HEAVY GUN MAKING

ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXV. No. 3495 NOVEMBER 17, 1944 9d. WEEKLY

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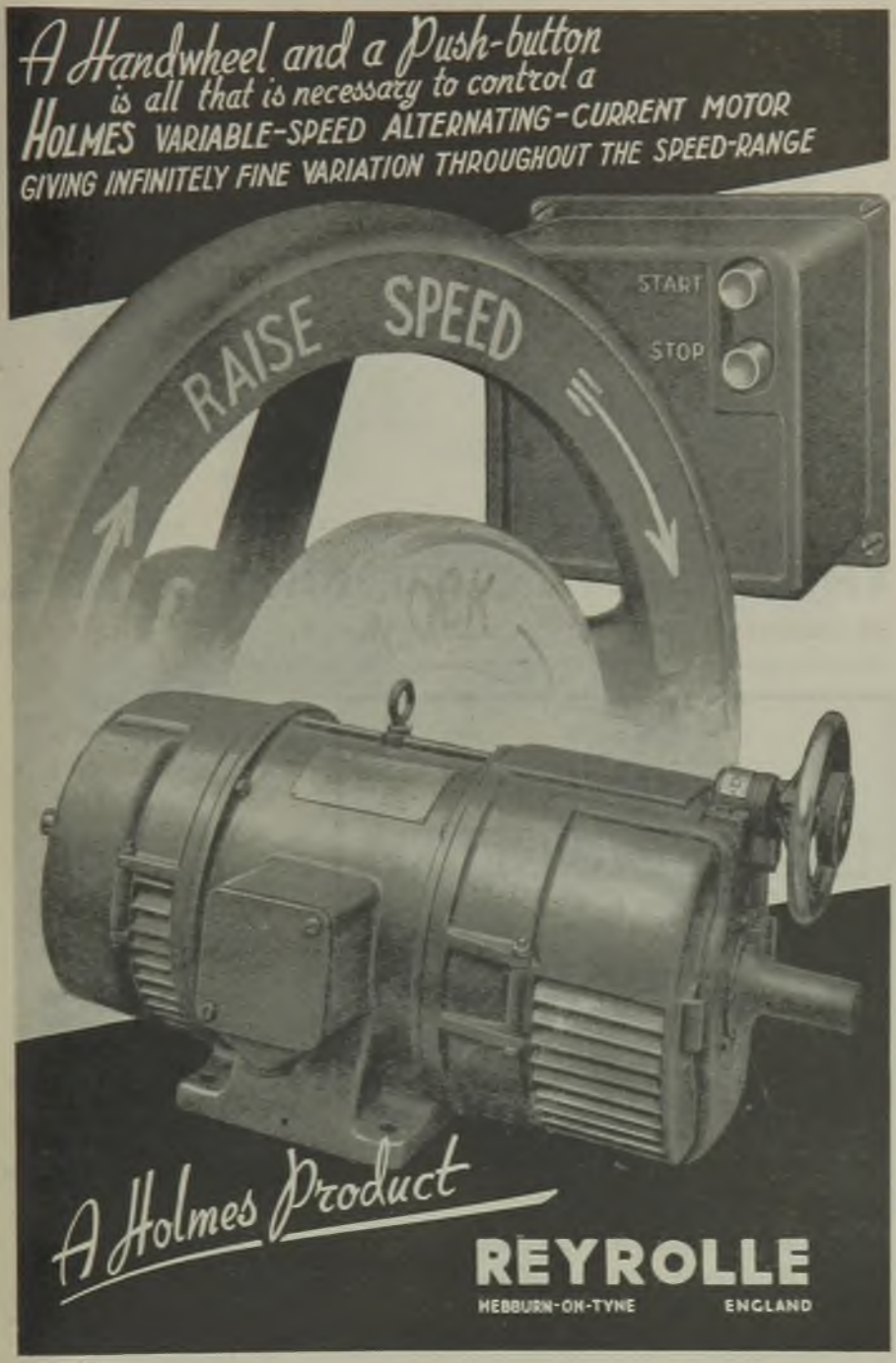
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ELECTRICAL REVIEW

November 17, 1944

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Designer and User

Achieving Desirable Collaboration

HOWEVER scientific the basis on which a piece of electrical apparatus and—quite as important—its accessories may be constructed, they are unlikely to give satisfaction unless they can be easily installed, stand up mechanically to ordinary rough usage and give reliable service without heavy maintenance costs over a number of years. That by itself would be warrant enough for the use of the term "electrical *engineers*." A frequent though unavoidable cause of shortcomings is insufficiency of "field" experience on the part of designers, who obviously cannot afford the time to become thoroughly conversant with all operating contingencies.

Practical Trials

A short cut to the acquisition of such experience in connection with domestic electrical accessories was mentioned in the paper presented before the I.E.E. Installations Section by Mr. F. C. Fuke last week. His suggestion was that the designer should himself connect up a model in an awkward position and then get a wireman to do the same and give his opinion. This would go only part of the way, however, as it would provide little indication of performance over a period of time, and what the designer would regard as minor and soon remedied defects in his own well-maintained installation might prove major troubles to consumers at large.

A notable example of effective co-operation between designers and users for the improvement of specific electrical equipment was described the previous evening in a Transmission Section paper, in which Mr. D. B. Irving reviewed the performance during twelve years of cable terminations on the grid at all standard voltages from 3·3 kV upwards. The point here is the value of the facilities placed at the disposal of cable makers for conducting tests under service conditions in conjunction with the staff of the Central Electricity Board. The claim of the author that this policy has contributed materially to progress appears to be fully justified in the results achieved.

Builders and Cheapness

Collaboration of this kind between engineers of high qualifications does not offer the same difficulties as those inherent in catering for domestic consumers. Comparable technical attainments are not generally available or, in the case of the ultimate users, are non-existent. Not the least of the obstacles is the type of builder who accepts the lowest tender without expert advice as to its merits in regard to safety or convenience. There have been, of course, deficiencies on the production side. One has been a lack of imagination in failing to grasp the implications of electrical developments as they occur. An instance is the legacy from obsolete DC practice still found in tumbler-switch breaks, which was discussed at length in Mr. Fuke's paper. Another is the nuisance from the householder's point of view, of the usual method of fuse renewal.

The ultimate aim of the designer, as Mr. Irving pointed out, is to produce equip-

ment on the basis of exact calculation. To ensure the fullest use of available technical knowledge there must be the fullest exchange of ideas between the parties in the various stages between producer and consumer, especially at the present time when the potentialities of new materials and new methods invite exploration. Only in this way can the designer deploy all the means at his disposal to meet the demand for electrical apparatus that best serves the needs of the user at a price which he is willing to pay.

Commons Improvements

IT is good news for members of the House of Commons that their new chamber is to be equipped with a complete air-conditioning system and adequate lighting. In both respects the old building was seriously lacking. It may be presumed that electrical methods will be employed and thus M.P.'s will be given a practical and permanent demonstration of the advantages of electricity which may have a beneficial influence when in the future they are considering legislation affecting the industry. Of course it may be argued that the perpetuation of the former outmoded system might have made them even more anxious for electrical development.

Expert Advice

WE report in this issue the appointment of Mr. J. C. Leslie, an experienced agriculturist, to advise the Edmundson group in matters relating to rural electrical development. Commenting on this matter in last week's *Farmer and Stockbreeder*, "Blythe" (a regular contributor) says :—"Possibly existing officials in such enterprises may look askance at such a move on the score that selling electricity to farmers is just an extension of established practice, but this is not so. The needs of farming are peculiar and if such a venture is to succeed (and it must not fail) then it must be guided intelligently by someone who is fully aware of its potentialities and limitations."

Big Business

THESE remarks were prefaced by the contention that "up to now rural demands have, generally speaking, been summarily rejected as an uninviting business prospect." And yet the Minister of Agriculture has stated that the income of the farming industry for 1943-44 was £540 millions, which, says "Blythe," "conjures up considerable possibilities." He draws attention to the increased demands for apparatus, machinery and household requisites which seem to possess great potentialities for ancillary industries. While we do not subscribe to his accusation of "summary rejection," we must agree that there is plenty of scope for more activity in this direction. But due attention will have to be paid to the question of responsibility for the heavy capital costs which are so often involved.

Fault Data

IT is generally recognised that the electrical industry would benefit materially through the establishment of a central organisation for supervising the collection and analysis of reports of plant breakdowns to be returned by undertakings on a common basis. In July of last year we published an article by Mr. J. A. Sumner (who at Norwich operates a local scheme in conjunction with the East Anglian Co. and Great Yarmouth Corporation) in which he put forward constructive proposals to cover undertakings throughout the country. The Electrical Research Association is, we understand, now prepared to accept the co-ordinating responsibility for which it is well equipped, both in experience and in facilities available, and has set up a new subcommittee for the purpose. It rests with engineers of supply undertakings to collaborate fully in order to make the scheme the success it ought to be, since their practical experience of how apparatus works under day-to-day conditions is an invaluable aid to progress in design.

London's Lighting

MR. HERBERT MORRISON announced last week that London was to be permitted the higher standards of street lighting which have been allowed in other parts of the country since September 17th. In making this statement Mr. Morrison mentioned the fact that there were nearly a hundred lighting authorities in the London area. For this reason it may be anticipated that there will be, as always, a considerable variation in conditions from district to district, a point which was dealt with by the London and Home Counties J.E.A. over four months ago. The Authority suggested that the

Government Departments concerned should take action to ensure co-ordination between the lighting authorities in its area. The reply of the Ministry of Home Security was that the question would be considered "at the appropriate time." Surely the appropriate time is now before full lighting is resumed and while the necessary preparations are being made.

Fruits of Co-operation

ONE of the criticisms to which the electrical industry has been subjected has been that the various interests could not "get together." Details just announced of the plans of E.D.A. and B.E.A.M.A. for meeting the post-war needs for electrical equipment in kitchens show how ill-founded this contention is when a matter of real importance is involved. In thus co-operating, manufacturers, while wisely not committing themselves to completely standardised equipment, have achieved a substantial measure of agreement with regard to vital external dimensions and replaceable parts which will assist considerably in securing the more widespread use of electrical apparatus. With the exact size of appliances known, proper planning of the kitchen is at last made possible, and with it the most efficient use of space and provision of the most labour-saving conditions. The advantage too of being able, say, to replace the compressor unit of a refrigerator by one of a different make is a big advance from the service point of view.

Washing Machines

MOST electrical people if asked to name domestic apparatus in order of number used would put the electric washing machine well down in the list. While this is true in our own country, among the farm homes of Ontario electric washers are more extensively used than any other type of electrical apparatus except irons and radio sets. Altogether there are over 40,000 compared with 12,000 cookers and 4,000 water heaters. The reason for this is no doubt the considerable saving in labour in laundering for a large number of farm hands. In this country, with small average families and the availability of commercial and communal laundry facilities, there is not the same scope for developing the sale of domestic machines. The suggestion tentatively made by Mr. N. H. Bridge at a recent E.D.A. Area sales conference that such machines might perhaps be hired would, if found practicable, undoubtedly do much to extend their use. Unlike the wash boiler, there is no effective gas counterpart to the electric washing machine.

Chimney Emissions

FOR preventing the emission of grit to an appreciable extent from power station chimneys, the practice of electrostatic precipitation of solid particles in the flue gases is well established. It was the method recommended in 1932 for adoption in pulverised fuel stations by a technical committee set up by the Electricity Commissioners to report on the subject as a whole. Pulverised-fuel firing was then in use in 14 per cent. of selected stations, but with the wider variety of fuels that may be allocated in future to the generation of electricity, its scope will probably increase. Although anthracite duff, which Mr. John Bruce more specifically discussed in his I.E.E. paper, may not have a wide application, many of the problems which are associated with its combustion are found to be common to other fuels.

New Birkenhead Station

REFERENCES have appeared in the daily papers to a new power station to be erected at Bromborough, Cheshire, by Birkenhead Corporation at a capital cost of £3,500,000. This will be one of the two stations scheduled in the Amending Scheme for North West Midlands and North Wales, which was published in 1940 and reported by us at the time, but it appears that the construction of this station is now regarded as a matter of urgency. The installation will comprise initially two 50-MW sets, but details of design are not yet available. It may be anticipated, however, that in common with other stations which are to be provided to meet post-war requirements, steam conditions will represent an appreciable advance on present general practice.

Dielectric Stress

By an unfortunate printer's error a note in our last issue on power cable design contained a reference to a maximum dielectric stress of 5,000 V per *mile*. Actually the stress is a little greater than this—it should have been per millimetre (mm.).

