army formations were equipped. He did valuable research work upon the induction coil, described in part in his Royal Society paper in 1912, and this led to the development of other apparatus for generating high-tension discharges, which he adapted both to wireless telegraph sets and to portable X-ray apparatus. In addition, he was the patentee of various improvements in the manufacture of condensers, transformers, and thermopiles.

Mr. A. G. Seaman.—We regret to learn of the death as the result of an accident on September 7th of Mr. A. G. Seaman who for twenty-seven years had been a member of the staff of the British Electrical and Allied Manufacturers' Association. He was seventy-four years of age.

Mr. A. R. Edwards.—The Australian journal Erda reports the death, following a heart attack, of Mr. A. R. Edwards, former commercial manager of the Electric Lamp Manufacturers' Association in Australia.

Will.—The late Mr. P. Hamilton, electrical instrument manufacturer, left estate valued at \pounds 35,979 (net personalty \pounds 35,221).

Sub-Metering Companies

IN New York there are about fifteen large "submetering " companies which purchase energy and retail it to the ultimate consumers said to number 300,000. Recently the Office of Price Administration has been investigating the practices of these companies after refusing them permission to raise their prices following automatic " coal clause " increases in the power producers' charges.

The O.P.A. maintained that the companies were selling a "commodity" and not a "service" and consequently came within the scope of the Emergency Price Control Act.

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ELECTRICAL REVIEW

Lamp Publicity

Further Arrangements for the 1944-45 Season

A^S in previous years, the "Osram" lamp campaign will embody a comprehensive scheme of advertising as well as a dealer service which includes the provision of attractive window display material. The advertising programme will embrace all the national and provincial newspapers, morning, evening and weekly. In addition there will be a subsidiary programme of advertising which will cover not only the popular magazines and the Press of all religious denominations but also the technical trade Press of every industry. Two window displays will be available to dealers and despite the limitations on all kinds of material these showpieces are



"Osram " display forming window centre-piece

simple, colourful and bold. The dominant feature of each display (there is a choice of two) is a centre-piece about 48 in. by 36 in., gaily coloured and appropriately worded. Arrangements for the installation of these displays and for the distribution of all display material are in the hands of the G.E.C. dealer service.

The production of advertising showcards and display pieces such as were associated with "Cosmos" and "Metrovick" lamps in the pre-war years is still prohibited. A new edition of the now familiar orange coloured price list L.S. 4102/26 has been prepared, however, and will be distributed as far as the regulations allow. It contains information on lamps of all the general types from the ordinary vacuum and gasilled to miners' safety lamp bulbs and includes Il types of electric-discharge lamps. A number of folding window display units made before the war are still available and will make a most effective display.

Metrovick fittings of all types for industrial lighting are described in the wartime folder 7102/44, and, for full peace-time lighting, the "Trafford" lantern leaflet 7102/31 describes in detail a street lighting unit which is especially designed for the illumination of first-class roads. These two leaflets can only be obtained by specific request. "Metrovick" fluorescent lamps and fittings are described in the most recent issue of 7102/36X, which includes the latest develop-

ments in control gear and other equipment. The demand for fluorescent lighting during the war is an

Typical "Cosmos" folding window display

indication of the popularity which it will undoubtedly attain in peace-time, and this folder gives a clear account of the nature and great possibilities of this form of lighting. The "Cosmos Girl"



calendar, which for very many years has been associated with the lamp and lighting department of the Metropolitan-Vickers Electrical Co., Ltd., will again be available. Wartime limitations will restrict the calendar itself to twelve monthly tear-off sheets commencing October 1st, 1944.

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"Ekco" lamp publicity (E. K. Cole, Ltd.) is planned on ambitious lines for the forthcoming season. Press advertising, national, provincial and technical, is to appear in a very extensive list of media. This will be supported by an increased number of specially selected poster sites in London and the principal provincial centres, as well as at main line railway stations throughout the country. The company is offering dealers "tie-up" facilities, lantern slides, window display services and a range of "sales aids" through its representatives. Among the sales aids is an attractive and colourful paint transfer, for windows and door panels.



"Ekco " lamp paint transfer

COMMERCE and INDUSTRY Engineering Unions' Moves. N.Z. Controls Relaxed.

Fire Guard Relaxation

N addition to the easing of the restrictions upon lighting, to which extended reference is made on another page, there is also to be in certain areas, as from September 12th, a relaxation of fire guard duties including those specified in the Business and Government Premises Order of 1943. The Electricity Commissioners have notified those electricity supply undertakings within the areas concerned of the extent of the relaxation.

Engineers' Wages

At York on September 7th the Engineering Joint Trades Movement discussed future action with regard to wages in the engineering industry and it was announced afterwards that a statement would probably be made next month. The Amalgamated Engineering Union, one of the bodies connected with the Movement, recently put in a claim for an increase of 10s. per week in the basic wages of adult male workers.

Forty-Hour Week

The engineering unions and the Engineering Employers' Federation are discussing the introduction of a five-day working week of 40 hours immediately after the cessation of hostilities. A conference on the subject between the two parties was to be held in London yesterday (Thursday).

Gas Prices Increased

The Minister of Fuel and Power has authorised the South Metropolitan Gas Co. to increase its prices by 1d. per therm as from the September meter readings. It is expected that other London companies will also be permitted to raise their charges to compensate them for the increased cost of coal.

Commodity Control

Butterworth & Co. (Publishers), Ltd., 11 and 12 Bell Yard, Temple Bar, W.C.2, have issued a second cumulative supplement to their "Commodity Control" (price 4s. 6d., postage 4d.). This contains all new Orders on the subject and amendments to existing Orders up to June 1st, 1944. The combined price of the main work and the supplement is 15s., postage 9d.

Civilian Production in New Zealand

The Wellington correspondent of the Chamber of Commerce Journal reports that the New Zealand Government recently announced, through the acting Prime Minister (Mr. Sullivan), that it was its policy to lift wartime controls as soon as opportunity arose. Mr. Sullivan said that the attitude was not to wait until the end of the war or until such time as it was felt that action should be taken, but rather that action should be taken as they went along, with controls being eased or lifted as and when it was considered circumstances permitted. Action along these lines had already been taken to some extent, and that course would be continued.

A restricted programme for the manufacture of certain electrical goods, to provide for essential civilian requirements, will be carried out by New Zealand manufacturers during 1944 and 1945. This indicates a partial easement of the ban imposed on a large number of electrical products in 1942. Electric ranges will form the largest portion of the programme for the year, and seven-eighths of the whole output of ranges will be used in new houses built by the State and privately, and the remaining eighth for the replacement where necessary of existing domestic units. A limited number of washing machines, irons, jugs and kettles and a small quantity of radiators and refrigerators will also be manufactured.

Naval Scientific Service

The Admiralty has announced that permanent provision is to be made for research, experimental design and development in the Royal Navy by the establishment of a Scientific Service formed from the existing scientific departments of the Admiralty. The service will be headed by the present Director of Scientific Research.

Allied Leaders in Kingsway

The latest display on the front of the G.E.C. premises in Kingsway is an impressive one. It consists of the portraits of Churchill, Roosevelt, Stalin and Chiang Kai-shek and the captions, which include quotations from the past speeches of these statesmen, are reminders that although the war is reaching its final phase the battle is not won until the last shot has been fired.

Electrodepositors' Technical Society

The twentieth session of the Electrodepositors' Technical Society opened in Birmingham on September 5th with a lecture by Mr. A. W. Wallbank, the new chairman, on "The Trade or Jobbing Plater and his Future." In London the commencing meeting will be held at the Northampton Polytechnic, E.C.1, on Monday, September 18th, when Mr. O. Wright will present a paper on "Lead and Allied Plating of Bearings."

Mirrlees Diesel Engines

At a meeting of the shareholders of Mirrlees, Bickerton & Day, Ltd., on September 28th, consideration will be given to a conditional agreement which has been entered into with Associated British Engineering, Ltd., which holds a large part of the capital of the Brush Electrical Engineering Co., Ltd. The agreement provides for the purchase of the goodwill including name, and assets of the Diesel engine business of Mirrlees, Bickerton & Day. It is proposed to form a new company to continue the business under the old name, all the shares being held by Associated British Engineering. ч.

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The price payable is reported to be £372,370 for the net current assets and the fixed assets, including the Hazel Grove works.

The existing Mirrlees, Bickerton & Day company would still own and operate the Glasgow factory as it has done for many years under the name of the Mirrlees Watson Co., Ltd. Besides continuing the manufacture of sugar machinery and other specialities previously produced at these works, the company would also remain responsible for the sale of "Roscru" pumps and mechanical stokers which, until other arrangements are made, would be produced at the Hazel Grove works by the new company.

Electro-Farming

East Anglia is giving a great deal of attention to the application of electricity in farming; the latest instance is an exhibition held at Ipswich last week under the combined auspices of the Ipswich Corporation Electricity Department, the East Suffolk Electricity Distribution Co., Ltd., and the East Anglian Electric Supply Co., Ltd. An "Essex" portable hammer mill, dairy equipment, pumps and welding plant were included in the display.

Mr. Allan Chapman, Under Secretary of State for Scotland, Sir Patrick Laird, Secretary of the Department of Agriculture, and others recently visited the farm of Hardgrove, Ruthwell, Dumfriesshire, tenanted by Mr. G. D. Wyllie, and inspected the up-to-date electrical equipment. Apart from the general use of electrical power for milking, refrigeration and driving machinery, elevators, etc., Mr. Wyllie has fitted up a most efficient workshop with electrically driven saw, lathe and drill, and in addition he has installed a welding plant.

Scottish Meter Readers' Claim

The National Arbitration Tribunal heard on August 31st a claim by members of the Clerical and Administrative Workers' Union employed by the Clyde Valley Electrical Power Co. that the company's survey or meter reading staff should come within the ambit of an agreement dated April 7th, 1944, now in operation between the company and the Union. The statements submitted included one that meter readers were included in the schedule of rates and conditions of the Scottish D.J.I.C. for the Electricity Supply Industry. This Council had already made a decision in the matter which had been approved by the N.J.I.C. for the Electricity Supply Industry but not accepted by the union. Reference was made to the inclusion within the scope of the Glasgow Corporation's staff scheme of the Electricity

Department's survey or meter reading staff. The Tribunal in its award (No. 625) finds that the claim has not been established and awards accordingly.