Heavy Gun Making—I

Precision Machining Operations

A 5·5-in. howitzer in action

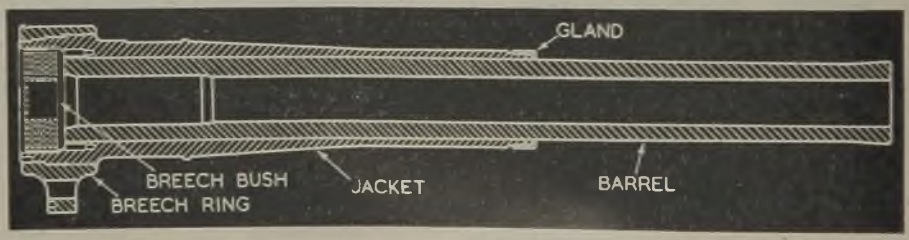
THIS article deals with the electrical applications to heavy gun manufacture as we saw them undertaken recently in a British factory, by courtesy of the Ministry of Supply. Various sizes and types of guns are produced, but because of such practical considerations as limitations of time and space, we decided, in co-operation with the factory management, to confine our attention to one particular calibre, the well-known 5·5-inch howitzer, and to deal solely with the major operations on the main components.

We were able to follow this chosen procedure throughout, except for the illustrations. We could not always see, just at the time we were ready to photograph a particular operation, the component of the type of gun we had in mind, in the appropriate machine, and we therefore photographed the machine with the corresponding component of whatever type and size of gun it happened to be dealing with at that moment. With this minor exception we believe the outline picture we have attempted to portray is true to our objective.

It may be a good thing at this stage to define our use of the term "gun," by which we mean the assembly of the barrel, jacket, breech ring, and the breech bush and mechanism, the breech screw being regarded as an integral part of the mechanism. The raw materials for the production of the barrels, so far as this particular factory is concerned, are forgings which are received rough-machined and heat-treated, with a hole pierced right through the barrel as part of the rough machining operation. Actually, in order to help to present the correct picture, we illustrate with the rough-machined and heat-treated forgings for 5·5-inch barrels, some rough barrel forgings (not 5·5 inch) before rough turning.

The first major operation on the barrel is that of opening out the original pierced hole. This is a "push" boring operation which is carried out in one selected case on a Loudon hollow-spindle gun-tube boring machine by the use of a "Dee" bit. This machine has a 32-in. diameter hole in the headstock, and is designed to accommodate tubes up to 28 ft. long.

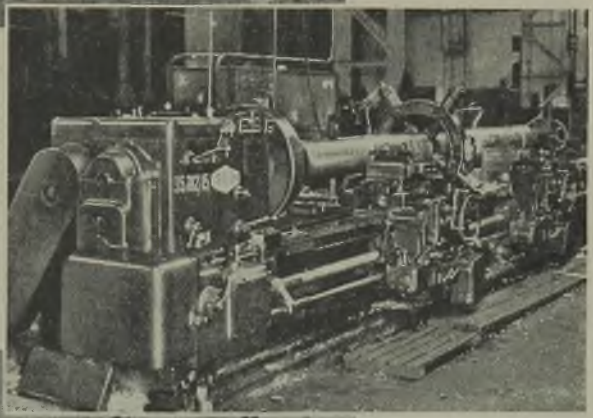
There are twelve spindle speeds from 1·6 to 60 RPM, and 24 boring bar feeds from 0·017 in. to 5·7 in. per minute. The spindle drive is by means of a Lancashire slip-ring, 40-HP, 725-RPM motor, while the feed and quick-traverse drive are by a motor of similar make and type, 7½ HP, 1,430 RPM, coupled directly to a gear box at the end of the

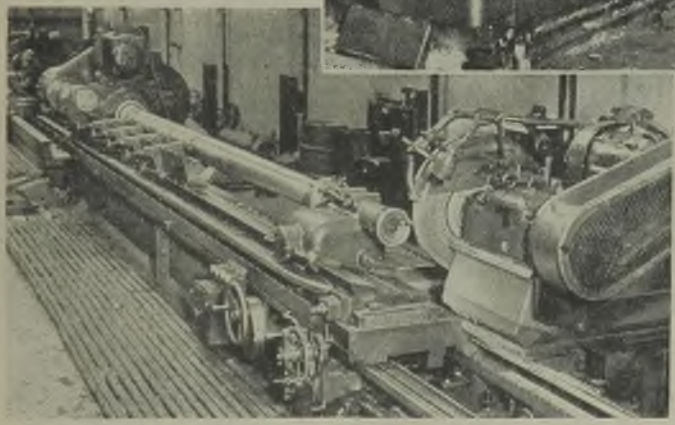


The term "gun" in this article means the assembly of the barrel, jacket, breech ring, and the breech bush and mechanism

machine. Situated in a pit at the back of the machine there is also a 12½-HP motor operating a suds pump which has a capacity of 60 gal. per minute at 175 lb. per sq. inch. Igranic contactor gear with push-button control is responsible for the operation of all these motors.

The second major operation on the barrel is that of rough turning the exterior, which is carried out in one instance on a Craven centre lathe with 14-in. centres and 25 ft. between the centres. The machine has a swing over the saddles of 20 in. and a swing over the bed of 28 in. There are sixteen spindle speeds from 1·5 to 145 RPM, eight sliding feeds of from 1/60 in. to ¼ in. per min., and eight surfacing feeds of from 1/120 in. to ⅛ in. per min. The two saddles each have sliding, surfacing, screw-cutting and taper-turning motions. The screw-cutting range is from 2 to 20 threads per inch, while tapering can be effected in 34 sections up to 0·25 in. diameter per inch of traverse. The main driving motor for this machine is a 12-HP, 960-RPM, slip-ring equipment situated behind the headstock and transmitting through multiple V-belts. Control is by B.T.H. contactor gear. There is a separate quick-traverse and feed motor on each saddle, while an individually driven suds pump is located in a pit behind the machine. Checking for truth leads, in some cases, to the third major barrel operation of straightening which we are describing in another article.



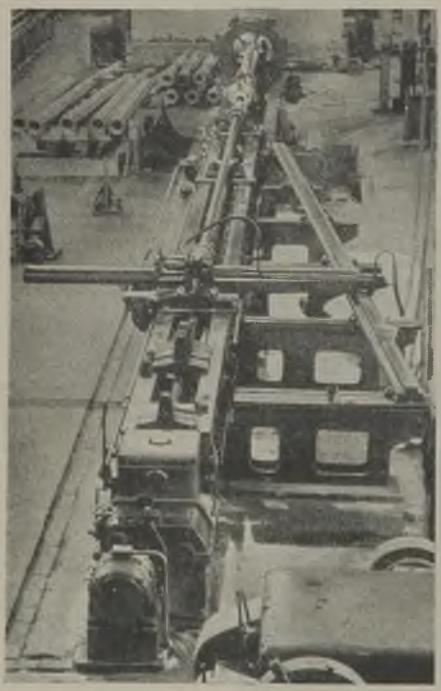


Top: The raw materials for the production of the barrels are forgings which are received rough-machined and heat-treated, with a hole pierced right through the barrel as part of the rough machining operation
Centre: The second major operation of rough turning the exterior is carried out on a centre lathe with 14-in. centres
Left: The final barrel operation of exterior grinding is carried out on a 20-in. diameter gun-tube grinding machine

The next major operation on the barrel is further opening out of the bore, and this is carried out on a hollow-spindle gun-tube boring machine such as that already described for the earlier boring operation, but in this case "draw" boring instead of "push" boring is employed. The draw boring head may be conveniently considered as in four sections, cited in the order in which these enter the barrel, *i.e.*, the

pilot or nib rings which have been machined to the diameter of the bore produced by the "Dee" head; the roughing cutters; the lignum vitæ pilot strips, of which there are four equally spaced round the drawhead, the diameter of these strips being greater than that produced by the roughing cutters, so that they "bite" into the bore; and the finishing cutters. A further exterior turning is next imparted to the barrel, but this is similar in all respects to the second major operation to which we have referred in detail.

Honing the barrel interior is the next operation, and is a process for producing a smooth finish on the bore, rather like the finish imparted to automobile engine cylinders. We saw it conducted on a Barnes horizontal honing machine in which a reciprocating movement is imparted to the spindle carriage by a reversible hydraulic system while the spindle is rotated electrically on the carriage. The maximum travel of the spindle is 22 ft., while the rate of feeding



Rifling is effected on a machine with a 26-ft. run and a 29-in. diameter barrel reception equipment

varies from 1 to 90 ft. per minute. The spindle is driven by a direct-on-line started 25-HP, 1,460-RPM, slip-ring motor situated on the spindle carriage and directly coupled to the gear box. The reciprocating movement is served by a 15-HP, 1,000-RPM motor situated behind the head of the machine and coupled directly to a Vickers hydraulic pump on the head of the machine. A 1-HP motor-driven coolant pump is attached to the bed at the back of the machine. All the motors on this machine are controlled from a push-button panel at the machine front.

The barrel may be said now to have reached the first stage of completion, and in consequence ready for auto-frettage, *i.e.*, a process of strengthening the barrel which replaces the earlier method of winding the barrel with wire. Closely associated with this process is the heat treatment of the barrel, and because both of these processes and their equipments are unique in character by reference to general engineering-shop operations, we propose to make them the subject of a second article.

The major operations after the auto-frettage and low-temperature heat treatment are further opening out of the bore by "draw" boring, similar to the draw boring at an earlier stage, and further exterior finishing. The barrel chamber, *i.e.*, the part of the gun which receives the explosive charge, is now created by boring operations at the appropriate end of the barrel, similar to those described already for the barrel as a whole.

Rifling Process

The barrel is next rifled, which means that spiral grooves are cut in the barrel bore for the purpose of engaging a copper band on the projectile, so as to impart a rotary motion to this during its passage from the gun. Rifling is effected on a Craven machine with a 26-ft. run and a 29-in. diameter barrel-reception equipment. It will rifle a maximum bore of 6 in. diameter, while the maximum traverse of the rifling carriage is 29 ft. The range of the spiral over the maximum rifling length is from 0 to 2·52 revolutions. A tangent bar, which is an angular projection at the side of the machine, which engages a rack operating a pinion, so as to give a rotary movement to the spindle, has an adjustment of from 0 to 9 deg. It will thus be seen that the combined oscillating and rotary movements of the spindle produce the spiral.

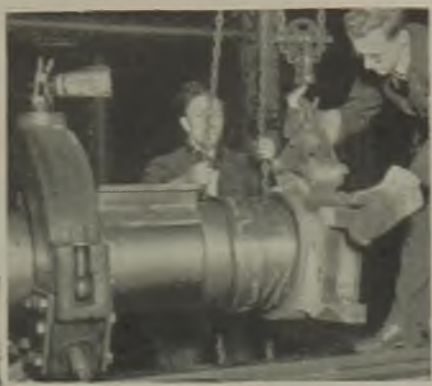
The rate of machine feed ranges from 5 to 30 ft. per minute. The "Metrovick" driving motor is a squirrel-cage 10-HP, 725-RPM unit situated on the gear box base plate at the end of the machine and directly coupled to the change-speed gear box. Watford contactor gear controls the operations of this motor. A 1-HP motor serves the suds pump in a tank at the back of the machine, which pump has a capacity of 4 gal. per min. at 250 lb. per sq. in.

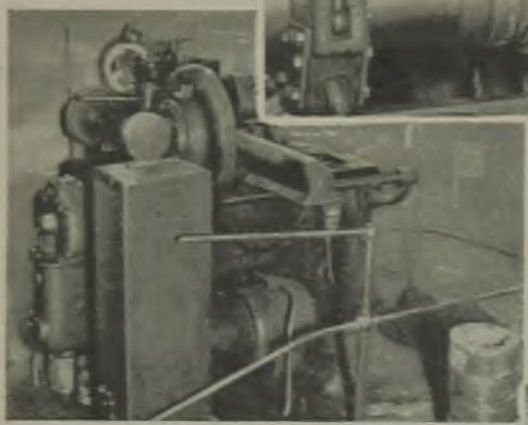
The final machining operation on the barrel is exterior grinding, by which a good interference fit of the tapered barrel is afforded in the jacket. This work is carried out on a

20-in. diameter Norton gun-tube grinding machine with 18 ft. between the centres. The 3-in. grinding wheel is 30 in. in diameter and the three speeds are 835, 960 and 1,220 RPM.

The feeds afford reductions in the work diameter of from 0·0005 to 0·003 in., and the headstock speeds range from 9 to 36 RPM. There is a selection of twelve table travel speeds from 6 to 84 in. per min.

For the work feed there is a B.T.H. compound-wound variable-speed (500 2,000-RPM) 10-HP motor mounted on the headstock and transmission is by V-belt to the gear box. The Brook 20-HP, 1,500-RPM, squirrel-cage motor serving the grinding wheel is mounted on the grinding table and transmits by multiple V-belt, while the 2-HP, 1,430-RPM similar motor for the travel table is housed at the back of the machine bed. A 1-HP motor-driven coolant pump is mounted on the coolant tank. All three of these motors are governed from an Electrical Apparatus Co. push-button control panel at the front of the machine.