Electricity Demonstrators

Women demonstrators employed by electricity supply undertakings in the E.D.A. North-West England & North Wales Area, held one of their periodical gatherings at the Manchester Corporation Electricity Showrooms on September 4th. Mrs. R. A. S. Thwaites, wife of the chief engineer and manager, presiding. In the morning an address on "Feeding, Past and Present" was given by Miss E. I. Deakin, food advice organiser for the North West Area, Ministry of Food. The afternoon session was devoted to kitchen planning, and Miss H. M. Minoprio, E.D.A. advisory demonstrator, spoke on postwar innovations, while Mr. W. E. Swale, sales manager and engineer, Manchester, gave some information on a recent investigation carried out in the North West Area.

Illuminating Engineers' Meeting

The Birmingham Centre of the Illuminating Engineering Society has arranged a special "Civic Mecting" for September 29th. The programme will include the inspection of a "unique" lighting installation and of drawings, plans and models of a proposed new estate. The conference will be opened by the president of the Society, Dr. H. Buckley, and a welcome will be given by the Lord Mayor of Birmingham (Alderman L. G. H. Alldridge). This will be followed by a description of a projected modern housing estate by Councillor L. J. Potts and an address on "The Principles of Lighting," by Mr. J. G. Holmes, B.Sc. Mr. R. O. Ackerley, A.M.I.E.E., will speak on work already being undertaken by existing committees and panels and the meeting will then be addressed by Mr. H. J. Manzoni, C.B.E., city engineer and surveyor, Birmingham, and Mr. Wallace Smith, president of the Institute of Housing, who is general manager of the Corporation Estates Department.

Hydraulic Valves

Pressures between 1,500 and 3,500 lb. per sq. in. are now common for working hydraulic presses (oil or water) in manufacturing processes; up to 6,000 lb. is not unusual and 10,000 lb. is used in some instances. Consequently the valves employed for controlling such presses have become highly specialised as is indicated by the range of types illustrated and described in a 36-page booklet issued by Glenfield & Kennedy, Ltd., which shows the most notable tendency to be towards automatic operation for controlling sequences in plant motion, the timing of operations and change-over from filling (low) to finishing (high) pressures.

Among the many applications of "Homeyard" valves described is actuation by means of an electro-hydraulic thrustor, which is well suited to valves of large diameter under remote control by electrical means. The smaller sizes of this type of valve are particularly suited to solenoid operation because of the effort needed to move them. Pump motor unloading valves are also often operated electrically by means of solenoids, while presses for plastics are good examples of automatic control.

Visit to L.E.P. Canteen

Members of the Wigan and Bolton branches of the Association of Clerks to Urban District Councils inspected on September 8th the Lancashire Electric Power Company's electrically equipped canteen at Westhoughton, and afterwards spent the evening at the "M.M. Club " for L.E.P. employees. The canteen equipment is capable of cooking 400 mid-day meals.

meals. The visitors headed by Mr. R. Edge, deputy chairman, and Mr. F. Hickson, secretary, were greeted at the canteen by Mr. C. D. Taite, managing director, accompanied by Mr. Leslie, mains superintendent, and Mr. Rix, secretary. Mr. Joseph Dickinson, M.B.E., chairman of the Association, wrote regretting that he was unable to be present, and Mr. J. Purrett, assistant engineer and manager of the company, was absent owing to a prior engagement.

After tea Mr. Taite extended a welcome and emphasised the fact that the canteen was not just a show place; it despatched day by day a very considerable number of hot meals to feeding centres and cold packed meals to men of the Mains Department working on the job.

Responding for the Association, Mr. Edge recalled the days when obstructions were being put in the way of the Lancashire Electric Power Bill, which had since proved of such benefit to the public. Mr. Edge said that when the time was ripe for Adlington to consider a supply of electricity he consulted an independent authority on the subject and was strongly advised to rely upon the Power Company. It was decided to accept this advice and it had since proved to be a very wise course as the Council could not have hoped to give the excellent service that the L.E.P. had always provided to the township.

Fatalities

Ladder with Steel Tips.—An inquest was held recently on Fred Clements (54), an electrician's labourer employed by the Mid-Lincolnshire Electric Supply Co., Ltd., who received a fatal electric shock when a ladder he was helping to carry touched a live wire. Two other men sustained burns on the hand. In evidence it was stated that the ladder, which had always been used, had tips of steel to reinforce it, and the coroner said he would have thought such a ladder was highly dangerous in the circumstances. A verdict of "Accidental death" was recorded.

Taxi Driver Killed.—While cleaning his cab on September 4th an Edinburgh taxidriver sustained a fatal electric shock. He was using a portable lamp the leads to which were taken through the front door of the vehicle. It appeared that the door closed upon the wires cutting into them.

U.S. Shipments of Lighting Fittings

A revised return issued by the Building Materials Division of the American War Production Board states that during 1943 manufacturers' shipments of lighting apparatus amounted in value to approximately \$35,200,000. Shipments of incandescent equipment exceeded \$15,000,000 while those of fluorescent fittings were over \$20,000,000. The value of production of comparable items in 1939 was reported as \$35,328,000 in the census of manufactures, most of the apparatus then being of the incandescent types.

Incandescent lighting equipment includes industrial, commercial and residential types, portable and attachable machine and bench lamps and mercury-vapour types, but does not include residential portable or desk lamps, aircraft or aviation lighting equipment, marine lighting equipment, floodlights, searchlights, traffic signals, street and highway luminaires, or vehicle lighting. Fluorescent lighting equipment includes hot and cold cathode types for commercial and industrial applications; values of starter switches are not included. The data for incandescent lighting apparatus has been obtained from approximately 140 companies and for fluorescent lighting equipment from 150 companies, representing those manufacturers reporting shipments under the Controlled Materials Plan.

Bombay's Industrial Development

An article published in the Indian Textile Journal gives details of the wartime industrial expansion which has taken place in Bombay Province. A table sets out the increase in the number of factories engaged in different classes of industry between 1938 and 1942. In engineering, the number rose from 360 to 495 and the average number of workers from 28,629 to 48,055. This does not include Government and "local fund" factories in which there was a threefold increase in workers (65,834 in 1942 against 20,686 in 1938), mainly due to the expansion of ordnance factories.

Flash Testers

Mains energised flash-voltage testing sets are offered under the trade name of "Hi-volt" by Runbaken Electrical Products, 71 Oxford Road, Manchester 1. They are intended to be used for determining the condition of motor and transformer coils and the state of the insulation of switchgear and other appliances by imposing high voltage stresses on them by means of prod elec rodes.

The larger of the two sets, both of which are provided with a red pilot lamp and are transportable, has a sloping front on which are mounted a voltmeter and rotary knob for varying the output (500, 1,000, 2,000 V) whereas the simpler box-like model furnishes 1,000 V only.

Factory Electricity Regulations

The Stationery Office has published a new edition of the wall sheet containing the Electricity Regulations under the Factories Act, 1937, with the Special Regulations made in June. The price is 2d. per copy (postage 1d.).

Change of Name

G. B. Hole, Ltd., electrical equipment manufacturers, Imperial Buildings, 56, Kingsway, W.C.2, have changed their name to Dudley Electronics, Ltd.

TRADE MARK APPLICATIONS

WRIGHT. Class 7. No. B623,342. Electric motors and dynamos, electric grinding machines and electric rotary pumps.—Wright Electric Motors (Halifax), Ltd., Century Works, Pellon Road, Halifax.

ROAD, Halliax. ROVAL, Class 9. No. 629,297. Electroplating apparatus and parts thereof not included in other classes.—International Corrodeless, Ltd., Lockfield Avenue, Enfield Middlesex.

Uva. Class 11. No. B628,308. Electric light fittings and parts thereof not included in other classes.—Uva Products, Ltd., Hinckley Road, Burbage.

ELECTRICAL REVIEW

Organisations of the Industry-XIII

Electrical Trades Union

THE Electrical Trades Union was born in 1889, the year of the great London dock strike. Almost simultaneously, two unions of electrical workers were established in London and Manchester. The London organisation was known as the Amalgamated Union of Electrical Operatives; the Manchester organisation went under the name of the Telegraph and Telephone Construction Men. The membership of both unions was drawn mainly from men engaged in outside line erection. Early

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negotiations between the unions led to amalgamation, but it was not until December,

1890, that amalgamation was finally effected, although the amalgamated union had been registered and approved by the Registrar-General the previous August as the Electrical Trades Union of Great Britain and Ireland.

For fourteen years after its formation the Electrical Trades Union had a hard struggle to survive. Its early officials lacked experience and as a new organisation it had to fight hard to secure recognition by the employers.

During the first year of its existence, a strike in the Brighton district nearly wrecked the fortunes of the union. A conflict which developed between the Manchester section and the London branches, which was not finally resolved until the early years of the twentieth century, threatened to extinguish it altogether. With the election of the late Mr. James

Rowan as National Organiser in 1904, and later as General Secretary, things began to take a turn for the better.

The Union began to win recognition as the representative body of journeymen electricians, not only from the employers, but from the older established craft unions. More and more collective agreements were negotiated with employers in various sections of industry. It began to play an active part in federation work, especially in the Federation of Engineering and Shipbuilding Unions, to the Executive and Emergency Committees of which its General Secretary early secured



By E. W. Bussey, **General Secretary**

Messrs. W. Stevens and M. T. Greenwell, Assistant General Secretaries

election. It was also in these years that Parliamentary representation, through the Labour Party and by direct approach to Government Departments, was resorted to on questions affecting the working electrician and the electrical industry generally.