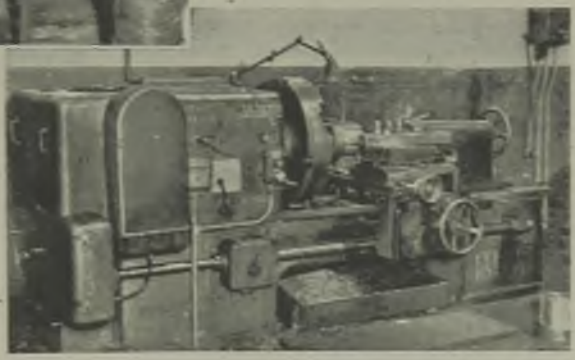


The breech bush is dealt with on a shaping machine with a special attachment for cutting the swing clearances

The operations referred to up to this point complete the production of the barrel, and they also apply, with certain minor modifications, to the production of the jacket, which has a tapered interior to suit the tapered exterior of the barrel. For the tapering on the gun-boring lathe a special tapered boring bar and slide are used. The jacket is now ready for the assembly of the breech ring, which is produced by normal lathe and milling types of operations. For this assembly the jacket is inserted into a centre lathe which is used in imparting a rotary motion to the jacket when the breech ring is finally screwed home.

For the assembly of the breech ring to the jacket, the jacket is held in a centre lathe by which the jacket is turned to screw it into the ring

The breech ring is shrunk fitted on to the jacket, and for this purpose is heated before assembly by coal-gas jets to the correct temperature, which is determined by a portable electric pyrometer. The breech ring is engaged on the thread and the lathe is then turned to screw the jacket into the ring. The jacket and breech ring are now finish-machined on centre lathes, milling machines, horizontal borers, and shaping machines, and the shaping operation involves cutting interruptions in the way of the screw thread in the jacket where the breech bush fits. With a normal continuous thread the screwing of the breech bush into the jacket would be a lengthy operation and hence undesirable in service. By removing the threads at four equally spaced positions on the jacket and



The thread step-cutting of the breech screw is effected on a stepped-thread cutting lathe

having corresponding interruptions on the thread of the breech bush, it is possible to push the bush into the jacket and lock it in a simple manner by giving the bush an eighth of a turn in the correct direction.

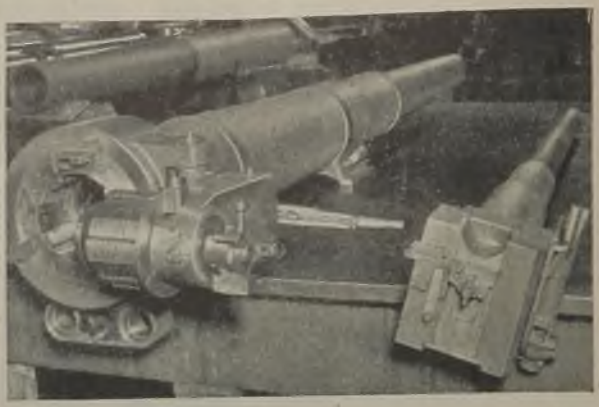
For the production of the breech bush which is fitted immediately inside the end of the jacket, normal lathe, slotting-machine and jump-screw machine operations are employed, and after the cutting of the internal interrupted thread the bush is dealt with on a shaping machine with a special attachment for cutting the swing clearances. These clearances are cut radially to the hinge pin of the mechanism, and by fixing a tool to the special attachment which is free to swing about the hinge centre it is possible to cut the clearances in the bush. The "Ormerod" 26-in. stroke traverse-head shaping machine operates with nine speeds from 8 to 75 strokes per min. and six feeds from 0·02 to 0·12 in. per stroke, and has a headstock traverse of 42 in. The machine is driven by a "Metrovick" squirrel-cage, 17-HP, 970-RPM motor which transmits by multiple V-belt to a gear box with a 2·94 to 1 ratio.

When the projectile and the charge are in the chamber the breech is closed by swinging the mechanism home and giving the breech screw a fraction of a turn. This necessitates an interrupted thread on both the bush and the screw, but it is obviously essential that too much of the thread should not be cut away; thus by stepping the thread on the breech screw and bush, only a sixteenth of a turn is necessary, as compared with the eighth of a turn in the case of the breech bush and the jacket. This thread-stepping is effected on a Muir stepped thread cutting lathe on which the threading is effected by alternate movements of the work piece and tool. It has a 26-in. swing and speeds ranging from 1 to 24 RPM.

Assembly of Components

The gun components so produced are now ready for assembly as follows: the barrel is pushed into the jacket and is prevented from turning by two screwed dowels which engage in two half-holes cut at 180 deg. to each other on a collar at the extreme breech end of the barrel. The breech bush is pushed home and given an eighth of a turn to engage its thread with the jacket thread, thus holding the barrel in position. The breech bush is prevented from turning by the insertion of screwed dowels half in the bush and half in the jacket.

Finally the gun mechanism is placed in position and after assembly the gun is proved at the firing range, where a charge in excess of the operational requirements is used. If, after dismantling, the components are found to be free from defects the gun, on re-assembly, is considered fit for service.



After final assembly following proving on the range the gun is considered fit for service; 5·5-in. howitzer on left, six-pounder gun right

Colliery Electrification

WHEN opening a discussion on the electrification of collieries at a meeting in Swansea of the South Wales Institute of Engineers, MR. B. L. METCALF (chief electrical engineer, Powell Duffryn group) said it was impossible to state what amount of the total coal raised was consumed by the collieries themselves, but it was more than 6 per cent.

He did not think anyone could dispute the possibility of reducing that figure below 3 per cent., if more electricity could be delivered into the pits. It was important to the future of the South Wales coalfield that the prevailing attitude towards the greater use of electricity nearer to the coalface should be reconsidered. There was no reason why electric power should not be utilised at the coalface, if the ventilation was adequate. In the opinion of most people to-day colliery electrification was indisputably the right policy. If South Wales set about reducing the pit-head consumption of raw coal to the "bogey" figure mentioned, there would be enough money in hand to pay for colliery electrification.

Major I. David pointed out that, though some of them had been struggling to take electricity underground, its use had hitherto been barred for a distance of 300 yards of the coalface. Now there must be a complete change of attitude and they must prepare themselves to take into use enormous amounts of machinery.

Mr. H. E. Blackiston explained that the increasing cost of coal, including the expense of transport, during the past nine years had just about doubled the cost of coal at the Swansea Corporation's power station.

Power Cable Terminations

Discussion on I.E.E. Transmission Section Paper

IN opening the discussion on power cable terminations at the Institution of Electrical Engineers in London (Mr. D. B. Irving's paper on the subject was referred to last week), MR. W. C. BARRY (W. T. Henley's research organisation) remarked that it would be dangerous to deduce anything from the author's graphical representation of cable circuit faults, except that the incidence of failures showed no tendency to increase in the 1932–43 period.

One of the most interesting sections of the paper was that which dealt with impulse strength at the higher voltages, because hitherto very little had been published on that matter. So far as was known at present impulse strength was a function of, or at any rate related to, stress in almost any impregnated paper cable. Petroleum jelly was a most unsafe material to use as it led to the formation of voids in use, even if they were prevented during the filling of the terminal. During his own work he had come across something which might require an alteration in the specification for impulse work. It had been found that after initial breakdown a number of repeat tests might be applied at the same voltage, or even higher, before another breakdown took place. Therefore, the only reasonable procedure was to record every "short" by a photograph. The time involved was a negligible disadvantage compared with what might happen otherwise. Before the cable makers could be satisfied with the design of the cable box associated with transformers and switchgear, there would have to be a great deal more co-operation between them.

Experience at Birmingham

MR. D. P. SAYERS (Birmingham Corporation) thought that the majority of supply undertakings were more concerned with cable terminations on switchgear and transformers and the paper would have been of wider interest if those items had been dealt with more fully. The Birmingham undertaking always worked in close collaboration with the makers and any fault or breakdown was the subject of a "post mortem" in which all who were in any way concerned took part. He believed there was a movement to form a Committee of E.R.A. to act as a clearing house for data on faults and breakdowns and that would supply a long-felt want.* His own impression was that a DC over-pressure test was particularly efficacious in detecting incipient faults in sealing ends, more than with any other class of fault. The migration of compound, which had been responsible for a number of faults on the grid, was the subject of considerable diversity of opinion. While single-core sealing ends at higher voltages should be regarded as part of the cable and designed accordingly, it was not quite so simple to deal with cable boxes on transformers and switchgear, particularly on the smaller lower-voltage ends. There was no doubt that a fluid or semi-fluid compound produced a sounder electrical result, particularly on outdoor gear; with a hard-setting compound there was the danger of cavitation within the body of the box, leading to breakdown. He mentioned a cable that had been carried over the top of the transformer in an endeavour to prevent the migration of liquid compound and said that it had been in use for a number of years without trouble.

Termination and Joint Faults

MR. W. HOLTTUM (B.I. Cables) asked for amplification of the author's classification of termination failures. One detail which would be interesting was the relationship between the number of faults on terminations and those on joints. There were likely to be differences of opinion with regard to compound migration for a long time, although the trouble it caused had diminished considerably. He suggested that condenser cones for controlling stress might be less necessary as the voltage increased.

MR. J. K. WEBB (Standard Telephones & Cables) said it was a pity that the author, in his otherwise excellent paper, could not have included a design of a super-voltage termination in which the potential gradient between the conductor and the sheath was made uniform and in which dimensions, although cut to a minimum, were still sufficient to meet the specified tests. A comparison between that and existing designs would be illuminating, since the effect of the distortion of the electric field at the termination of the earthed screen of a cable was not sufficiently appreciated. Such distortion, among other things, initiated discharges externally at the base of the porcelain and so lowered both the dry and the wet flash-over values. The so-called "stress cone" only mitigated, but did not cure, that distortion. Condenser cones of all types and sizes were available to the industry and might be included in existing designs without modifying them in any way. The upright type was more convenient and was usually preferred for the factory testing of cable; while the inverted type was better

* This matter is referred to in a leaderette, "Fault Data," in this issue.—Editors, *Electrical Review*.

adapted for inclusion in porcelain for service conditions. With condenser cones it was possible to employ a standard type of 30-kV porcelain for life testing cables at 60 kV to earth (three times the rated voltage) with complete success, and they were still "going strong" after two years' service. It might be that the stress could be controlled by means of a conducting glaze applied within the porcelain, which had yet to be proved and developed into a commercial form; but the principle of capacitance grading as made use of in the condenser cone appeared to fulfil all requirements. A barrier type of termination was also available in which an inverted condenser cone was formed of bonded styrenated paper, and successful "oil-free" types of 33-kV terminations had been developed with a tight fitting porcelain over the cable end which had previously been wrapped with rubber-styrene cotopa tape.

Shortcomings of Cement

MR. C. H. GILLAM (Taylor, Tunnicliff & Co.) said the author seemed to expect cement to act as an effective oil barrier in the event of the failure of the gaskets, but cement could not be expected to form oil seals. Portland cement was porous and although litharge containing glycerine was not porous to the same extent, it could not be expected to stick closely to both metal and porcelain under varying temperatures. Trouble had occurred through the disintegration of gaskets, but this would have been avoided if it had been possible to examine the gaskets.

MR. C. H. CLARKE (Steatite & Porcelain Products) welcomed what the author had said with regard to the mechanical strength of cement and expressed the hope that it would correct the tendency of users lately, particularly for cable terminations on quite simple jobs, to specify elaborately and expensively ground porcelain instead of the cemented type. One of the mistakes in this connection was to grind the upper surface of the porcelain flange and try to distribute the mechanical stress on it from the clamping ring. If the upper surface was left glazed, the pressure round it could be controlled by using independent clamping pieces instead of one single ring, and a much stronger arrangement resulted. It was not appreciated that there was a chemical attack by Portland cement on the cork, which must be watched. The right way to deal with cascading was to see to the design of the arcing horns so that the arc, once it had started, no matter the cause, was directed away from the porcelain, which was merely a matter of design of the end fitting.

MR. J. H. HARDING (Pirelli-General), speaking with regard to cemented fixing of the sealing end of a cable, said that one of the serious difficulties encountered on a small insulator could be overcome by metallising the surface of the porcelain which enabled sweating to be carried out. No doubt that was only possible on a small cable, but was there any prospect of development on that line to get rid of the cement, which was a fundamental source of weakness?

MR. D. B. IRVING, in replying, agreed that tests with petroleum jelly had shown lower values, possibly due to the jelly not adhering to the stalk of the cable. As regarded the onus for correct design of switchgear boxes being placed on the cable maker, he sympathised with what had been said because there were difficulties when one piece of apparatus was made, perhaps, 400 miles away from the other. Nevertheless, there was usually plenty of room and he did not think the cable maker was at a great disadvantage in putting in his stress control arrangements. Switchgear boxes had given very little trouble.

As to routine DC over-pressure tests, the Central Board did not carry them out but he knew that the record at Birmingham was very good indeed. There were no styrenated ends on the grid system, but there were styrenated joints. However, they were not used electrically, but only as a barrier. In London there were many more joints than terminations, but over the country as a whole there were many lengths of cable which had no joints at all. The design of arcing horns needed a great deal of attention because not very much was known about it at present. Some makers used rings to aid them in their stress control, but the Board generally favoured arcing horns. There had been trouble due to large birds sitting on the rings and causing flash-overs.

Moulded Screw-threads

THE importance of studying means of ensuring the effective mating of moulded screw threads is indicated in a monograph "Tolerances for Screw Threads," by J. Butler, obtainable from British Industrial Plastics, Ltd., 1, Argyll Street, London, W.1, which is anxious to receive constructive criticism for incorporation in a proposed scheme of fine, medium and coarse tolerances to be submitted to the British Plastics Federation.

The document is concerned with screw threads made wholly of plastic materials as well as partly moulded for mating with metal counterparts; threads which are quite correct for metal may not be at all suitable for moulded plastics. The basic cause of the difficulty is the shrinkage of plastic substances immediately after they have been moulded. But moulding powders are made under controlled conditions, which allow provision to be made for shrinkage by forming mould threads over size in both diameter and pitch, if equipment for cutting non-standard pitch threads is available. The series of tabulated data presented in this monograph permits allowances to be calculated to suit the shrinkage rate of the kind of plastic material chosen, the type of thread needed and the degree of fit required.

Domestic Accessories

Suggestions for Improved Design and Performance

OPENING the discussion at the I.E.E. Installations Section on November 9th on Mr. F. C. Fuke's paper on electrical accessories for domestic purposes (*Electrical Review*, November 10th, p. 662), MR. E. A. REYNOLDS disagreed with the author's view that electrical contractors considered only first cost and, moreover, the contractor had not a free hand. When the tender was on a competitive basis it was the customer, or his agent (usually an architect) who invariably accepted the lowest price and was thus the real culprit. With regard to reliability, there should have been some reference in the paper to the continuous carrying capacity of the closed contacts, in addition to contact pressure and correct length of break. As regarded switches, while he agreed that quick break was essential, quick make was equally important, together with pressure after the contact was made. There were very definite differences between breaking DC and AC arcs. But for the war, he believed by now micro-break AC switches would have come into the market. As soon as they did it would be realised that they were the only switches which should be used.

Opportunity for New Start

MISS CAROLINE HASLETT, C.B.E., remarked that the cessation of manufacture of domestic appliances for two years would enable a fresh start to be made. Safety had often been overlooked and the industry seemed to love providing ledges on domestic apparatus of all kinds, making them anything but labour saving. No mention had been made of ceiling switches, but there was need for the elimination of suspended flexibles.

Some of the greatest offenders in asking for special fittings and specifications were Government Departments, and supply engineers were also rather bad offenders. She favoured the foot-operated socket outlet, but suggested that the author's type illustrated in the paper had the plunger too close to the socket case, having regard to the fact that so many women were wearing larger shoes than was formerly the case. There should be a small indicator to show whether a cartridge fuse had blown.

MR. F. G. QUANCE maintained that first-class designers always had the question of easy fixing before them. In installation the biggest item was labour, but, very often in a large buying department price was the criterion so that it was not uncommon to find that the result was undue labour costs in installation. The manufacturer who sold a switch did not know whether it was to be used on AC or DC and therefore produced a mechanism which gave good average results on both systems. Work was going on in connection with AC switches, but it was not possible to put the products before the public at present.

MAJOR B. MCCORMICK, speaking as a user, said that as 80 per cent. of domestic electrical apparatus was used by women, their reactions and suggestions might be sought far more. As regarded appearance, he thought a greater use might be made of moulded rubber or a rubber substitute. He urged greater attention to the placing of outlets to prevent action by moisture, and asked if the author had considered the elimination of the switch socket outlet and substituting a switch plug suitable for the equipment.

MR. GEORGE SMITH suggested that a better test of a switch than the number of makes and breaks it withstood under constant conditions was to test it in different atmospheres.

MR. G. POOLE emphasised the importance of accessible terminals and of providing room for the effective looping-in of the cables, which was particularly necessary with socket outlets in view of their potential use in ring mains. Accessibility was also important in such things as ceiling roses, which, however, he hoped would fall out of use altogether. He suggested the possibility of a hinged bank of fuse carriers on the distribution board.

Compliance with Specifications

MR. J. F. STANLEY said that if apparatus were marked as complying with the appropriate specification, a great deal would be done to avoid the use of inferior articles which were alleged to comply with the specification.

MR. J. B. TUCKER pointed out that in AC prepayment meters, especially for cookers, there had been for years 30-A switches breaking about 1/10,000th in., so micro-break switches were not quite so new as might be supposed. There should certainly be a reduction in the number of types of apparatus and he criticised some of the details of the author's proposals.

MR. J. I. BERNARD (E.D.A.) thought it was time that some really simple apparatus was designed for ordinary careless people. He emphasised the difference between plastics and metal techniques. British Standard Specifications to-day very seldom set standards of performance. They were primarily confined to interchangeability, but standards of performance would be useful in connection with such matters as cartridge fuses.

COMMANDER E. L. R. DAMANT suggested that increasing use should be made of the consulting engineer's advice in electrical installation work. There was a tendency in that direction and in the Navy there was a special establishment whose job it was to represent the user and to collect opinions, complaints and suggestions. Awkward positions which the designer might not have thought of were thus called to his notice, although sometimes this was resented by the designer. He knew it was because he had been in charge of that establishment for some time. The idea was a good one because it was thus easier for the manufacturer to keep in touch with the user and this might induce him to employ more engineers and fewer salesmen.

MR. A. G. RAMSEY said he had pointed out last year that the manufacturer should introduce much simpler designs to facilitate mass production and ease difficulties in the export world. Now was the time (when standards were being revised and new standards introduced) to depart, if necessary, from conventional designs.

MR. P. J. HIGGS urged the formation of some organisation to carry out testing and proving, and so secure the export market. Before the war he was associated with the testing of accessories, and, in particular, fuses at the N.P.L.; a result of the work done there was that certain standard performances were incorporated in B.S. Specifications.

MR. F. C. FUKE, replying to the discussion, said that in the case of competitive housing schemes it was not so much the contractor as the builder who encouraged the manufacture of cheap shoddy articles. Accessories should be branded and steps should be taken to ensure that the public appreciated such goods. The designer must test his devices himself under practical conditions. The voltage across a micro-break switch should not alternate because the whole idea was for the arc to go out before the current alternated. As to the provision of indicators to show that a cartridge fuse had blown, the engineer could do anything if he were paid for it. Soft rubber collected dirt, but no doubt some combination or variations in vulcanisation would overcome that difficulty. The cover of the switch he had illustrated had been designed to stand hard knocks. He was disappointed that so little attention had been paid to his tables listing the present types of tumbler switches and the suggested reduction of their number.

Industrial Accidents

Fewer Reported in 1943

FOR the first time in the war years, the number of reportable accidents decreased last year. The annual report of the Chief Inspector of Factories, Sir Wilfrid Garrett, for 1943 (Stationery Office, 1s. net) gives the total at 311,144 (1·1 per cent. less than in 1942) of which 1,220 were fatal (10·5 per cent. less). As indicated in the notes on "Electrical Accidents" by the Senior Electrical Inspector, Mr. H. W. Swann (*Electrical Review*, September 22nd), only 1,255 of the total reportable accidents (58 fatal) were due to electricity.

Reference is made to the shortage of skilled electricians and consequent lowering of the standard in some cases, an effect that is aggravated by frequent and rapidly made alterations of factory lay-out to meet changing requirements of production. This often results in a temporary type of installation that falls short of safety requirements and although skilled labour resources have been pooled the general deterioration will take some time to make up.

The main causes of electrical accidents are generally simple, such as omission to use an earth wire or to maintain it properly. Highly trained electrical engineers concerned with complex and advanced electrical work do not always, it is stated, show interest in normal safety problems. The onus is legally on the occupier of a factory and hence the responsibility of the engineer in charge (not of the factory inspector). Any advance in the prevention of accidents of this type would appear to be through education rather than through inspection.

Striking improvements have been made in illumination, particularly in large factories engaged in war production. Progress would probably have been greater but for restrictions imposed on the installation of fluorescent tubular lighting, as some occupiers are awaiting the removal of control rather than put in other systems which they do not consider so good. In smaller factories progress has been slower and although intensities in excess of the minimum requirements were sometimes found (*e.g.*, 12 to 25 ft.-candles) glare was often noticeable. In 18 per cent. of the factories major improvements were required and in a further 42 per cent. they were necessary but would have entailed considerable expenditure of materials and labour.

Zinc Development

A REPORT of the Zinc Development Association's activities in 1943-44 also indicates that the scope of the Zinc Alloy Die Casters' Association has greatly increased and that the Zinc Pigment Development Association was formed just a year ago to extend the uses of oxide and lithopone. There have been greatly increased demands for information and library service from wartime users, with an awakening interest in possible peacetime applications.

The Association has opened a workshop at Oxford, which is fully equipped for the construction of models in sheet metal, being at the disposal of craftsmen and designers for experimental purposes. A sheet metal expert is available to advise and assist.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Plastic Lighting Fittings

THE first of a new range of plastic lighting fittings to be marketed by the Lighting Division of E. K. COLE, LTD., Southend-on-Sea, under the trade name "Plastalux" are now available.

Ekco "Plastalux" lighting fitting assembled and in two parts

An attractive feature, reducing installation and maintenance costs, is a patented one-piece gallery, which has no screws or loose parts, the shade and gallery being assembled by a simple "twist-grip." This means that the shade can be quickly fitted or removed, leaving the one-piece gallery in position on the lighting flex. The fittings, which are unaffected by water, oil, grease and corrosives, are suitable either for domestic or industrial use.

The two sizes already available are 9 in. diameter (type "PF1") for accommodating 40/60-W lamps, and 11 in. diameter (type "PF2") for 75/100-W lamps.

Air Compressors for Switchgear

Compressor equipment specially designed for use with air-blast circuit-breakers is being manufactured by COOKE & FERGUSON, LTD., Victoria Street, Openshaw, Manchester, 11. Each set consists of two compressors, one acting as a standby to the other and each driven by a 3-HP, 400-V, three-phase, squirrel-cage motor, mounted on sub-bases attached to a horizontal air receiver which, together with the filter and starters, are all attached to a substantial base plate. As an alternative to the combined filter and dryer, after-coolers are fitted for air-drying without maintenance.

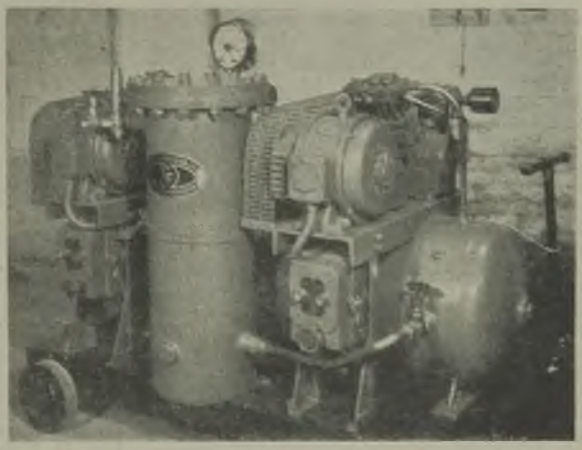
Each machine delivers 6·75 cu. ft. of free air per minute when running at 600 RPM. A suction filter is fitted to the intake of both machines. An automatic air unloading device, which comes into operation when the compressors are switched off, reduces the pressure in the cylinders and the intercoolers, thus alleviating starting-load conditions. Safety valve, drain tap and electro-pneumatic control switch to maintain the receiver pressure between the limits of 300 and 270 p.s.i. gauge are fitted, while an additional electro-pneumatic switch starts the standby compressor at 250 p.s.i.

The air receiver has a volume of 10 cu. ft. and is fitted with the necessary safety valve, sluice valve, drain tap, pressure gauge and inspection doors. The pressure gauge is fitted with alarm contacts so arranged that a remote signal will be given if pressure falls below a certain value.

One of the applications of this set is to small switchgear installations and to serve as an individual compressor for isolated circuit-breakers. It is suitable for 33 kV air-blast breakers operating at 200 p.s.i. gauge up to the rating of 1,000 MVA for which rating the pumping speed is sufficient to provide a complete breaker operation every three minutes.

For the purpose of serving several breakers from a common air supply, the main receiver size is increased, the size of compressor necessary being determined by the required frequency of operation of the circuit-breakers.

Typical installations developed by the company include one suitable for a medium-sized circuit-breaker (1,000-MVA, 33-kV) switching scheme and another for an out-door substation with sixteen 2,500-MVA, 132-kV circuit-breakers divided into groups of four.



Dual compressor set for air-blast circuit-breakers

Welded Naval Ships

Good Performance in Service

SOME recent technical developments in naval construction are commented on in the thirteenth Andrew Laing Memorial lecture delivered to the North-East Coast Institution of Engineers and Shipbuilders at Newcastle-upon-Tyne by SIR STANLEY V. GOODALL, Assistant Controller (Warship Production), Admiralty.

The first part of the printed lecture deals with the materials employed in the construction of ships and their fittings. In the second part the lecturer explains that the first all-welded British warship, a minesweeper completed in 1938, has during five years of war service been employed in some of the stormiest seas in the world and must have been in close proximity to underwater explosions. Usually small ships on such work develop leaks, but the oil-fuel tanks of H.M.S. *Seagull* have been markedly free from such trouble; indeed she has passed through her exacting experiences with flying colours.