By 1914, the foundations of the Union had been well and truly laid, and the structure of the present organisation then began to take visible and outward shape. Though the Union was started

by organising what nowadays are called the contracting or installation electricians, its activities were soon spread to

other sections of the industry. As early as 1889 the Manchester branch had in its membership armature winders and men employed in the instrument shop of Mather & Platt, Ltd. This section came under engineering, and the Union was soon able to negotiate agreements with the engineering employers which have been maintained and extended ever since that time. The notoriously bad conditions and low

wages which prevailed in the supply industry were most marked in the London area. Men in charge of switchboards were paid, in some cases, no more than 15s. for a 56-hour Overtime week. payments were not recognised, and sick allowances were rare. Rates for the same job varied from one undertaking to another. When, in 1916, the L.C.C. and other under-

takers refused an application for an increase to meet the ever-rising cost of living, an approach was made to the London District Committee of the Union. The grievances of the workers in the power stations, substations, and in the distribution service of the London "Underground " undertakings were placed before the Committee, and plans for organising these workers were drawn up. As a result, a number of power station engineers' branches of the Union were opened, the largest of which drew its membership from the L.C.C. Tram-ways and the North Metropolitan Electric Power Supply Co. A programme of estab-

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lished rates and conditions of service was advanced, but did not meet with the approval of the employers. In the end the matter was referred to the Committee on Production, which, in November, 1918, issued the now famous " Award No. 2772."

The claim of the unions was for the application to the workpeople concerned of the Award of the Committee on Production for the Engineering and Foundry Trades. To this, however, was added a claim for new card rates and working conditions. The unions' chief claims were granted, and a schedule of base rates and working conditions, covering all grades except charge engineers and supervisory staffs, was set out by the Committee.

Award No. 2112 greatly facilitated the establishment of a Joint Industrial Council for the industry. This was formed in May, 1919, and our late General Secretary acted as chairman or vice-chairman of the Council from its inception to his retirement in 1941. To-day, the negotiating machinery of the supply industry comprises fourteen District Joint Industrial Councils covering England, Scotland, Wales and Northern Ireland, and the National Joint Industrial Council.

Electrical Contracting

Before the formation of a Joint Industrial Council for the Electrical Contracting Industry, wage negotiations were conducted with local associations. The Electrical Trades Union, as the only recognised workers' organisation catering for contracting electricians, was put to much trouble and expense negotiating local agreements, although the masters' associations belonged to the Electrical Contractors' Association which was the national organisation of employers engaged in the industry. In view of the development of the industry, and of the recommendations of the Whitley Committee, it was felt that the existing machinery of negotiation was inadequate and out-of-date. The E.C.A. and the E.T.U. combined, in January, 1919, to form the National Joint Industrial Council for the Electrical Contracting Industry, the E.C.A. being solely representative of the employers and the E.T.U. of the employees.

An award of the Committee on Production in 1917, which prevented members of the E.C.A. from receiving applications for wage increases from various unions, virtually made the N.F.E.A., which the E.C.A. had formed to conduct Labour negotiations, and the E.T.U. the governing bodies to negotiate and agree the rates of wages and conditions of employment to be observed by electrical contractors throughout the country. The establishment of the N.J.I.C. consolidated this position.

Relations between the parties have been characterised by mutual respect and goodwill. The very acute problems brought about by the war, however, have, for the first time in the history of the N.J.I.C., resulted in four differences between the parties being referred for settlement to outside arbitration. More normal relations have now been restored, and the machinery of negotiation established in 1919 has been left quite unimpaired.

From a loose federation of approximately 1,100 members in 1891, the Union has now grown into a national organisation of over 125,000 members. The last analysis of the membership figures revealed that 52-65 per cent, were skilled craftsmen, 20-38 per cent, electricians' assistants (mates), 16-53 per cent, apprentices, and 10-22 per cent, were wartime "dilutees."

The government of the Union is vested in an Executive Council, which consists of eleven elected members working at their trades, the General President, the General Secretary, and the two Assistant General Secretaries. For the purpose of the ballot for these there are eleven electoral divisions, each division nominating and electing its own councillor.

The rules of the Union may be added to. amended or rescinded by ballot, and rules revision conferences in recent years have been held every six years. Policy is determined by biennial conferences, the delegates to which are chosen and elected by the members. It is from these conferences that authority in all matters of policy is derived. Though the majority of items discussed deal with wages and working conditions generally, wider matters concerning the electrical industry, the social services, the organisation of industry, etc., are also within the scope of conference decisions. Members also have the right, by vote, to convene national conferences on urgent matters affecting their interests.

Central and Regional Administration

Administration is centralised at the general offices of the Union, at 9 and 11, Macaulay Road, Clapham. Regional administration is carried out from 15 area offices, to which are attached 21 full-time area officials. Each area official is elected for a period of five years by the members within the area. In addition to the area officials, there are two National Organisers, also elected by the members and controlled by the Executive Council, who assist, when necessary, the area officials, and who undertake local and national duties on behalf of the Executive Council.

Functioning within the 15 areas are 35 district committees. They consist of one member from each branch and are controlled by the Executive Council. The committees have power, subject to the approval of the Executive Council, to deal with and regulate the rates of wages, hours of labour, terms of overtime, and the general conditions affecting the interests of members in their respective districts. Wartime developments and the march of events have made obsolete much of the structure and the machinery of the cort-

mittees. Proposals for their reorganisation are under consideration.

In 1904, there was established the Electrical Trades Journal, the official organ of the Union. It serves not only as a medium for news concerning the Union and the electrical industry generally, but also provides a platform for the exchange of opinions on topics of interest to members. Though recent changes have improved its contents and layout, wartime restrictions have prevented other improvements which we have in view.

Wartime Developments

As with most other industrial organisations, the war has had considerable effect upon the Union, and has wrought many changes in its structure and policy. We have voluntarily relinquished, for the period of the emergency, many cherished trade customs and practices. We have agreed to the entry of women into the industry, on jobs formerly done by men. Recently, to meet the requirements of women employed in the electrical industry on work that has come to be regarded as women's work, we established a new women's section which we hope will become a permanent part of the organisation. At the request of the Government, we agreed to the introduction of systems of payment by results on electrical work in the shipbuilding industry. This brought a warm tribute from Mr Ernest Bevin, Minister of Labour and National Service, who said that it was worth about 3.000 to 4,000 men to him, and enabled the Government to put on a campaign against the U-boats at the precise date fixed

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The constant stream of Statutory Rules and Orders relating to labour and industry has brought us much additional work, and has placed a heavy burden upon officials involved in their application and operation. Close contact has been established with the Supply Departments of H. M. Government on matters affecting our members employed by the Departments.

Principal Officers

In 1941, the late Mr. James Rowan, who had been General Secretary of the Union for 34 years, retired from office, and was succeeded by the writer, who had been honorary General President of the Union since 1933. The office of General President is now a full-time one. a step made necessary by the growing activities of the Union. Mr. H. P. Bolton, who had been one of our National Organisers, was elected to the post in 1941.

The duties of the President consist mainly, in conjunction with the General Secretary, or national negotiations with the employers, and he presides at meetings of the Executive Council and at National Delegate Conferences. The General Secretary is responsible for the administration of the whole of the Union, and is aided by two Assistant General Secretaries, Mr. M. T. Greenwell and Mr. W. Stevens.

In addition to the normal work of negotiation and administration, many of our officials are serving on local appeal boards, food and price regulation committees, district and regional production committees, etc. In May, 1942, I accepted an invitation to become a member of the Production Advisory Panel set up by the Ministry of Production to assist the Supply Ministries and the Ministry of Production. As a craft union, we were one of the three unions invited to submit evidence to the Beveridge Committee on the Use of Skilled Men in the Services. The trouble we went to was rewarded by the tribute we received from the Committee in the Final Report which admitted that "The Trade Unions have made out their case: they have shown failure to use men according to their skill in a substantial number of cases, and have proved the need to take more effective measures in the future.

Our membership has grown since 1939 from 70,000 to 125,000 and the number of branches from 381 to 427. We believe that our contribution to the nation's war effort has not been negligible and we take some pride in the fact that we have been able to play some small part in the life and death struggle which the Democracies are waging against the Faccist dictatorships.

Present and Future Activities

The present activities of the Union cover a wide field of industry. Though primarily engaged in the electrical contracting, the electricity supply, and the electrical cable-making industries, we have members employed on the railways, in road transport, engineering, shipbuilding, chemicals, the silk textile industry, the glass industry, flour milling, the iron and steel trades, film studios and in a number of minor and subsidiary trades. We are represented on the National Joint Industrial Councils for the Electrical Contracting Industry, the Electricity Supply Industry, and the Electrical Cable Making Industry, the Admiralty Joint Industrial Council, the Shipping Trades Joint Council, the National Railway Electrical Council, and the National Railway Shopmen's Council.

The Union is a constituent body of the British and International Trades Union Movement, being affiliated with the Trades Union Congress and the Scottish T.U.C.: the Confederation of Shipbuilding and Engineering Unions: the International Federation of Trade Unions: and the International Metalworkers' Federation. Our late General Secretary, Mr. James Rowan, was for many years a member of the General Council of the Trades Union Congress, and I myself, a few months after succeeding him, was elected to a seat on the Council.

We consider that we are entitled to claim, as

Mr. Rowan did in these columns in 1939, that we have played a useful and honourable part in the development of the electrical industry, and we firmly believe that we have a still more useful and honourable part to play in the future. Already we are preparing plans for post-war developments, and are making provision to meet any contingencies which may arise. The department at head office concerned with this side of our activities is engaged in collecting the data necessary to formulate reasoned proposals for ensuring the continued success of the Union and of the electrical industry as a whole, of which the Electrical Trades Union lays claim to be a truly representative body.

United States Exports

Substantial Rise in 1941

W ASHINGTON has decided to release certain figures of United States foreign trade, hitherto withheld for reasons of security. For some time there have been signs that the American authorities are awake to the desirability of preparing to resume normal trade after the war and the resumption of the publication of import and export statistics is presumably part of the policy of directing attention to overseas markets.

The figures now make available relate to 1941 (mainly a "pre-war" year for America) and are the latest to give full particulars of countries of origin and destination. From them the accompanying table has been compiled. It compares United States exports of some of the leading electrical items in that year with those for 1940 and includes the outstanding markets. In the case of the largest group—radio goods exports range over a very large number of countries, the leading buyers being Mexico, South Africa, Brazil, India, Egypt and the Dutch East Indies.

In the electrical export trade as a whole there was an increase of over 25 per cent. compared with 1940. Within the space available here, only a few of the more noteworthy purchasing countries can be specified. It will be seen that exports to the Dutch East Indies made a very striking advance; those to Russia and South Africa approximately doubled, while Mexico also became a much more important buyer.