Landing craft, which are bound to be knocked about and inevitably suffer some structural damage by bumping when grounding, have afforded an interesting comparison. Although sisters in all other respects, some all-riveted craft have had to be taken out of action while leaky joints have been repaired, but all-welded craft have generally remained watertight in similar circumstances; although "crinkled," they have been able to carry on.

Severe Damage Withstood

Much of the all-welded fore-end structure of a larger ship remained watertight after severe underwater damage. There were a few minor leaks in a bulkhead, but it stood up to a journey of well over 1,000 miles. The ship's speed was as high as 19 knots while the weather was changing from a strong beam wind and moderate sea through a calmer period to a strong wind and moderate sea from a bow bearing. For the last mentioned conditions speed was reduced to 8·5 knots for a short time and subsequently increased to 14 knots.

The extent to which it has been necessary to speed up the use of welding in order to increase output is indicated by the fact that in 27 yards building naval vessels the number of welders on the wages books has grown by 80 per cent. during the past two years. The Research Council of the Institute of Welding has been of the first importance in demonstrating how considerable economy can be effected by the development of new types of electrodes, especially those of larger gauges, as well as fresh welding procedures.

Photographs which illustrate the lecture indicate the advantages and effects of welding in shipbuilding practice. For instance, work on the upper sections of the two largest (26 tons) pre-fabricated parts of the bow of an aircraft carrier, which would have been extremely difficult *in situ*, was done comparatively simply on the ground. Portions of destroyers are pre-fabricated in the shops ready to be taken out to the ships. The disability of a welded shaft bracket of a destroyer being slightly heavier than when forged is accepted because of the 50 per cent. reduction in time from order to delivery; incidentally, welding reduces the cost of a bracket by 40 per cent. In the case of the welded stern frame of a large warship the weight reduction is 20 per cent., reduction in time of manufacture 50 per cent. and cost reduction 40 per cent.

X-Ray Examination of Welds

Reference is made to the use of several types of X-ray set for the examination of welded joints, but Sir Stanley states that the ideal set for shipyard use has not yet appeared on the market. Arrangements are being made for a complete re-design based on experience to date and incorporating promising features. Three-dimensional viewing of stereoscopic pairs of exposures helps greatly in the recognition of defects. Sir Stanley does not hesitate to affirm that X-ray examination has raised the standard of welding in shipyards.

The third section of the lecture deals with tank experiments with propellers and steering, while the last part is concerned with protection against underwater attack, in which connection reference is made to pressure-time records of undersea explosions obtained by tracing on a high-speed photographic film the movement of a cathode-ray oscilloscope beam. The latter is deflected by the electrical potential created between the faces of a large tourmaline crystal suspended in the water.

Sound and Acoustics

A REPORT prepared by the Building Research Council on Sound Insulation and Acoustics has been issued by the Ministry of Works as No. 14 in its series of Post-War Building Studies. It is pointed out that different problems are involved in the insulation of buildings against noise generated from within or without and in acoustics, which refer mainly to hearing conditions in auditoria, and so the two subjects are treated separately. The outline of information at present available on both aspects is likely to interest also those not immediately concerned with building construction. Electrical sound reproduction involves many special problems not within the scope of the report.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Minister of Aircraft Production has agreed to release **Sir Alan Gordon-Smith** from his position as Controller of Construction and Regional Services so that he may return to his company, S. Smith & Sons, of which he is managing director. His successor will be **Mr. F. J. E. Blake,** formerly Deputy-Controller. Sir Alan will continue to assist the Minister as honorary adviser on regional organisation.

Mr. Harold H. Mullens, B.Sc., M.I.E.E., who, as reported in last week's issue, has just been appointed assistant general manager to the North-Eastern Electric Supply Co., Ltd., is forty-four years of age and was born at Hornsey. He was educated at Merchant Taylors' School (London) and Armstrong College (now King's College), Newcastle-upon-Tyne, and he received his technical training with Clarke, Chapman & Co., Ltd., Gateshead - on - Tyne. Joining the North-Eastern Electric Supply Co., Ltd., in 1924 as an assistant engineer at its head office in Newcastle, he was transferred in 1932 to the area office at Middlesbrough. He was appointed chief assistant to the engineer of the power department, southern area, in 1936, and engineer in charge of that department in 1941. He is a past chairman of the Tees-side Sub-Centre of the I.E.E. and a vice-president of the Cleveland Technical and Scientific Institute.

Mr. H. H. Mullens

Mr. H. Norton, of the Sheffield Transport Department, has been appointed as assistant secretary (Northern Area) of the Electrical Power Engineers' Association and will take over the work of **Mr. J. F. Wallace,** who will become assistant general secretary. Mr. Norton commences his duties on December 1st.

Mrs. G. E. Crabtree and **Mr. J. A. Crabtree** have been elected additional directors of Crabtree Electrical Industries, Ltd.

Mr. H. J. Sheppard, managing director of Johnson & Phillips, Ltd., who has been associated with the business for more than fifty-five years, is to retire from active work, but will continue to hold a seat on the board. **Mr. G. Leslie Wates,** J.P., the chairman, has been appointed managing director.

Mr. W. L. E. Short, M.I.Mech.E., who has been manager of the Dumbarton works of Babcock & Wilcox, Ltd., since 1915, will retire at the end of this year. **Mr. W. P. Ross,** at present assistant manager, will succeed him.

After fifty-two years' service, **Mr. S. H. Cross,** manager of the export packing department of the General Electric Co., Ltd., has decided to retire. Mr. Cross has been connected with the export side of the company's business ever since he joined the G.E.C. He was made manager of the department in 1919. He will be succeeded by **Mr. S. G. C. Nash,** who has been a member of the export department of the G.E.C. since he joined the company in 1907.

Mr. Jack Roberts, who has also retired after completing fifty years' service with the G.E.C., is the first member of the company's Union Works to serve for this period. At a gathering of members of the staff and operatives he received a cheque as a parting gift. The presentation was made by Mr. H. G. Cheel, manager of the Union Works.

Mr. J. M. Calder, A.M.I.E.E., A.M.I.Mech.E., manager and engineer, Reading Corporation Transport Department, is leaving at the end of the year. He reached the retiring age two years ago, but his service was extended.

Mr. R. S. Whipple has presented to Cambridge University his collection of historic scientific instruments and books and some of these are now being exhibited at the University. In opening the exhibition Sir Henry Dale, O.M., President of the Royal Society, said that he hoped the collection would form the nucleus of a History of Science Museum and Library, eventually with a professorship, as a centre of university study and research.

Professor G. I. Finch has been awarded the Hughes Medal by the Royal Society for his fundamental contributions to the study of the structure and properties of surfaces and for his important work on the electrical ignition of gases. The Rumford Medal has been awarded to **Dr. H. R. Ricardo,** Pres. I.Mech.E., for his important contributions to research on the internal combustion engine.

Mr. J. C. Leslie, for many years principal of the East Anglian Institute of Agriculture and executive officer to the Essex War Agricultural Committee and, more recently, deputy general secretary to the National Farmers' Union, has been appointed agricultural adviser to Edmundsons Electricity Corporation, Ltd., and its associated companies. These companies, which serve preponderatingly agricultural areas, plan to spend some £15,000,000 in the first five post-war years on the provision of a comprehensive service in their rural areas. In this work Mr. Leslie's extensive experience and knowledge of farming will be of great service, and his appointment—the first of its kind in the electricity supply industry — will be particularly welcomed by all who have a special interest in the electrification of the countryside.

Mr. J. C. Leslie

Appointments Vacant.—Among the appointments advertised in this issue are the following:—Technical assistant for Hull (£713); secretary to the Dover electricity undertaking (£450-£500); assistant lecturer in electrical engineering

for the Manchester College of Technology (£300-£400, plus bonus); and chief draughtsman and constructional assistant for Eastbourne Electricity Department (£361).

Obituary

Mr. G. Reeves.—We regret to record the death, on November 4th, of Mr. George Reeves, meter contracts manager to Ferranti, Ltd. Though only forty-nine years of age, he had thirty-five years of service with the company, interrupted only by the last war, through which he served in France. In his early days he was private secretary to Dr. Ferranti, afterwards becoming personal assistant to the late Mr. R. H. Schofield, general sales manager. On his return from war service he became attached to the meter sales department. As a founder member and chairman of the Electricity Meter Manufacturers' Export Group he was indefatigable in his efforts to promote the interests of British manufacturers overseas.

Mr. Frank Walker, whose death on October 31st we reported last week, retired from the publicity department of the Metropolitan-Vickers Electrical Co., Ltd., in 1939 after thirty-six years in the service of the company. He had been in poor health during the whole period of his retirement.

Mr. R. Attwater.—The death occurred on November 4th at his home at Fulwood of Mr. Richard Attwater, until his illness about six months ago managing director, and since governing director of Attwater & Sons, Ltd., manufacturers of electrical insulating materials, Preston.

Mr. A. T. Gilbride.—We regret to record the death on November 4th, through a railway accident, of Mr. A. T. Gilbride of the North West Midlands Joint Electricity Authority. Mr. Gilbride had been a charge engineer with the Authority since its inception in 1930, when it took over the Stoke generating station from the Corporation. He was one of the original staff of the Stoke-on-Trent Corporation Electricity Department, previous to which he was with the Burslem Corporation and the Leek Urban District Council. During the last war, he served with the Royal Engineers.

E.P.E.A. Meter Engineers' Group

MEMBERS of the Electrical Power Engineers' Association will be pleased to learn that the Southern Divisional Meter Engineers' Group has arranged for a series of meetings to be held each month, between November and June, 1945, in Room 19, Livingstone House, Broadway, Westminster, S.W.1. It has been decided that short technical papers on metering and allied subjects shall be read, followed by discussions which should prove of considerable interest to those members of the Association engaged on metering and measurements. Any member of the Association wishing to submit papers for discussion, should communicate with Mr. O. G. W. Davis, Hampstead Borough Council Electricity Supply, Lithos Road, N.W.3. The next meeting is on Friday, November 24th (see "Forthcoming Events"). For further information regarding this Group application should be made to the hon. secretary, Mr. L. W. Russell, 26, Merrivale Avenue, Ilford, Essex.

Electronic Devices

Varied Industrial Applications

SOME of the very many possible applications of electronic devices to industrial needs are commented on in a paper prepared by MR. F. E. HENDERSON for the Association of Supervising Electrical Engineers.

The author commences by contrasting electron travel with current flow and then briefly explains the difference between thermionic valves (thyratron relays) and mercury rectifiers. The field of application of the former in the industrial sphere is very wide indeed, while a large demand for the latter is visualised not only for normal power and traction needs as well as electrolytic and chemical work, but in addition for the energisation of industrial devices under variable voltage control.

The many ways in which electronic devices can be utilised for detection and measurement in conjunction with the possibility of applying the resultant impulse to the regulation of motors and machines enables control gear to be developed for almost any desired responsive or selective performance. They function within fine limits, speedily, and often with greater facility and sensitivity than in the case of mechanical means.

More recent development has been the swift extension of the far-reaching principle of high-frequency AC heat generation, previously employed by the medical profession, to the industrial heat treatment of both conducting and dielectric substances.

Switchgear Testing

New Problems Introduced

ADDRESSING the Coventry Electric Club last week on the subject of "Testing of High Power Circuit Breakers," Mr. J. S. Cliff, A.M.I.E.E., described the apparatus needed to equip a modern high-power switchgear testing laboratory. He claimed that this country already had the finest circuit-breaker testing stations in the world, but after the war they would undoubtedly need to be stepped up in output to keep pace with circuit-breaker requirements at home and abroad.

The advent of the air-blast circuit-breaker had introduced new problems into testing technique, since it was now necessary to take into account the high-frequency characteristics of the test-circuit in addition to the power frequency phenomena. Special recording instruments had been designed to enable this to be done quickly.

All the testing stations in this country co-operated through the Association of Short Circuit Testing Authorities in applying standard testing rules based on pooled experience and consequently the performance of oil circuit-breakers had been improved considerably: frame sizes had been reduced; oil content and fire hazard decreased; air-blast circuit-breakers had been introduced for all high-voltage ratings; low-voltage air-break circuit-breakers had been developed; and the performance of m.r.c. fuses had been improved.

The talk was illustrated by a film showing a typical high-power testing laboratory in operation.

CORRESPONDENCE

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

"Standard"

I DO not think that Mr. Brasher's letter in your issue of November 3rd should be allowed to pass unchallenged. He makes the quite unwarranted assertion that no one should make use of the word "Standard" except in connection with appliances covered by B.S.I. specifications.

There are very few manufacturers of electrical or other commodities who do not use the word "standard" in describing a particular range of their products, and there is no easy alternative. I do not think that the B.S.I. has ever claimed a monopoly of the word, nor would this be possible on legal or commonsense grounds.

In the 1936 issue of the "Reference Catalogue of Current Literature" there are 82 books whose titles commence with the word "Standard," and these include a number of electrical and other technical subjects, none of which appears to have been the subject matter of British Standard Specifications.

The word comes from the Latin *extendere*, to stretch out, and this is what it would appear that Mr. Brasher has done. If he had deprecated the use of the expression "British Standard" for articles not standardised by B.S.I., this letter would not have been written, as I should have been in agreement with him. Perhaps the word "British" was omitted from his letter by accident.

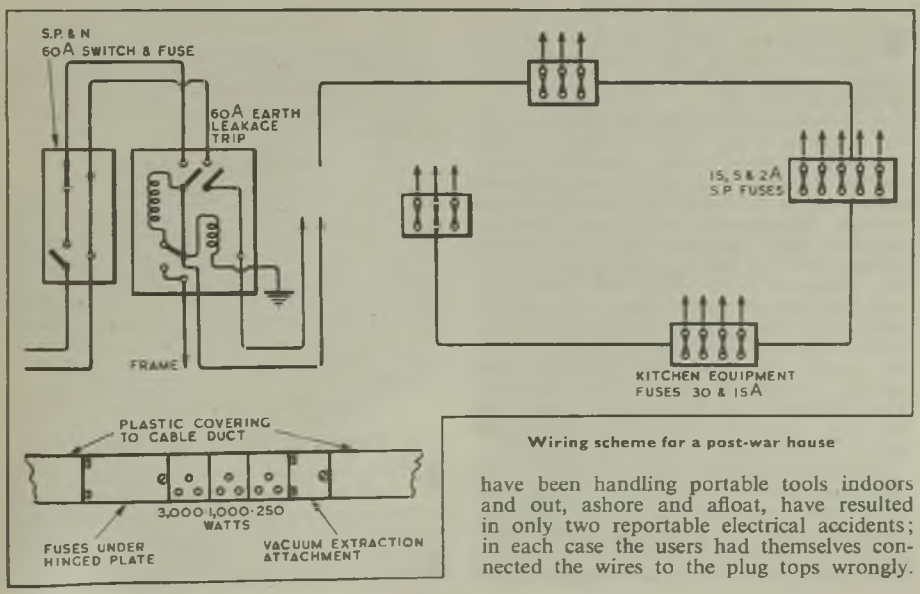
R. ILLINGWORTH,
Borough Electrical Engineer and General Manager.

Poplar.

Domestic Lay-out

THE electrical layout here described was designed for post-war houses of the orthodox type, although it could quite easily be adapted to prefabricated houses by the use of R.A.F.-type cable couplings linked by mineral-insulated cable to flexible braided cable with the phase pin larger to prevent wrong connection. It is the outcome of several years' experience with cables of all types in installations some of which were eventually maintained by skilled men and others by men without technical knowledge.

The installation is based on the use of a ring main of copper-sheathed mineral-insulated two-core 7/·064 cable and of cartridge fuses that cannot be rewired by any amateur. A strip of plaster at dado height, and matching the colour scheme, covers the cable duct. The safest installation, as proved by practice, is one controlled by earth-leakage circuit-breakers. Nearly six years of dealing with 600 to 700 men who have been handling portable tools indoors and out, ashore and afloat, have resulted in only two reportable electrical accidents; in each case the users had themselves connected the wires to the plug tops wrongly.



Wiring scheme for a post-war house

In the design now under consideration portable equipment has been reduced to a minimum, but should any piece of apparatus become faulty or should the occupant of the house plug-in apparatus that might give a shock by leakage to earth, the current is at once cut off from the socket and cannot be restored unless the offending item is taken out of circuit. The few pounds extra involved is a very cheap insurance against accidents.

Lighting fittings in ceilings and elsewhere are plugged in *via* two-pin plugs and sockets. Dust would be removed from carpets and furniture by a central extractor fan with remote switching, which would draw the dust through trunking. A flexible hose attached to the trunking by screwed couplings under a hinged flap in the wall in each room would replace trailing flex, and motor push-buttons would be fitted alongside. Fuses accessible through a hinged panel closing flush with the wall are situated in each room where there are plugs.

The meter or meters are in cupboards accessible from floor level from which moisture is carefully excluded; this is of utmost importance if the effect of the usual mass of rust at the top or underneath the stairs is to be avoided. A simple brochure of instructions on fusing and use of apparatus should be issued with every electrical installation. Every socket outlet should be inscribed with its capacity in watts, as most domestic appliances have that much information on the nameplate.

West Looe, Cornwall. E. WILLIAMS.

Single-Pole Fusing

THE following recent incident presents another side of the question as to whether single-pole fusing is preferable to double-pole fusing.

A housewife was plying her domestic iron one morning early, when a heavy report and flash occurred in the region of its connector. Finding that her cooker had gone out of action she asked for the service man to call. His examination showed that the iron had been supplied from a 5-A outlet integral with the cooker-control unit, which was protected by a single-pole fuse. The fault had severed the terminal pin from the body of the iron, but the local fuse was still intact. Further investigation showed that the cooker circuit had been wrongly connected so that its polarity was reversed. The single-pole fuse therefore was not in the live pole. The fault blew a 30-A fuse in the main control, hence the very heavy flash.

The above incident took place at 9 a.m. The scene now changes to the next door house which has electricity for lighting only. There the good lady turned on her gas cooker at 11 a.m. and found insufficient pressure to cook the dinner. She therefore sought the help of the gas service man. He found that an electric conduit had been in contact with a composition gas pipe, which had burnt through. The escaping gas had ignited and was burning freely in the roof void.

There had been no fault on this installation. There seems no doubt that the fault in her neighbour's iron had raised the potential on the water services of the two houses sufficiently to cause a heavy flow of current to the gas system, thus setting up an arc at the point of contact, puncturing the composition pipe and setting fire to the gas.

P. RIDLER.

Meter Rents

IN your issue of November 10th there is a leaderette relating to meter rents, arising from a case brought by the Corporation of West Ham against a consumer for non-payment of an account.

There is an implication that some part of our claim was in respect of meter rents but this is quite inaccurate as this undertaking has not, for the last twenty years, made any separate charge for the provision of meters for the purpose of measuring the amount of energy used.

We are entirely in agreement with your conclusions as our practice, for many years, has been to avoid the making of separate small and irritating charges to consumers. We believe that these are much better incorporated in the general charges for electricity supply or, rather, a much more correct term, electricity supply service.

*Stratford, E.*15. JAS. TOWNLEY,
Engineer and Manager,
West Ham Electricity Department.

[The comment was based on a report in a local paper. We are sorry that we were misled into doing Mr. Townley an injustice when he is so obviously on our side.—Editors, *Electrical Review*.]

Fluorescent Lamps

REFERRING to the article "Electric Lamp Manufacturers' Association" in the current issue of your journal, I think the relative efficiency given for the fluorescent lamp is rather optimistic, especially the sustained efficiency. So far as I can estimate, this efficiency is not nearly so good as originally anticipated. It would be of interest to have the opinion of Mr. Jones.

Bradford. T. H. CARR,
City Electrical Engineer and Manager.

Domestic Plugs and Sockets

FOR many years I lived in England and was well accustomed to the standard two- and three-pin plugs, with and without interlocked switches and fuses, whereas the standard practice throughout Canada and the United States is to use a twin flat-bladed plug for all

domestic uses and of one capacity only, namely 10 A. This unit is used on skirting boards, refrigerators and all domestic appliances and even as auxiliary outlets on stoves.

From personal experience I have found it always most satisfactory even though the voltage here is 110 and not 230, introducing troubles owing to double current carrying capacity. In nearly all houses at least eight outlets are found in each room which may be a contributing factor, but in view of the reliability of this plug and socket and its complete lack of need for maintenance I should be interested to hear your readers' views of the real necessity for interlocked switches and plugs.

Also the domestic fusing arrangements here seem far superior as a simple glass moulded screw-in fuse is inserted, thus obviating all threading of wires through porcelain holders. As these fuses can be bought at any store for five cents each and inserted, even by children, with complete safety, I fail to see the necessity of what now seems to me the complicated switch and fuse installations to be found in the average English house.

Toronto. STANLEY A. CORY.

[American and Canadian practice in this respect was dealt with at some length by Mr. E. A. Pinto in our issue of September 15th last.—Editors, *Electrical Review.*]

Forthcoming Events

Friday, November 17th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Measurements Section. "Planning the Future Electricity Meter," by G. E. Moore.

London.—Institution of Mechanical Engineers, 5.30 p.m. Thomas Hawksley Lecture: "Research and Development in Aeronautics," by Dr. H. E. Wimperis.

Birmingham.—At Society of Arts Gallery, New Street, 6 p.m. Illuminating Engineering Society (Birmingham Centre). Paper on "Recent Development" by an illuminating engineer and an architect.

Saturday, November 18th. — *Manchester.* — Association of Supervising Electrical Engineers (Manchester Branch). "Modern Protective Equipment," by M. Kaufmann.

London.—At 20, Regent Street, S.W.1, 3 p.m. Women's Engineering Society. "Recording for Radio Transmission," by E. W. C. Wilder.

Monday, November 20th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Informal discussion on "The Effect of Welding on Electricity Supply," to be opened by Dr. H. G. Taylor.

Birmingham.—Grand Hotel, 6 p.m. Birmingham Electric Club. "Electricity for Domestic Uses in the Post-War Era," by E. G. Batt.

Nottingham.—Corporation Gas Showrooms, 6 p.m. Nottingham Society of Engineers. "Modern Applications of Mercury-Arc Rectifier Valves and Metal Plate Rectifiers," by J. C. Milne.

Tuesday, November 21st.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Radio Section. Discussion on "New Aspects of Post-War Interference Suppression," by P. R. Coursey.

Leeds.—Great Northern Hotel, 6 p.m. I.E.E. North Midland Centre. "Modern Submarine Cable Telephony and the Use of Submerged Repeaters," by R. J. Halsey.

Wednesday, November 22nd.—*Newcastle-on-Tyne.*—Neville Hall, 6.15 p.m. Joint meeting of the I.E.E. North-Eastern Centre and the Institutions of Civil and Mechanical Engineers arranged in conjunction with the Ministry of Fuel and Power. Papers on "Location and Winning of Opencast Coal," "Maintenance and Operation of Opencast Machinery" and "Utilisation and Future of Opencast Coal."

Birmingham.—At James Watt Institute, 7 p.m. I.E.E. South Midland Students' Section. Part I of Students' Lecture: "The Cathode Ray Tube and its Applications," by Dr. W. Wilson.

Derby.—Electricity Showroom, 2.30 p.m. I.E.E. East Midland Sub-Centre. "Electrical Aspects of Farm Mechanisation," by C. A. Cameron Brown.

Thursday, November 23rd. — *London.* — At Institution of Civil Engineers, 11 a.m. Autumn general meeting of the Iron and Steel Institute. Discussion on "Blast-Furnace Operation and Problems" (also Friday, 10.30 a.m.).

Friday, November 24th.—*London.*—Institution of Mechanical Engineers, 5.30 p.m. Informal meeting. "Mechanical Engineering Problems of London Transport," by W. S. Graff-Baker.

London.—Room 19, Livingstone House, Broadway, S.W.1, 6.30 p.m. E.P.E.A. Southern Divisional Meter-Engineers' Group. "Polyphase Meter Testing," by X. H. Balfre.

Saturday, November 25th. — *Cardiff.*— At Institute of Engineers, 3.15 p.m. Institution of Civil Engineers. "Planning of City Thoroughfares and Public Utilities," by R. N. Pegg.

London.—Bonnington Hotel, W.C.1, 2.45 p.m. Meeting of the Institution of Factory Managers, South Eastern (London) Branch.

Monday, November 27th.—*London.*—Institution of Electrical Engineers, 7 p.m. London Students' Section. "Some Hydro-Electric Possibilities and Achievements," by W. A. Hatch.

Newcastle-on-Tyne.—Neville Hall, 6.15 p.m. I.E.E. North-Eastern Centre. "Electrostatic Precipitation of Dust from Boiler Plant Flue Gases," by J. Bruce.

London.—Northampton Polytechnic. Electrodepositors' Technical Society. "Silver Plating of Steel," by J. Sprague.

Wednesday, November 29th.—*Birmingham.*—At James Watt Institute, 7 p.m. I.E.E. South Midland Students' Section. Part II of Students' Lecture "The Cathode Ray Tube and its Applications," by Dr. W. Wilson.

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

COMMERCE and INDUSTRY

Coal Research Appointment. Allocation of Contracts.

Batteries for Deaf Aids

IN the House of Commons last week Mr. Dobbie asked the President of the Board of Trade if he was aware of the continuing difficulty of obtaining batteries for hearing aids by people who were hard of hearing and the inconvenience caused through this; and if he would take action to remedy this shortage.

Mr. Dalton said he regretted that supplies of these batteries had recently been seriously affected as a result of enemy action, he was glad to say that full production was resumed last month, and the manufacturers were now doing their utmost to catch up arrears.