Class	1941 \$(000)	Inc. or dec. on 1940 \$000	Class	1941 \$(000)	Inc. or dec. on 1940 \$(000)
Self-contained lighting sets- Total To Canada "Mexico "Brazil "Dutch East Indies	2,819 423 280 210 289	$\begin{array}{rrrr} - & 71 \\ + & 278 \\ + & 212 \\ + & 83 \\ + & 131 \end{array}$	Searchlight and airport beacons— Total To U.S.S.R. ,, Canada ,, Dutch East Indies Demotic motor driven devices	8,096 2,708 1,314 2,014	4,705 2,656 870 + 2,010
Total To Canada	4,110 141 145 604 165 232	$\begin{array}{rrrr} + & 1,595 \\ + & 21 \\ & 67 \\ + & 399 \\ + & 35 \\ + & 95 \end{array}$	including washing machines, vacuum cleaners and paris— Total To Canada " Mexico " South Africa	2,190 554 395 440	155 780 + 240 169
light— Total To Colombia "Venezuela "United Kingdom Testing, measuring and indicat-	2,568 372 334 280	- 758 + 114 + 84 - 1,038	Therapeutic apparatus and parts- Total To Canada "Mexico "India "South Africa	3,210 806 238 221 195	+ 796 + 218 + 55 + 93 + 112
Total Total To Canada '	3,911 1,966 161 2,855	+ 211 + 706 - 43 + 370	Radio apparatus and parts— Total Other telegraph and telephone "apparatus and parts— Total	29,574	+ 7,534
To Canada " Mexico " Brazil " Chile Portable electric tools—	617 289 277 176	+ 180 + 182 + 63 + 54	To U.S.S.R. "Brazil "Dutch East Indies Grand Total	201 414 162 146,361	+ 198 + 130 + 147 + 29.654
To United Kingdom ,, Canada Household refrigerators— Total To Mexico ,, Brazil ,, South Africa	2,550 607 948 - 10,281 1,425 1,857 1,944	$\begin{array}{r} + & 880 \\ + & 271 \\ + & 365 \\ + & 2,205 \\ + & 820 \\ + & 725 \\ + & 1,067 \end{array}$	To U.S.S.R. ,, United Kingdom , Canada , Mexico ,, Brazil ,, Dutch East Indies ,, South Africa	6,201 7,099 34,928 10,280 11,752 6,946 11,380	$\begin{array}{r} + & 3,058 \\ - & 7,620 \\ + & 9,733 \\ + & 4,522 \\ + & 4,017 \\ + & 5,424 \\ + & 5,612 \end{array}$

Wiring Accessories

American and Canadian Ideas

S fears are being expressed as to the danger of intro-ducing new lines of accessories on the ground that they would

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

No entirely satisfactory system of fusing and control for ring mains appears

to have been evolved and there is wide divergence of opinion as to whether present ideas of the fuse protection of varying sizes of appliances should be continued. It seems, also, that accessories will have to be designed with space and terminals large enough to allow for looping. Looping is seldom practised in America and engineers rather marvel at our adhering to it with what they consider its wastefulness as regards both space and materials and the difficulties it imposes when it is desired to make extensions to a circuit. They have a surprisingly large range of jointing and tapping accessories, most of which are extremely simple and efficient.

The proposal that one size socket should

receive 2-, 5- and 10-A plugs aroused some amusement amongst Canadians, as did the fact that objections have been raised in some quarters against the introduction of new or altered types of sockets and plugs on the ground that some existing jigs and tools would have to be scrapped.

It was pointed out that the increased cost, for a time, of new types would represent such a small proportion of the cost of the installation or the building itself that it might well be ignored. They point out that we cannot make progress without paying something for it in one way or another.

Flat contact plugs are universal in America, though the variety of arrangements of the blades is apt to be somewhat confusing at first. The commonest types are shown in the accompanying figure. As one pole of the 115-V system is earthed, the provision of an earthing pin is unnecessary. These

are confined to industrial uses, such as on portable tools and, of course, on 230-V apparatus. Switches to control socket - outlets are for the most part unknown in domestic use.

In spite of what has been said, it is a fact, backed by personal experience, that flat pins do not maintain good contact nearly as long or effectively as the better types of English round pins. It is considered that

decrease rather than promote standardisation, it may be appropriate here to indicate an important difference which is discernible between English and American ideas. Although standardisation is aimed at on every suitable occasion, Americans seem to work on the principle of making the material suit the job rather than juggling the job around to make it fit in with the available material. A cursory glance through any American or Canadian catalogue will show such a number of accessories under almost every heading as would horrify the large school of English engineers who aim at simplification and reduction. With expersimplification and reduction. With experience of both systems, I am not prepared to say which is responsible for the most headaches, but whether "standardised" or In last week's issue Mr. Pinto reviewed North American not, there are many American practice in domestic installaarticles unknown to us, which tion work. This article deals are real savers of labour and with the plug and socket

material. There are distinct signs in some quarters of a failure to

appreciate that dimensional standardisation, which makes for interchangeability and is therefore so desirable in electrical matters, does not necessarily aim at reducing the number of useful articles which may be placed on the market. Probably the most conspicuous example of this is the standardisation of electric motors in the United States by the National Electrical Manufacturers' Associa-Every desirable type and size of tion. motor is obtainable and individual characteristics of the various manufacturers are largely retained, but motors of all N.E.M.A. makes are interchangeable in practically every important detail. Those engineers who

have experienced great the verv advantages of this dimensional standardisation will considerrequire able inducement before purchasing a non - N.E.M.A. (English motor.

exporters please note !) It is a pity that more co-operation on these lines is not practised English manufacturers, who should by realise that reduction in cost is not the only aim of standardisation.



question including the matter

of standardisation

the "sloppiness" which would ensue from the use of varying widths of blades in the same socket over a prolonged period would lead to bad contact and arcing. From the user's point of view, the flat pin is much more difficult to insert than the round type, so that it seems that, all in all, the round pin, fitted to a universal 10-A plug or to individual 2-, 5- and 10-A plugs, will form the best combination. The flat pin, again from personal experience, is far more liable than the round one to distortion and misalignment, with the consequence of bad contact, even under the moderately rough treatment received in the average home. The claim that because switches have flat contacts the same should apply to plugs, is surely valueless. The treatment received by a switch fixed on the wall several feet above floor level is not to be compared with that meted out to a plug when being trailed across floors or being trodden on.

Fusing of these circuits can be considered from more than one aspect, but the proposal to use a round-pin plug with one of the pins forming a fuse seems to deal with most of the difficulties in a simple and practical way. If cartridge fuses are used inside the plug itself it is liable to become inconveniently large. Although fused switches may be used to control small lighting circuits, their use for protecting usually adjacent sockets is merely hedging and is to all practical purposes an infringement of the rules forbidding fused sockets. Switches are seldom used to control sockets in Canada where, also, fuse wire is almost unknown. Almost all fuses are of cartridge or screw-in type. The former are made in fixed or renewable patterns and the latter, which are of "Pyrex" glass and screw into an ordinary e.s. base, are so cheap that failures are thrown away. Fused sockets are definitely barred, as in the I.E.E. Regulations.

Fuse Protection

The sizes of fuses and the protection of flexible cords are very completely dealt with in the Canadian Code and some of the provisions contained therein are worth repeating. Rule 803 (4) says: "Flexible cord sizes No. 18 and 16 B. & S. shall be considered as protected by 15-A overcurrent devices." The maximum current-carrying capacities of these sizes are stated to be as follows:—No. 18, diameter 040 in., rubbercovered cord, 5 A; heater cord (rubber and asbestos covered), 10 A; for No. 16, diameter 051 in., the figures are, respectively, 7 and 15 A. It is interesting to note the distinction between the different types of covering, which is carried on through a very wide range of coverings for various purposes.

"Tinsel cord" may be used with portable heating appliances rated at not more than 50 W and in lengths of not more than 8 ft. The whole question of flexibles and their fusing has received very full attention from the compilers of the Code and if their conclusions are to be accepted (why not?) the use of a 10-A or even a 15-A general utility fuse is amply justified. This is confirmed by the well-known fact that the majority of faults on portable appliance circuits are caused by short-circuits in either flexible or appliance and not by earthing or overloads.

To conclude with a quotation from the Canadian Code. It has already been pointed out how objection is made to long lengths of flexible and in one of the "notes," which are interspersed in the Code to emphasise certain rules, is one which is obviously aimed at limiting these lengths and contains advice which might well be followed by all. The "Note" precedes Rule 2011, which deals with ceiling roses, wall sockets and lampholders and reads (the nomenclature has been anglicised):—"It is strongly recommended that at least one socket be installed on each wall of each living room, dining room and parlour of a private dwellinghouse or flat; also that in all other rooms (except bathrooms) of such dwellings at least one such socket be installed."

Diesel-Electric Icebreaker

CONSTRUCTION of a tunnel under Northumberland Strait, between Prince Edward Island and the mainland of North America, has been discussed for fifty years, although it may never be bored. In winter, when steamers may be icebound, the isolation of the islanders and the handicaps to trade are felt most. Another icebreaking ship is therefore to be built, to cost about a million dollars, and Canadian contractors are to have it at work next year.

it at work next year. This ferry will be 372 ft. by 61 ft., longer and wider than its predecessor, the s.s. *Charlottetown*, lost in 1942. Lower, main (railway car), mezzanine (motor car) and boat decks will provide carrying capacity for 2,000 tons and will transport 19 railway passenger and freight cars on three lines of rail, 60 cars or buses, and 950 passengers. The ship will be able to move through field ice as well as pack ice : its extreme draught will be 19 ft. and it will be able to travel at 164 knots.

Eight Diesel engines driving electric generators of 12.000 BHP will operate four sets of propelling motors, each connected to a separate propeller, two forward and two aft, throwing a concentration of maximum power from the Diesel engine generating sets on to one propeller in an emergency. The forward propellers will improve the ice-breaking efficiency, increase manœuvrability in the restricted terminals, shorten the period for docking, and be a factor in reducing the time of the ten-mile crossing between Borden and Cape Tormentine.

between Borden and Cape Tormentine. Diesel-electric propulsion is believed to be the most efficient power for vessels of this type. It is used successfully in ice-breakers in Russia, Finland, Sweden and the United States Electricity for lighting and the operation of equipment will also be Diesel-electric generated 3. 104

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ELECTRICITY SUPPLY

Lincoln Inquiry. Irish Restrictions Eased.