Coal Research

The British Coal Utilisation Research Association is advertising for a director with " scientific training and research experience which will enable him to initiate and direct fundamental research into the constitution of coal and its use both as a fuel and as a source of chemical derivatives." To a man with the necessary qualifications, and who can " direct work on the practical development of the results of research," and conduct the general management of a large and technical organisation, the Association, which claims to be the largest example of co-operative research in Great Britain, is prepared to pay a commencing salary " of the order of £2,500 per annum, with provision for pension."

Birmingham University Extensions

The *Birmingham Weekly Post* reports that the University of Birmingham has appointed Mr. Verner O. Rees, F.R.I.B.A., to prepare a scheme for developments on the north side of University Road and for the completion of sections of the original scheme prepared by the late Sir Aston Webb. This appointment does not cover all contemplated developments in the University. Messrs. Peacock and Bewlay are designing new premises for mechanical and electrical engineering to replace the out-of-date premises adjacent to the University power station. Messrs. Hoare, Lea and Partners have been appointed as consultants for the engineering services.

Building Contracts

A number of recommendations affecting the electrical contracting industry are contained in a report just issued by the Ministry of Works Central Council for Works and Buildings (Stationery Office, 1s.). The report, which deals with the placing and management of building contracts, is based mainly on the evidence and opinions of forty members of a committee representing architects, consultants, quantity surveyors, general contractors, sub-contractors and operatives, the chairman being Sir Ernest Simon. It is pointed out that the Government alone can deal with the financial and economic problems which will face the building industry after the war and emphasis is placed on the importance of avoiding excessive prices, securing stable economic conditions, and above all preventing the disastrous booms and slumps and unemployment which occurred after the last war. Inadequate pre-contract preparation is stated to be responsible for much damage to the building industry.

The report says it is clear that the operation of the competitive system of tendering in the building industry presents difficulties which do not exist in other industries, and special safeguards are necessary to prevent the placing of orders with firms who are likely to adopt low standards and to avoid their full obligations and to ensure that work shall be entrusted to firms who will do a good job at a fair price. Competitive tenders should therefore in all cases be called from a limited number of firms carefully selected as being capable of and likely to do work of the standard required.

A definition is given of the best methods of selection and appointment of each of the many different types of sub-contractors, and in connection with the engineering services, including lighting, heating, ventilation, cooking, and lifts, it is recommended that the architect or consulting engineer should obtain tenders and select the specialist. When work begins on the site the general contractor should be made responsible to the architect for all executive work.

Intensive Course at Borough Polytechnic

The next intensive course in electrical engineering at the Borough Polytechnic, London, S.E.1, will commence on Monday, January 8th. The conditions for admission are the same as on previous occasions, *i.e.*, candidates should have obtained the Ordinary National Certificate in Electrical Engineering or some equivalent qualification. Admission to the course is free and a maintenance grant is paid to the student whilst in attendance.

Competitive Tenders Banned

The placing of contracts by the Electricity Department without offering them to tender was criticised at a meeting of the Sheffield City Council, and it was revealed that this was done by order of the chairman of the Central Electricity Board. The debate arose on a contract for the erection of a cooling tower at Neepsend generating station for £69,448 with Mitchell Engineering, Ltd.

Alderman J. A. Longden, chairman of the Electricity Committee, said that no local firm could do the work and none was asked to tender. The contract was placed by a co-ordinating committee of the Ministry of Production. Councillor F. Lloyd declared that the contract was going to a firm at that firm's price and without the safeguard of competition. He had challenged the legality of the practice of suspending a Standing Order so as to permit the purchase of electrical equipment without first inviting tenders, and the town clerk had advised him that it was legal. Councillor R. Neill asserted that a dozen firms could do the job and were willing. Alderman F. Thraves

resented suggestions of side-stepping or evading a Standing Order. The chairman of the Central Electricity Board directed that competitive tenders should not be sought in these times.

Alderman E. Wilson contended that the present position was the result of bureaucratic control, and it behoved every local authority to get rid of it as soon as possible. Alderman Longden recalled that at one time "rings" decided which firms should get a contract, but now a Government Department directed the operations of firms supplying power plant.

Thanksgiving Day Celebration

As a tribute to the United States a Thanksgiving Day celebration is to be held at the Albert Hall on November 23rd under the auspices of the American and British Commonwealth Association and sponsored by the *Daily Telegraph*. It is entitled "To You, America" and will take the form of a novel experiment in prose, verse and music. Mr. John Barbirolli, in charge of the musical arrangements, will present the London Symphony Orchestra, the Alexandra Choir and the Kneller Hall Trumpeters, together with many well-known actors and actresses. The producer is Squadron Leader Ralph Reader, and the script has been prepared by Mr. Stephen Potter of the B.B.C. Every American State flag will be on parade and John Latouche's famous "Ballad for Americans," rendered by the London Symphony Orchestra with full choir and soloist, will constitute one of the outstanding features of the occasion.

All expenses are being defrayed by the *Daily Telegraph* and the whole of the proceeds are being given to King George's Fund for Sailors.

Seats are available from the Royal Albert Hall and the leading theatrical agencies. Prices range from seats in boxes at £3 3s. down to balcony and arena seats at 5s. and 3s. 6d. The festival, which commences at 7 p.m., will be broadcast both in this country and America.

Exports to Iceland

The Board of Trade announces that the arrangements for the export of goods to Iceland have been modified. Applications for licences for goods other than specified items will be considered somewhat more freely, although it must be borne in mind that shortage of supply or other circumstances may render it impossible to issue licences in some cases. Licences for the specified classes of goods (apart from those articles falling under the general headings which do not normally require licences) will, however, be granted only in exceptional circumstances. They include electric wire and cable; electro-medical instruments (including u.v.r. lamps and Röntgen and diathermy instruments); ice-making and refrigerating equipment; electric lamps; hearing-aid equipment; electrical appliances and fittings of metal; and electric and pneumatic tools and arc welders.

Burnley Corporation and Contractors

Mr. Alan E. Dent, A.M.I.E.E., hon. secretary of the Burnley Branch of the E.C.A., comments on the attitude of the Corporation Electricity Committee in proposing to object to the Board of Trade to an application for permission to transfer an electrical business which was already being carried on in the borough, to a new address near the municipal electricity showroom. He says that the electrical contractor and retailer is, by the nature of things, the "unpaid canvasser" of the electricity supply authority, whose primary duty is, and exclusive business should be, the sale of electricity, this alone being a public service. Mr. Dent states that Burnley electrical contractors realise that the greatest possible service to the public can be achieved by active co-operation between the supplier of electricity and those whose business it is to sell electrical appliances.

Travelling Scholarship

Members of the Quality Control Panel of the Birmingham District Production Committee of the Ministry of Production, have been greatly impressed by the contribution which the application of statistical methods has made to manufacturing efficiency during the war. In order to encourage the more enthusiastic study of the subject they have, through the generosity of local firms, been able to establish one or more travelling scholarships of about £350 each, to enable the recipients to spend three months in America studying the application of statistical methods in that country. The scholarships will be awarded for the best papers of not less than 5,000 words in length on a subject which could come under the general title of "The Application in Industry of Statistical Methods, with particular reference to Quality Control." The competition is restricted to employees of established firms within the Midland Region, and candidates intending to submit papers should notify the Q.C. Panel, Room 205, C.M.L. Buildings, Great Charles Street, Birmingham, not later than December 31st.

Production of Mica Insulators

About forty members of the Northampton and District Electrical Association spent an interesting evening at their monthly meeting at the College of Technology on November 8th when Mr. Dinenage, of the Micanite & Insulators Co., Ltd., showed a film illustrating the mica industry from the mining of the raw material to the time of its appearance in the widely varying forms of insulators used by the electrical industry. A quantity of samples which were on view were given to the Association who in turn handed them over to Mr. O. F. Bailey, so that they could be of use not only to members of the Association but also to students of the College of Technology. The next meeting is on Wednesday, December 13th, when a discussion on "Earthing" will be opened by Mr. W. K. Allen.

New Zealand Programme

In a speech last week the Prime Minister of New Zealand (Mr. Fraser) said that among the reconstruction projects which the Government was putting forward was a ten-year plan for hydro-electric development which would increase productive capacity in the North Island alone from 211,000 to 700,000 kW.

Post-war Appliance Outlook

A prediction that within five years the demand for domestic electrical appliances will be double that before the war is made by Sir

Alexander Aikman, managing director of Electric & Musical Industries, Ltd., in the *Financial News*. He suggests that the guiding policy in reconversion should be to relegate temporary expedients, such as Portal house equipment, to war factories and to secure the return to normal production by manufacturers on the most up-to-date lines. He thinks it is difficult to differentiate between "luxury" and "utility" models. In most cases the former possesses a higher degree of actual utility and it would be unsound to encourage the manufacture of the less useful article by removing the purchase tax on one and not the other. In view of technical improvements apparatus immediately after the war would probably cost more than before the war, but the price would come down and it would be better to put up with those higher prices than flood the market with less efficient models which would quickly become obsolete. Sir Alexander is not averse to bulk purchase of apparatus provided there is full co-operation with the industry.

Cable Current Ratings

With regard to the data for mass-impregnated cables given in our last issue, the figures in Table 5 are for 66-kV cables, not 33-kV as stated.

Restoring Public Lighting

The fifth of the series of Lighting Reconstruction Pamphlets issued by the Illuminating Engineering Society, 32, Victoria Street, London, S.W.1, is entitled "Public Lighting in the City and Highway." Covering such topics as administration, the importance of the lighting committee, the need for expert advice, and the criteria of good lighting installations in different classes of streets, the pamphlet should prove of great service to anyone concerned with public lighting problems of the future. All the pamphlets in the series are obtainable at 1s. each, 9s. a dozen, or £3 a hundred.

Indian Power Board

Reuter reports that the Government of India has decided to set up a Central Technical Power Board, under the chairmanship of Mr. H. M. Mathews, M.I.E.E., electrical commissioner. It will act as the central planning organisation for initiating, co-ordinating and pressing forward the development of public electricity supply throughout the country, and will collect ideas, conduct surveys and prepare schemes in consultation with the provincial and state Governments. A proposal for the setting up of such a Board was put forward at an All-India Technical Conference on Post-War Electrical Development held in Calcutta early this year (*Electrical Review*, August 25th, 1944, p. 271).

Electrolytic Hydrogen

An experimental investigation into the production under pressure of electrolytic hydrogen gas for use as a substitute fuel in place of petrol and coal gas for road vehicles has been described by Mr. J. S. Just in the *Journal* of the Institution of Engineers, Australia. The author was instructed in 1942 by the Queensland Government to explore the commercial possibilities, for the purpose indicated, of water electrolysis by utilising off-peak energy from the existing electric power plant in Brisbane. Much of the report is of purely local value, but it includes a survey of previous work on the subject by other investigators. Those portions dealing with the general requirements that commercial plant must satisfy, together with information about the electrolytic pressure cell designed experimentally by the author, are abstracted in Part I (General) of the *I.E.E. Journal* for October, 1944.

Standard Aircraft Wiring

In last week's issue (p. 669) reference was made to a standard system of wiring for aircraft which had been developed by the Society of British Aircraft Constructors. We are now informed that the idea is based on a system devised by J. A. Crabtree & Co., Ltd., which is described with the aid of very clear illustrations in a vest-pocket booklet issued by the company. As we stated last week, although the system was developed (at Crabtree's works) for installation in aeroplanes it is considered to be adaptable to domestic and industrial wiring generally.

Institute of Marine Engineers

The next examinations for admission to the Institute of Marine Engineers will be held as follows:—Students (common preliminary examination), April 10th to 13th and October 2nd to 5th, 1945. Graduates (section A of associate membership examination), June 4th, June 6th and 8th, 1945. Associate members, June 4th to June 11th, 1945. Syllabuses of these examinations, copies of previous papers, and particulars of exempting qualifications will be supplied on application to the Secretary, at 73, Amersham Road, High Wycombe, Bucks.

Trade Publications

Salford Electrical Instruments, Ltd., Silk Street, Salford, Lancs.—New list of "Gecalloy" radio cores made by the magnetic powder process, including some technical and dimensional data.

British Insulated Cables, Ltd., Prescot, Lancs.—Descriptive list (NSB.2/1) of tee-off box incorporating HRC fuse for protecting branch circuit cable in industrial wiring.

English Electric Co., Ltd., Stafford.—Publication (FG/110) describing moulded fuse units with porcelain contacts.

Bona fide trade applicants can obtain copies from the companies concerned.

Change of Name

The Surrey Arc Welding Co., Ltd., has changed its name to the Harbour Arc Manufacturing Co., Ltd.

Electrical Travellers

The Electrical Trades' Commercial Travellers' Association is holding its annual general meeting at 5 p.m. to-day (Friday) at the Feathers Hotel, The Broadway, Westminster, S.W.1.

Trade Announcement

Henfrey Electrical Installations have returned to London, their offices now being at 42 & 44, Great Titchfield Street, W.1 (telephone: Museum 6217). The firm would like to get in touch with pre-war employees whether in or out of the Services.