Accrington.—PUBLIC LIGHTING ADMINISTRA-TION.—The Town Council has brought all public lighting under the control of the Electricity Committee, with the borough electrical engineer in charge of its administration.

Belfast.—FUTURE OF UNDERTAKING.—At the quarterly meeting of the City Council members pressed for a statement on the result of conferences between a sub-committee of the corporation and representatives of the Government regarding the future of the electricity undertaking. Councillor H. Scott, chairman of the Electricity Committee, refused to divulge any information, saying that no report would be issued until the discussions ended.

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Bolton.—UNDERTAKING'S JUBILEE.—At the last meeting of the Electricity Committee it was reported that the undertaking would attain its fiftieth year of operation on October 31st. It was decided to make suitable arrangements for celebrating the event.

Denny and Dunipace (Stirlingshire).—LOWER LIGHTING RATE.—The Town Council has reduced the flat-rate charge for lighting from 3d. to $2\frac{1}{2}d$. per kWh.

Huddersfield.—OWNERSHIP OF SELECTED STATIONS.—The Electricity Committee has decided in favour of the policy of giving complete support to all municipal selected station owners who wish to retain control of their stations, and to co-operate with all company selected station owners wishing to do the same.

Keswick (Cumberland). — COUNCIL'S ELEC-TRICAL PLAN.—The Urban District Council proposes to introduce all-electric street lighting. while electricity is to be extended to all Council houses. Estimates are to be obtained.

Lincoln.—INQUIRY INTO EXTENSIONS.—Following protests from various quarters, the Electricity Commissioners have decided to hold a public inquiry on October 4th, and subsequent days if necessary, into the proposal of the Corporation to erect two cooling towers as part of the extensions to the St. Swithin's power station. The objectors contend that these towers, which would be 220 ft. high, would mar the view of the city from the south-east.

London.—WAGES IN LIEU OF HOLIDAYS.— Stoke Newington Electricity Committee reports that considerable difficulty has been experienced in releasing employees in jointing gangs for the twelve days' leave to which they are entitled. It has arranged for the men to take one week', holiday and to be paid an extra week's wages in lieu of the second week's holiday.

Manchester.—LOANS FOR PLANT.—The Corporation Electricity Committee has obtained sanction to borrow £144,990 for extensions and is seeking permission to borrow £1,820,800 for plant. Salisbury.—EXTENSION OF PURCHASE OPTION. —The Electricity Commissioners have made the New Sarum Electricity (Extension of Purchase Date) Order, 1944. This extends for a year the period ending January 6th, 1945, within which the Corporation may exercise its right to purchase the undertaking authorised by the Salisbury Electric Lighting Order, 1895.

Sheffield. — COUNCIL APPROVES PRICE INCREASE.—Last week the City Council approved the proposal to increase electricity charges.

Overseas

Eire.—LARGER CONSUMPTION PERMITTED.— The Electricity Supply Board has announced that, in view of the recent heavy rainfall, it has been found possible to relax, as from last week, the restrictions on the consumption of electricity. The present ration of 40 per cent. of the consumption during the basic year for lighting and general domestic purposes is increased to 90 per cent. and the ration for cooking from 75 to 90 per cent. A 50 per cent. ration is allowed for water-heating, which was prohibited during the summer. The prohibition on space heating is also lifted and the 90 per cent. ration applies in this case. For motive power the permitted consumption remains at the same amount as in 1943. The restrictions on the hours of use of electricity supplied through current limiters are removed. The absolute prohibition of the use of electricity for tram services is, however, still retained.

Our Dublin correspondent reports that these relaxations are welcomed as the electricity shortage caused very great inconvenience. Several industries have been obliged substantially to reduce their working hours and domestic consumers have found it very difficult to keep within their allowance. Experience during the war demonstrates that the Shannon and Poulaphouca schemes combined will not be adequate to supply the needs of the country and that supplementary hydro-electric schemes will have to be developed. The *Irish Times* declares emphatically:—"Electricity is Ireland's fuel; we must not run short again."

United States.—OUTPUT OF T.V.A. PLANTS.— With an annual output of 10,000 million kWh, the Tennessee Valley Authority has become the biggest producer of electric power in the United States. When the Kentucky and Fontana dams are put into operation this year, the total annual output will be raised to 12,000 million kWh. Gross receipts for the fiscal year ended June 30th totalled more than \$35,000,000 an increase of \$3,500,000 compared with the previous year.—Reuter's Trade Service.

RADIO & TELEPHONY

France.—SERVICE TO PARIS RE-OPENED.— Cables & Wireless, Ltd., announced last week that the radio service with Paris, which was discontinued in 1940, has been re-established. For the time being traffic will be confined to Government and Press communications.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The East African Power & Lighting Co., Ltd., reports a net profit for 1943, before meeting taxation, of £141,543, as compared with £155,220 in 1942, the decrease being attributed mainly to higher operating expenses, particularly fuel costs and repair and maintenance charges. Income tax takes £7,341 (£11,278), depreciation £46,796 (£50,801), and £10,000 (£15,000) is transferred to general reserve. After paying the preference dividend and maintaining the ordinary dividend at 7 per cent. by a final distribution of 4 per cent., £36,903 (£33,434) is carried forward.

The report states that the company has approved considerable extensions of plant and transmission lines in Kenya, Tanganyika and Uganda. Plant for certain important immediate extensions has been ordered and construction work is in hand. Additional finance will be required to meet the capital expenditure and resolutions are to be submitted to the annual meeting in Nairobi on September 29th, for an increase in the authorised capital by £250,000 to £1,500,000.

A. C. Cossor, Ltd., report a net profit for the year ended March 31st, after providing for income tax on all profits earned to that date, of $\pm 102,606$ as compared with $\pm 97,058$ in the previous year. With a final ordinary dividend of 7 per cent. tax free the total distribution is unchanged at 10 per cent. free of tax for the year, and $\pm 109,395$ ($\pm 76,193$) is carried forward.

It is stated in the report that $\pounds54,098$ profit on the sale of the company's shares in Sterling Batteries, Ltd., together with $\pounds24,876$ credit balance on the reserve account and the current year's appropriation of $\pounds4,404$ for the same purpose, a total of $\pounds83,378$, has been applied to reduce the goodwill figure to $\pounds200,000$.

Vactric, Ltd.—The annual meeting was held last Friday, Sir Frederick Whyte (chairman) presiding. Later, at an extraordinary meeting a resolution was passed approving the increase of the company's capital to £400,000 by the creation of 600,000 new shares of 5s. each. Sir Frederick Whyte had mentioned in his speech that when the necessary permission to raise the new capital was obtained shareholders would have an opportunity of increasing their interest in the company on favourable terms.

The County of London Electric Supply Co., Ltd., held an extraordinary meeting on September 12th to consider a resolution proposing that all the issued and fully-paid shares of the company not converted into stock (£150,000 ordinary shares of £1 each) should be converted into ordinary stock of the same nominal amount.

Anglo-Argentine Tramways Co., Ltd.—At the annual meeting on September 8th, the chairman (Sir Bernard Docker) spoke at some length on the difficulties with which the company was faced in Buenos Aires and the unsatisfactory nature of the Argentine authorities' attitude to the Buenos Aires Transport Corporation. Later, at an extraordinary meeting the scheme of arrangement adopted by the debenture stockholders was sanctioned.

Telephone Rentals, Ltd., report a net profit of £138,851 for the year ended May 31st last, against £137,756 for 1942-43. To this is added $\pounds 32,811$ brought forward and £7,650 reserve against losses of subsidiaries no longer required. Taxation absorbs £99,695 (against £92,793) and $\pounds 5,000$ is again transferred to general reserve. The final dividend of 6 per cent. again makes 10 per cent. for the year and £33,537 is carried forward. The business of the operating companies has been maintained.

Berry's Electric, Ltd., announce that the net profit for 1943-44 was $\pounds 56,338$ (against $\pounds 43,151$). After deducting directors' fees, N.D.C., interest on 7½ per cent. notes, etc., and adding $\pounds 3,589$ brought, in the disposable balance is $\pounds 52,220$. Allocations include $\pounds 23,000$ to income tax reserve, $\pounds 15,000$ to note redemption reserve and $\pounds 2,000$ to repairs reserve. After payment of a dividend of 10 per cent. (same), $\pounds 4,673$ is to be carried forward.

Pirelli-General Cable Works, Ltd.—The report for the year to March 31st last shows a profit of \pounds 522,174. Debenture interest and sinking fund take \pounds 36,000, depreciation \pounds 51,063, directors' fees and staff pensions \pounds 15,138, E.P.T. reserve \pounds 200,000 and income tax reserve \pounds 50,000. The dividend for the year is 8 per cent. plus a bonus of 8 per cent. (same) and \pounds 230,638 (\pounds 220,625) is carried forward.

Walsall Conduits, Ltd., has announced the usual interim dividend of 20 per cent. on the ordinary shares.

Lancashire Dynamo & Crypto., Ltd., has declared an interim ordinary dividend of 5 per cent. (same).

Hall Telephone Accessories, Ltd., is maintaining its interim dividend on the ordinary shares at 5 per cent.

A. Reyrolle & Co. Ltd., announce the payment of an interim dividend of 5 per cent. (same).

The Electric Supply Corporation, Ltd., has declared an interim dividend of 31 per cent. (same).

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The Lancashire Electric Light & Power Co., is again paying an interim dividend of $2\frac{1}{2}$ per cent.

The Bournemouth & Poole Electricity Supply Co., Ltd., is paying an interim ordinary dividend of 5 per cent., the same as last year.

New Companies

Thermalair, Ltd.—Private company. Registered August 29th. Capital, £100. Objects: To carry on the business of technical advisers on air conditioning plant, refrigerating, cold storage, heating, ventilating and humidifying plant and scientific instruments, electrical and general engineers, etc. Subscribers: D. Williamson, 4, Great Winchester Street, E.C.2 and A.J.
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O Dell, Cranmere Hotel, 42, Aberdeen Park, N.5. Registered office: 4, Great Winchester Street, London, E.C.2.

S. Newson, Ltd.—Private company. Registered September 6th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, radio and electrical equipment, gramophones, accumulators, batteries and accessories, etc. S. Newson, 189, Mawney Road, Romford, is a permanent director. Registered office: Bank House, 618, Lea Bridge Road, E.10.

Road, E.10. G. Callingham & Son, Ltd.—Private company. Registered September 1st. Capital, £1,000. Objects: To carry on the business of electrical decorators, constructional, heating and lighting engineers and contractors, etc. Subscribers: J. E. Walker, 170. Poplar Road, S.W.19, and P. K. Archibald, 15, The Gateways, Park Lane, Richmond, Surrey. Directors: H. Bishop (chairman) and Dora Callingham. Solicitors: C. R. Enever & Co., Broad Street House, London, E.C.2.

Micramatic Electrical Instrument Co., Ltd.— Private company. Registered September 2nd. Capital, £5,000. Objects: To carry on the business of electrical, mechanical, radio and general engineers, etc. Directors: L. Black and Beatrice M. Black, both of 27, Kynaston Close, Harrow Weald, Middlesex. Registered office: 9, Cavendish Square, W.1.

Ormlite Installations, Ltd.—Private company. Registered August 31st. Capital, £1,000. Objects: To acquire the business of electrical engineers, etc., carried on at 53, Gorst Road, London, S.W.11, as A. V. Bennett. Directors: A. V. Bennett, 53, Gorst Road, S.W.11, and Violet H. Sparks, 98, Vale Road, N.4. Solicitors, Daynes, Keefe and Durrant, Norwich.

Trust Accessories, Ltd.—Private company. Registered August 28th. Capital, £10,000. Objects : To carry on the business of electrical, mechanical and general engineers, etc. Subscribers : W. G. Russell and C. A. Garrett, 97, Cannon Street, E.C.4. Registered office : Industrial Building, Brook Street, Macclesfield, Ches.

Companies Struck Off the Register

The following companies have been struck off the Register and are thereby dissolved :— Rational Electrical & Neon Co., Ltd.; Wigan Electro-Metallurgical Works, Ltd.; and Woodfyt Sales, Ltd.

Companies' Returns Statements of Capital

Pritchett & Gold & E.P.S., Co., Ltd.—Capital, £200,000 in £1 shares (100,000 preference and 100,000 ordinary). Return dated May 30th. All shares taken up. £30,394 paid. £169,606 considered as paid. Mortgages and charges : Nil.

Lang Electrical Co., Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1943 (filed June 16th, 1944). 51 shares taken up. £51 paid. Mortgages and charges: Nil.

Llanelly & District Electric Supply Co., Ltd.— Capital, £1,400,000 in £1 shares (660,000 6 per cent. cumulative preference, 660,000 ordinary and 80,000 undenominated). Return dated March 28th. 660,000 preference and 660,000 ordinary shares taken up. £1,314,000 paid. £6,000 considered as paid. Mortgages and charges : Nil.

Keswick Electric Light Co., Ltd.—Capital, £30,000 in £1 shares (5,000 preference and 25,000 ordinary). Return dated April 4th. 4,000 preference and 25,000 ordinary shares taken up. £23,000 paid. £6,000 considered as paid. Mortgages and charges: Nil.

British Insulated Cables (S.A.), Ltd.—Capital, £2,000 in £1 shares. Return dated July 26th. All shares taken up. £2,000 paid. Mortgages and charges: Nil.

Increase of Capital

Silentbloc, Ltd.—The nominal capital has been increased by the addition of £50,000 beyond the registered capital of £150,000. The additional capital is divided into 500,000 ordinary shares of 2s. each.

Mortgages and Charges

South Wales Power Station Co., Ltd.—Particulars filed of debenture stock to secure £1,750,000 (including £1,000,000 already registered) authorised by resolutions of June 28th, 1943, and July 25th, 1944, and secured by trust deed dated August 23th, 1944, and supplemental trust deed dated August 23rd, 1944, charged on the property charged by the trust deed of August 24th, 1943, the amount of the present issue being 2750,000. Trustees: Prudential Assurance Co., Ltd. The stock is issued at 99 per cent.

Howell Williams Refrigeration, Ltd.— Mortgage on Station Garage, Llandudno Junction, registered August 23rd, 1944, to secure all moneys due or to become due from the company to District Bank, Ltd.

Receiver Released

Pearl & Pearl, Ltd.—K. B. Hutton, of Victoria House, Southampton Row, London, W.C.1, ceased to act as receiver and/or manager on August 21st, 1944.

Winding-up Petition

Claybury Electrical Supplies, Ltd.—A petition for the winding-up of this company has been presented by a creditor and will be heard at the Royal Courts of Justice, London, on October 16th. Notification of intention to appear must be sent to Lieberman Leigh & Co., Talbot Mansions, Museum Street, W.C.1, by October 14th.

Bankruptcies

J. H. Matthews, electrical engineer, carrying on business at 232, Town Street, Bramley, near Leeds.—Last day for receiving proofs September 22nd. Trustee, Mr. H. C. Bowling, 24a, Bond Street, Leeds, Official Receiver.

Liquidations

Gallagher & Co. (Electricians), Ltd.—Final meetings of members and creditors will be held at the offices of Poppleton & Appleby, 93, Queen Street, Sheffield, 1, on October 9th.

STOCKS AND SHARES

TUESDAY EVENING.

THE drawing nearer of peace has brought about a fairly general fall of prices in the Stock Exchange markets. Apart from electricity supply shares and a few popular "Kaffirs," the tendency has been mainly downward. The uncertainty attaching to the post-war prospect is no longer serving as a bull point. On the contrary, it has brought about a good deal of scattered selling: "scattered," because the sales cover a wide area of Stock Exchange securities. The New York stock markets have been definitely flat on apprehensions that the transition from war to peace work will be fraught with difficulties and accompanied by declining profits. But Home electricity supply shares show strength in consequence of the modification about to be made in the blackout regulations.

Further Falls in Prices

The tale of weakness in this week's pricelists is marked principally in the equipment and manufacturing group. The high-priced shares are naturally the most vulnerable in an atmosphere of quiet depression. British Insulated at 110s. are 5s. down. Johnson & Phillips have fallen 3s. 3d. to 76s. 3d. Tube Investments at 93s. 3d. and Murex at 96s. 3d. are respectively 3s. and 2s. 6d. easier. A 3s. decline lowered Lancashire Dynamo to 94s. 6d. Enfield Cables at 61s. 6d. and General Electrics at 91s. 3d. have lost a florin. About a dozen other prices are 6d. to 1s. 3d. cheaper on the week. Several of the falls follow upon losses sustained a week ago.

Transport "C"

With the end of the war in nearer prospect, interest revives in the possibilities which attach to the "C" stock of the London Passenger Transport Board. The present price of 70 is relatively high as compared with the prices of other Home Railway junior stocks. The discrepancy is explained by reference to a nebulous hope, that one of these days the "standard rate" of 5½ per cent. on the "C" stock, mentioned in the Act of 1933, may be paid. The dividends paid so far have ranged from 4½ per cent. for 1937–1938, to 2½ per cent. for 1941. Last year's dividend was 3½ per cent. Up to January, 1939, the Board declined to apply for the right to adjust charges in order to meet rising costs. In January, 1939, however, the Railway Rates Tribunal received an application, and in the following October the Board's report said that it could hopefully look forward to the future. The post-war position is obscure, but if the terms of the L.P.T.B. Act can be implemented. the

present price of the "C" stock will look cheap.

Miscellaneous Matters

The quotable changes in the Home electricity group are few, but the market in the shares is strong. Looking well ahead, to-day's buyers anticipate increased dividends on the leading shares when the war is over. County of London are up 1s. at 45s. but, oddly enough, City Lights have dropped 1s. to 30s., and London Electrics have shed 6d., to 30s. 6d. Isle of Thanet at 19s. have gained 1s. on hopes of a dividend distribution. The Overseas list shows no alteration of consequence, but in the traction market, British Electric deferred is down 50 points to 1245. Calcutta Trams have gone back 2s. to 70s. 6d. The Home Railway stocks are dull and unbefriended. Southern Railway preferred is down a point to 74½. Thomas Tilling keep steady at £3. Cable & Wireless ordinary is lower at 82;

Cable & Wireless ordinary is lower at 82; Globe Telegraph, ordinary and preference, lost 6d. apiece. As a notable exception, Great Northern Telegraphs are 4½ higher at 30, the peace hopes serving to bring in buyers. Earlier this year the price fell to 19.

Electricity Supply

The absorption of ordinary shares in the Home electricity list continues without intermission. Intimation that the ban upon lighting is to be partially lifted next Sunday has quickened the previous investment demand, and has brought fresh inquiries into a market that is seldom supplied with shares on any large scale. Would-be buyers find that they are frequently told that their wishes can be met provided they will consent to the bargain being done "not to press." This practice has no official Stock Exchange sanction. All bargains done under war conditions are—at any rate nominally for cash payment. If, however, a buyer particularly wishes to purchase certain shares of which there are none in the market at the time, he is not infrequently ready to agree to the proviso that, if he buys, he shall not press for immediate delivery.

Cossor Shares

The price of A. C. Cossor shares is a trifle easier at 24s, 6d. The company has declared a final dividend of 7 per cent., tax free, making 10 per cent. net for the year ended March 31st last. The net profit of £102,606 is £5,500 up, as compared with the previous year, which in its turn went against £51,600 in 1942. The company was formed to manufacture scientific and electrical instruments and apparatus. When the wireless industry began to take shape it started the manufacture of receiving sets, valves and other components. Besides this, Cossors

(Continued on page 394)

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ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

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Stocks and Shares (Continued from page 392)

are manufacturers of neon signs, television receivers and other apparatus and appliances. The present capital is £500,000 in ordinary shares of 5s. each, with a similar amount of 6 per cent, preference shares of £1. The yield on the ordinary at the present price comes to £2 0s. 9d, per cent., tax free, equivalent to £4 1s. 6d, per cent, gross with 10s, income tax. Electric & Musical Industries at 32s. 6d, and E. K. Cole at 30s. 9d, have given way in sympathy with the prevailing tendency round the markets.

Money and Peace

The argument frequently heard nowadays is that, after the war is over, the demand for capital in order to rebuild and reconstruct every branch of industry throughout the country, if not throughout the world, will be so great that money rates must inevitably advance. The scramble for capital will be enormous, and unless the Government is able tightly to control the position, the period of cheap money will quickly give way to another, during which money rates will be continually rising. The Government has on many occasions announced its intention to continue the cheap money policy, but it is doubted whether this can be maintained in the face of post-war requirements. On the assumption of a possibly increased cost of money, the prices of industrial shares have been declining from the levels touched a few weeks ago ; before, that is to say, the prospect of peace came so nearly into the picture.

East African Power

A sign of the times is the proposal of the East African Power & Lighting Co. to take powers to increase its capital by £250,000, bringing it to $\pm 1\frac{1}{2}$ million. The meeting is to be held at Nairobi on the 29th of this month, when the shareholders will be asked to sanction the proposal. The issue of shares is to be made at a suitable time, the money being required for extension of the plant and transmission lines. No doubt there will be many proposals of similar character forthcoming in the fairly near future. As has been said, it remains to be seen whether, in all the circumstances, the Government will be able to hold to its policy of cheap money.

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Electrical Specifications Recently Published

The numbers under which the specifications will be The numbers under which the specifications with op-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.

ALLMANNA Svenska Elektriska Aktie-bolaget.—" Method and means for operat-ing vapour ionic valves for current con-version." 18102 42. January 9th, 1942. (563683.)

Automatic Telephone & Electric Co., Ltd., and E. E. Comfort.—" Electromagnetic relays." 2390. February 12th, 1943. (563602.) F. C. Beekley.—" Microphones." 17445 42. December 26th, 1941. (563595.) British Insulated Cables, Ltd., W. P. Fuller

and J. G. Lauder.—" Extrusion presses for lead and lead alloys." 6805. April 29th, 1943. (563608.)

British Thomson-Houston Co., Ltd. — "Electric protective devices." 14413 42.
October 14th, 1941. (563587.) "Spacers for electrical windings." 6866 43. May 5th. 1942. (563610.) "Adhesive compositions." 14063 42. October 10th, 1941. (563624.) "Sealing arrangements for elastic fluid turbines and the like " 3465143 March 12th 1941.

and the like." 3465:43. March 2th. 1942. (563727.) "Electrical regulation systems." 4605:43. March 28th. 1942. (563731.) British Thomson-Houston Co., Ltd., and J. Dyson.—"Circuit arrangements employing thermionic valves." 6890. April 30th, 1943. (563698.)

Broom & Wade, Ltd., and C. B. Smith.— "Air or gas compressors." 7157. May 5th, 1943. (563741.) C. S. Bull.—" Electric transforming arrange-ments." 2849. February 20th, 1943. (563689.) C. L. Burdick. — "Rotary compressors, pumps, engines and the like." 2643. February 17th 1943. (563643.)

17th, 1943. (563603.) L. Burn and J. Harrison Carter, Ltd.—"Rotary impulse pumps." (Cognate applications 15713 42 and 18538 43.) November 6th, 1942. (563631.)

(563631.) Cinema-Television, Ltd., and L. G. Wyatt.— "Mounts for magnetic deflecting means."
2956. February 23rd, 1943. (563729.) G. M. Clark (Radio Corporation of America). —"Artificial silk or the like and the manufacture thereof." 16649. November 24th.
1942. (563590.)
E. K. Cole, Ltd., and C. E. White.—" Inductance coils for use in radio circuits. 5276. April 2nd, 1943. (563692.)
M. H. Detrick, Co.—" Furnace arch or roof construction." 16936 42. September 16th.

1942. (563593.)

General Electric Co., Ltd., and E. Fried-lander.—" Electric rectifying apparatus fed by a three-phase supply." 6979. May 3rd, 1943. (563702.)

General Electric Co., Ltd., R. C. Chirnside and L. A. Dauncey. — "Manufacture of powdered alumina." 2483. February 15th.

1943. (563693.) G. R. MacLean and H. Barder.— Safety devices for lifts, skips, cages and the like. 16651 42. December 23rd, 1941. (563591.)

Marconi's Wireless Telegraph Co., Ltd.— "Cathodes for electron-discharge devices." 13905 42. October 3rd, 1941. (563623.) "Detection system for very short waves. modulated in angular velocity." 1560 43.

modulated in angular velocity." 1560-43. January 30th, 1942. (563686.) F. Newton.—" Carbon pile regulators." 2886-43. February 21st, 1942. (563661.) Pirelli-General Cable Works, Ltd., and H. Barron.—" Manufacture of plastic com-positions." 14543. October 16th, 1942. (563625.)

Revo Electric Co., Ltd., and F. H. Reeves.— "Means for connecting electric lighting sources in flameproof enclosures." 4035. March 12th, 1943. (563667.) "Means of installation and adjustment in the location of electric lighting fittings." 4753. March 24th, 1943. (563733.)

P. S. Robinson .--- "Side lamps and direction indicators for motor vehicles." 2841. February 20th, 1943. (563660.)

Rotax, Ltd., and R. H. Woodall.—" Ignition magnetos." 2720. February 18th, 1943. (563639.)

A. E. Salisbury and R. Towers.—" Methods of stripping insulation from wires." 3716. March 8th, 1943. (563664.)

R. C. Sowood and Ferguson, Pailin, Ltd.— "Electric cartridge type fuses." 588. January 12th, 1943. (565600.) Standard Telephones & Cables, Ltd. (Inter-

national Standard Electric Corporation) .-"Automatic or semi-automatic telephone or like exchange systems." 3986. March 11th, 1943. (563666.)

Standard Telephones & Cables, Ltd., and M. M. Levy.—" Arrangements for regulating the outputs of sources of electric waves." 1531.

January 29th, 1943. (563659.) Standard Telephones & Cables, Ltd., H. Wolfson and S. C. Shepard.—" Methods of securing wires to metal surfaces." 2880. February 22nd, 1943. (563690.)

L. W. E. Townsend.—" Manufacture of electrical insulating sleevings and braids." 2609. February 17th, 1943. (563637.)

Western Electric Co., Inc.—" Electric wave translating systems." 6857 43. May 16th, 1942. (563696.)

Westinghouse Electric International Co.— "Moulded articles." 9972 42. July 17th. 1941. (563619.) "Pneumatically actuated electric circuit interrupters." 2738 43. February 18th. 1942. (563641.) "Electric circuit interrupters." 2739/43. February 18th. 1942. (563642.) "Pneumatically actuated electric circuit inter-rupters." 8177 44. February 18th. 1942. (Divided out of 563641.) (563646.) "Electric elevator systems." 746 43. January 14th. 1942. (563684.)

S. Y. White.—" Frequency selective network." 12241 42. April 1st, 1942. (563620.)

Amended Specification.

H. A. Brassert & Co., Ltd.—" Electric arc furnaces." (550216.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

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

Burnley.-September 18th. Town Council. Supply of electric lamps to institutions, hospitals, clinics, etc., for the period from October 1st to March 31st, 1945. Public Assistance Officer, 20, Nicholas Street, Burnley.

Chepping Wycombe .--- September 25th. Town Council. Supply and installation of an additional multi-stage high-lift centrifugal surface pump and electric motor to pump 50,000 g.p.h., together with control and switchgear, etc.— S. Young, borough water engineer, 70/71, Easton Street, High Wycombe (deposit £2 2s.).

New Zealand.—November 28th. Public Works Department. Plant for Maraetai power station and 220-kV substations; turbine and generator plant; transformers; switchgear; synchronous condensers; overhead travelling crane, etc.

North-West Midlands. — Joint Electricity Authority. October 10th. Various works in connection with new power station. Forms of tender and specification may be obtained from Sir Alexander Gibb & Partners, Queen Anne's Lodge, Westminster, London, S.W.1 (returnable deposit of £5 5s.).

Plymouth.—September 30th. City Electricity Department. Low voltage distribution board with accessories, and two outdoor transformers. (See this issue.)

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.

Aylesbury.—Sewage disposal works at Quainton (£10,140) for R.D.C.; surveyor, Council Offices, Buckingham Street.

Barnstaple.—Kitchen and canteen (£2,508); Perry & Son, builders, 104, Northwold Road, Clapton, London, E.5.

Bolton.-Extensions, Commercial Institute, Manchester Road; Walter Lord. Workshop, Parker's Court; J. W. Priestland.

Bournemouth.—Canteen, 612, Wimborne

Road; Progressive Engineering Co. Chaldon (Surrey).-Dairy, Willey Farm; Guy

Morgan & Partners.

Cheltenham.-Extensions, flour mills, Winchcombe; Winchcombe Flour Mills, Ltd.

Extensions, machine shop, Prestbury Road; W. W. Jenkins.

Experimental houses; borough engineer.

Edinburgh.—Dispensary at Western General Hospital, and clinics in Firrhill and West Pilton districts; city architect.

Howden.-Dining room and kitchen at Council School, Eastrington; surveyor, Rural Council Offices, Howden, Yorks.

Kilmarnock. — Wartime nursery (£2,830); burgh surveyor.

Leeds.—Proposed community centre, etc., Farnley Hall and grounds, for Parks Com-mittee; W. S. Cameron, city engineer.

Liverpool.—Therapeutic block at Walton Hospital; city engineer, Municipal Buildings, Liverpool, 2.

Motherwell.—Workshops in John Street (£2,756) for Lanarkshire Welding Co.; manager.

Canteen (£5,268) for Alex. Findlay & Co., Parkneuk Works; manager.

Newcastle-on-Tyne, —Erection of factories for letting; city engineer.

North Riding.—Houses for farm workers at Old Hall Farm, school dining centre, Barker Road, Thornaby, and depot at Richmond for the Highways Department; county architect, County Hall, Northalierton.

Oxford.—Training school for apprentices: Morris Motors, Ltd.

Port Glasgow.-Houses (448) for Town Council after the war; Boston, architects, Glasgow. Frank Burnet &

Sheffield.—Adaptations and conversions at properties at 375-385, Glossop Road, 62, Glen Road, and 30, Oakhill Road, for Estates Com-mittee; W. G. Davies, city architect, Town Hall. Meat preparation and cold rooms (£5,446);

J. Laver & Sons, Ltd., contractors, 44, Greenhill Road, Woodseats.

South Shields .- Factory for the Government: Gerrard & Sons, builders, Swinton, near Manchester.

Stanley.-Factory premises; Wakefield Shirt Co., Ltd.

A.S.E.E. Programme

THE Association of Supervising Electrical Engineers has arranged an attractive pro-

gramme of meetings for the forthcoming London lecture session. With one exception, these are to be held at the lecture theatre of the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2, through the courtesy of Mr. W. J. Jones, director of E.L.M.A.

director of E.L.M.A. The opening meeting will be on Saturday. October 21st at 2.15 p.m. when there will be a display of technical films after which the president will give his address. Subjects and lecturers at later meetings are as follows:-Saturdays, 2.15 p.m.; November 11th (joint meeting with Institution of Engineers-in-Charge at Magnet House), "Some Applications of Electronics," by Mr. F. E. Henderson; Decem-ber 9th, "P.V.C. in Practice," by Mr. P. H. Barton; January 13th, "Installation, Main-tenance and Operating Problems of Theatre Lighting," by Mr. L. G. Applebee; and February 10th, "Distribution of Electricity in London," by Mr. E. H. Jesty. Tuesday, 6.15 p.m.; March 20th, "Esti-mating," by Mr. W. H. Brooks; April 17th, "Electrical Installations for Post-War Build-ings," by Mr. E. J. Sutton; and May 15th, winning entries in Branch Papers Competition.

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CLASSIFIED **ADVERTISEMENTS**.....

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to First post on Monday, at Dorset House, Stamford Street, London,

S.E.1. **THE CHARGE** for advertisements in this section is 2)- per line (approx. 8 words) per insertion, minimum 2 lines 4/-, or for display advertisements 30/- per inch, with a minimum of one inch. Where the advertisement includes a Box Number there is an additional charge of 6d. for postage of replies. **SITUATIONS WANTED**. — Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES TO advertisements published under a REPLIES TO advertisements published under a Box Number if not to be delivered to any particular firm or individual should be accompanied by instruc-tions 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, Stam-ford Street, London, S.E.I. Cheques and Postal Orders should be made payable to ELECTRICAL REVIEW LTD, and crossed. REVIEW LTD, and crossed.

Original testimonials should not be sent with applications for employment.

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CITY OF PLYMOUTH ELECTRICITY SUPPLY DEPARTMENT

THE Plymouth Corporation invite Tenders for the supply and delivery of the following equipment :-

Low Tension Distribution Board with Accessories.
 Two Outdoor Type 3-phase Transformers.

(2) Two Outdoor Type 3-phase transformation Specifications and Forms of Tender may be obtained from the City Electrical Engineer, Armada Street, Plymouth. Completed tenders must be returned to the undersigned not later than noon on the 30th September, 1944. COLIN CAMPBELL, Town Clerk. 610

SITUATIONS VACANT

COUNTY BOROUGH OF SWANSEA

Electricity Department

Appointment of Deputy Chief Engineer

A PPLICATIONS are invited from persons not over the age of 45 years for the above position, at a com-mencing salary of £900 per annum, rising by annual in-crements of £50 to £1,100 per annum, plus a war bonus, variable by the Council from time to time (at present 33 lds, per annum), and a car allowance (at present £50 per annum). The appointment will be subject to the Local overnment Superannuation Act, 1937, and the successful subleant will be required to pass a medical examination. Specialised knowledge and experience of the installation operation and maintenance of large and up-to-date station into is indispensable. Candidates should possess an engineering degree and/or

plant is indispensable. Candidates should possess an engineering degree and/or the Corporate Members of the Institution of Electrical Engineers, have held a similar position of major responsi-bility in a large selected generating station of not less than 100,000 kWs, and have sound administrative ability and experience in the control of staff. Applications, which must be made upon a prescribed form obtainable from the Borough Electrical Engineer and Manager, Guildhail, Swansea, together with copies of not more than three recent testimonials, must be delivered to the undersigned not later than Thursday, the 18th Schember, 1844. Canvassing, either directly or indirectly, is prohibited and will be a disgualification. T. B. BOWEN.

T. B BOWEN.

Guildhall, Swansea. 7th September, 1944.

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Town Clerk. 622

A ^N old-established engineering firm. Midlands, manu-facturing industrial and marine steam turbines, quires the services of a first-class Engineer to assist in team turbine design, research and development. Permanent osition with post-war prospects. Pension Salary nom 5600 according to qualifications and experience. publicants should write, quoting C2166XA. to the M Labour and National Service, Room 432, Alexandra souse, Kingsway, London, W.C.2. for the necessary arms, which should be returned completed on or before sth September, 1944.

WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

Appointment of Power Station Superintendent

THE above-named Authority invite applications for the position of Power Station Superintendent at a generating station in the West Midlands, Class H, Grade 3, on the National Joint Board Schedule, present salary £654 per annum, with an additional £60 per annum for load-

The anom, with an additional Scheidule, present sainty and control responsibilities. The appointment will be subject to the Authority's Superannuation Scheme under the Local Government Superannuation Scheme under the Local Government Superannuation Act, 1937, and the selected candidate will have to pass a medical examination. Candidates must have had a thorough works training and a wide experience involving senior responsibility in the operation and maintenance of an electricity generating station. Corporate membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers will be an advantage. Applications, stating age, education, experience and mersent occupation, accompanied by copies of three recent testimonials and endorsed. "Power Station Superinten-dent." should reach the undersigned not later than the 29th September, 1944. Canvassing, either directly or indirectly, will disquality. H. F. CARPENTER.

H. F. CARPENTER, Clerk and Manager. Phœnix Buildings, Dudley Road, Wolverhampton, 29th August, 1944.

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CITY OF MANCHESTER EDUCATION COMMITTEE

Newton Heath Technical School (Principal: R. Saunsbury, M.Sc., M.Ed.)

R EQUIRED to take up duties on 1st October, or as soon after as possible, a Teacher of Mathematics who would be prepared to take an active interest in the cor-porate life of the School. Candidates should have suitable qualifications and teaching experience. Salary according to Burnham Scale for Technical Schools. The vacancy is caused by a retirement. Application forms and conditions of appointment may be obtained (stamped addressed envelope) from the Director of Education. Education Offices. Deansgate, Manchester, 3. and completed forms should be returned to him by 25th Sentember.

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Idresseu ... DOUGLAS H. INGALL, Principal. 604

ELECTRIC Cooking and Water Heating Engineer-Manager required in medium size works producing Electric Water Heating Equipment, etc., of various types for the Government, also the development from patented prototype cookers to final production, full range contem-plated. Applicants should possess experience in the design and production for economical output. Modern cutlook and capable of the control of staff. The position is a progressive one and offers scope for development. Appli-cunts are invited to state the salary required and their experience in confidence.—Box 6238, c/o The Electrical Review. Review

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ELECTRICAL Wholesalers require a Clerical Assistant, conversant with trade and materials as handled.— London Electrical Co. (Blackfriars) Ltd., Blackfriars Road. SE1

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Payme Bros. 7, Station buildings, Cattoro. Phys. 609 L EADING firm of electrical manufacturers has a number for vacancies for post-war Technical Representatives. Sound technical education with works and drawing office training essential. Experience in the installation and maintenance of distribution equipment an advantage. Applications will be considered now. Reply, giving parti-culars of age, education, training and experience, to—Box culars of age. education, train 15, c/o The Electrical Review.

15. c/o The Electrical Review. LEADING manufacturers in electrical and mechanical engineering products require a number of first-class Technical Journalists, sound electrical and general engineer-ing knowledge essential, must have ability to absorb technical detail and design of engineering products and to write lucid descriptions for the company's publications and for the technical press. Applications will be considered from those who will be available on cessation of hostibilities as well as from those free for immediate engagement. Applicants should write, stating age, previous experience and salary expected, to—Box 593, c/o The Electrical Review.

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or before 26th September. 1444. 608 The Berger Schuler Schult and Schult Schul

SALES Manager required by a nationally known pro SALES Manager required by a nationally known pro-gressive and virile organisation holding a leading position in the radio industry. Mature business experience and the ability to gain the confidence and respect of both inside and outside staff are essential qualifications. Arrange-ments will be completed immediately, but applications from suitable men now engaged on national service will have every consideration. Apply, with comprehensive details of experience, age and highest salary previously earned and salary now expected, to -Box 623, c/o The Electrical Review. SALES Manager required for firm of Electrical Manufac-turers. Should be well introduced with electrical manufacturing companies throughout the country. Very good prospects for energetic man.-Box 627, c/o The Electrical Review. GALES Representative for Scotland, permanent progres-

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SALES Representative for Scotland, permanent progres-sive position for man with knowledge of power appli-cation of A.C. and D.C. motors. Apply—Higgs Motors Ltd., 74, York Street, Glasgow, C.2. 618 TECHNICAL Manager required for design section of firm manufacturing F.H. and H.F. Motors, good theoretical electrical qualifications necessary and practical experience of F.H. motors very desirable, good prospects for right man. Applications in confidence. State age, education, experience and salary required. Box 582, c/o The Electrical Review.

APPOINTMENTS FILLED

Dissatisfaction baving been so often expressed that un-successful 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.

STRETFORD and District Electricity Board – Junior Shift Engineer: Halifax Corporation—Control Room Attendant.

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September 15, 1944 ELECTRICAL REVIEW

ELECTRICAL Engineer with 15 years' power and light enrent erbertence, including communication, desires in London, Knowled, of Russian and other languages. The Electrical Review. ELECTRICAL Supervising Engineer (45), disengaged, responsible for works' maintenance and installations, contracts, etc. — Years' experience, desires similar posi-tion, London or S. Counties preferred. —Box 6177, c/o The Retrical Review.

ontracts, etc., in years expreince, desires similar posi-tion London or S. Counties preferred. —Box 6177, c/o The EMGINEER, B.Sc. Eng. Lond., A.M.I.E.E., age 31, prac-tical working knowledge and manufacture of trans-time transformer and the second second second second preference and the second second second second second ratios. Experience in development and research supervise of the second ratios. Experience in development and research supervise of the second methods. Second second second second second second second research second second

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