System for Contractors

Drawings, Site Organisation and Labour

By T. Dunwoody,
Associate I.E.E.

RECENTLY* I referred to the methods of submitting tenders and the factors involved. This article mainly concerns those things which have a more direct application to the execution of the work. It would not be out of place, however, to consider the plans which form an essential part of the electrical contract.

More attention needs to be paid to the preparation of the drawings. Electrical installation drawings should not be merely architects' drawings with electrical outlets superimposed. They should show only the essential contructional features and all outlets should be clearly indicated.

Better Code of Symbols Needed

A difficulty is experienced in adopting a satisfactory code of symbols for use on drawings. BS.447 is notable for its omissions, and, of those that are indicated, many are too complicated and require too much effort to be portrayed neatly. This seems to be another sphere in which fruitful results could be obtained by the interested associations. A really sound and flexible code of symbols would be of immense value. The drawings should also be annotated sufficiently to give clear instruction to the erector. Any special precautions to be taken to avoid other services, and clearances to be maintained for fittings, should be given. In the absence of such data, the draughtsman should state where such information is to be obtained. The outlets should also be tabulated on each of the drawings. This serves as a cross check at the design stage, assists in the preparation of the schedule and benefits the contractor.

The author contends that the provision of special drawings is necessary and that contractors can avoid much trouble by proper store arrangements and an enlightened treatment of operatives

Large-scale details of any features affecting his work should be made available to the contractor, who should also always be immediately acquainted of any alterations to the structure, notwithstanding the fact that, other than in exceptional circumstances, it is usually a confession of error when such alterations have to be made. It should not be assumed, once the contractor is given satisfactory drawings, schedules and specifications, and a suitable contract, that there is nothing else to be done. Although it is practically impossible to make a sound job if the design is faulty, it is very easy to make an unsound job of the best possible scheme, and it is also very easy for the contractor to spend a great deal of his money unnecessarily on his organisation.

The contractor should normally be free to place his orders with whom he desires, provided that there is no attempt to "beat" the specification. By this freedom the enterprising contractor and the enterprising manufacturer can very often operate to the benefit of all concerned. Orders can often be placed advantageously with local manufacturers who frequently agree to hold stocks and deliver to suit the convenience of the works.

An important point is the setting up of an adequate store on site. The degree of organisation depends of course on the size of the contract, and wartime experiences have brought home forcibly the need for close attention to this point. The first consideration is the site. On all contracts embracing large areas and units of individual buildings, the store should be a separate temporary lock-up structure adequately lighted, heated and ventilated. It must be approachable by a road suitable for vehicles in all weathers. Much depends on local conditions, but the foregoing are the minimum requirements and the contractor should not be intimidated into accepting anything else. The spectacle of squads of men floundering through a sea of mud to reach a site stores is most depressing and it can become financially disastrous, especially when transport companies refuse to leave sound roads and dump their loads by the wayside for the contractor to pick up as best he may. This is important, as post-war schemes will probably consist mostly of large areas upon which will be erected numbers of individual buildings.

Supervision of Materials

All materials should be checked in as they arrive and it should be insisted that the manufacturers send delivery notes with their consignments. All goods issued should also be recorded by the storekeeper, and preferably so arranged that material is requisitioned and issued for specific buildings. In this way a check can be kept on loss and wastage. The stocks on sites should be so arranged that a steady flow of goods passes from the manufacturer through the store out for use on the job. The longer material lies on site, the greater the risk of loss and damage. The lay-out of the store should be designed on this basis. Some sites will call for subsidiary stores where much the same procedure is found to be necessary. The single building contract

* *Electrical Review*, November 3rd, 1944.

is not quite such a problem, but again requires thought.

Economy can also be effected by the assembly of various components, etc., before delivery to site. Pendants may be made up, conduits cut to length, and, contrariwise, all accessories which have to be dismantled before erection could preferably be sent as components. Switches have to have their covers removed, saddle clips have to be taken apart. Any article made to a standard pattern and in widespread use could be conveniently dealt with on these lines.

The Contractor's Representative

The choice of a site representative is of paramount importance. Fortunate indeed is the contractor who has available a staff of outside representatives who are endowed with the qualities of technical knowledge, diplomacy and discipline. Much has been heard of late of compulsory registration ; perhaps the only sphere in which some form of registration is really needed is in the category of outside representative, whether he be supervisor, walking foreman, agent or foreman. Such a person carries the firm's goodwill in his keeping and is largely responsible for the soundness of the installation. The merits of a contractor can generally be assessed by the personality of his representatives. He should, therefore, pay a great deal of attention to the type of representative that he employs.

Another prolific source of wastefulness is the time sheet. The necessity of a time sheet is questionable, but it is to some extent involved in the hourly casual form of labour which is the curse of the building and allied trades. Many of the past troubles experienced in industry have been due primarily to the feeling of insecurity engendered in operatives by the hourly method of employment. Emergency conditions have now to a certain extent stabilised employment by the application of an Essential Work Order to most of the firms engaged in the electrical contracting industry. Under this Order, operatives may not be dismissed, except for misconduct, without the approval of a Government official, nor may the employee leave without similar sanction. Seven days' notice also has to be given of termination of employment, and a guaranteed week removes the risk of "laying off" for short periods if work is not immediately available.

Improvement of Employment Conditions

The extension of this measure to undertakings in the electrical contracting industry was to some extent due to the need to "immobilise" labour, thus offsetting the tendency of operatives used to casual employment to take advantage of the unusual circumstances and select congenial jobs, leaving the often more important, but less attractive, contracts starved of labour. The Essential Work Order has met this need, but it is still a compulsory control imposed upon the activities of employer and employee alike by the State. No contractor accepts the prospect of continuation of such controls into the post-war period with pleasure. Much might be done to hasten their eventual removal by the adoption of a farsighted policy by contractors in respect of employment conditions generally.

A wage based on a different unit from the hour would remove the need for individual time sheets, the preparation of which alone absorbs much time and concentration on the part of the operative. It becomes much more marked in its effect when opinions differ as regards amounts due, and deductions for unpunctuality and other losses of time, and much good could be done by an immediate reconsideration by the contractor of this particular part of the organisation. The alternative to the time sheet is the wages sheet which can be prepared by the wages clerk or foreman and would satisfy accountancy requirements ; the operative need not normally be affected by this part of wages payment routine.

Attention should also be given to welfare. It has been accepted that one cannot suddenly cause numbers of people to be deposited in any part of the country for any length of time without giving some consideration to their accommodation and well-being. A sense of proportion is needed, and it is hoped that the lessons of wartime conditions in this respect will not be forgotten.

Nine-Point Plan

A summary of the points raised in these articles could well be entitled "A Nine-Point Plan for Electrical Contractors," the points being classified as follows :—Restricted competition ; abolition of the "lump sum" tender ; provision of a standard schedule ; abolition of sub-contracting ; appointment of consulting engineers for all schemes ; improved specifications and drawings with a better code of symbols ; intelligent ordering of supplies ; efficient site organisation by the contractor ; and consideration of labour problems (including welfare).

A point that has not been mentioned is the training and education of the younger generation. Contractors have been short-sighted in this respect, although there are some outstanding exceptions, and the consequence is a shortage of young skilled craftsmen. The contractor should give more attention to the training of youth, including facilities for technical education. Attention should also be given to a suitable syllabus for the education of the young craftsmen at technical schools, and every effort should be made to restore the standard of craftsmanship of bygone days.

All-Electric Kitchens

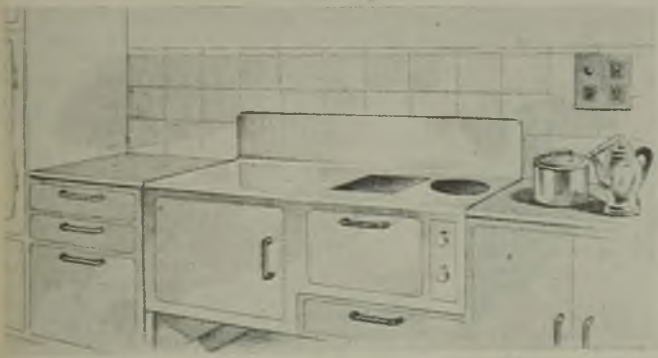
Plans for Low-cost Post-war Homes

THOUGH intended primarily to assist housing authorities and others responsible for house design, a booklet issued by the British Electrical Development Association entitled "Electric Kitchen Plans for Low-cost Post-war Homes" will attract much wider interest. It is the outcome of scientific study of the needs of the housewife and the functions and work methods of the kitchen, and among the experts consulted were the well-known architects, Mr. Frederick Gibberd, Mr. Howard Robertson and Mr. Louis de Soissons, the housewife's point of view being presented by Alderman Mrs. E. Gregory, a member of the Electrical Association for Women.

In designing the kitchens the task has been not only to make them all-electric but also to make them the most easily run from every point of view, at the same time seeing that the cost is in line with the probable cost of the building. The detailed plans in the booklet therefore show, besides skilfully-designed kitchens, the various types of apparatus and fittings of standard design which will be available after the war to go in them. On the assumption that the majority of the houses in the immediate post-war period will be of a size of the order of 800-950 sq. ft., four types of kitchen are suggested, two for houses and two for flats. Full-scale models of these are to be available for inspection by representatives of local authorities and other interested bodies.

The general planning is based on an analysis of the three main functions of a small-dwelling kitchen—cooking, washing and eating. In each case only one living room is provided for. In the first type, for a semi-detached house, there is, besides a 134-sq. ft. kitchen proper with space for a dining table, a 60-sq. ft. utility room accommodating washing machine, drying cupboard and cupboards for cleaning materials and brooms. In the other model, for a house having a dining recess attached to the living room, the floor area is smaller, 115 sq. ft. Similarly, of the two designs for flats one with space for serving breakfast has an area of 88 sq. ft., while the other intended for cooking has 68 sq. ft.; washing facilities are not provided since it is felt that a communal laundry is more desirable for flats.

A large larder is unnecessary if the new 4-cu.-ft. built-in refrigerator is installed



The proposed new horizontal cooker does away with stooping

Equipment to be provided in these kitchens includes a cooker, a refrigerator, a water heater, a space heater, shadowless lighting, a wash boiler or washing machine, a clothes dryer, clock and plug points for the kettle, iron, mixing machine and other accessories. Among the various types and sizes of cooker

that will be available is a horizontal model which, to obviate stooping, is arranged alongside the hob and the hot-cupboard unit. Although this type of cooker has a width of 42 in., the effective space utilisation is actually better since there is space underneath for shelves or cupboards.

The latest type of water heater, designed for fixing under the draining board, is of 15 or 20 gal. capacity, arranged so that either a small or large amount of hot water may be stored according to requirements. As an alternative to a reflector fire or convector for heating the kitchen, it is suggested that if solid floors are provided it may be possible to incorporate in the construction electric heating elements or wires which will prevent cold feet and afford useful general heating.

Great reduction in the cost of electric refrigerators is anticipated as a result of widespread demand. Compact designs will be available for building into cupboards and one model recommended is intended for installation at a height to avoid stooping. Measuring overall 46 in. high, 21 in. wide and 19 in. deep, the refrigerator is of such ample capacity (4 cu. ft.) that a larder of the ordinary size is unnecessary. Smaller cupboards on the wall and a vegetable cupboard under a counter top, preferably with ventilation through an outer wall, will provide all the accommodation required for food in a much more convenient way than a larder.

Lighting Arrangements

Glareless lighting of a minimum intensity of 10 ft.-candles on working surfaces can best be provided by diffusing type fittings preferably of totally enclosed pattern. For the smallest kitchen one 100-W ceiling fitting may be sufficient, but for kitchens of 80-120 sq. ft. floor area a second ceiling or bracket fitting for a 60-W lamp is usually necessary to give good illumination without shadow over the sink. For working surfaces, with wall cupboards above, additional illumination can be provided by tubular fittings fixed to the underside of the hanging cupboard. Tubular fluorescent lamps in fittings suitable for kitchens will no doubt be available after the war and these are recommended.

Positive ventilation of a kitchen fitted with electrical appliances is not always necessary or justifiable when capital cost has to be kept to the minimum. When, however, extract fans are used for removing the smell of cooking or steam, practical tests have shown that there is little or no value from the ventilation point of view, in providing a hood or duct. To prevent a draught when not running the fan should be fitted with a baffle or louvres.

It is recommended that the wash boiler or washing machine should be fixed in its working position, preferably under a removable draining board. This avoids having to pull the apparatus out into the middle of the room, thereby interfering with the working area for other purposes. In this case a filling tap from the hot water supply and an emptying pipe connected to the drain can be provided to eliminate the carrying of water and the use of hosepipe. Although outdoor drying when possible may be preferable, clothes can be dried indoors satisfactorily in an electrically heated cupboard, a heating element fitted in the bottom effecting the necessary movement of air without the use of a fan.

B.E.A.M.A. Booklet

Issued simultaneously with the E.D.A. booklet is a publication by the British Electrical and Allied Manufacturers' Association called " A Peep into the Future " which gives further details of the appliances which will be available for post-war kitchens. Special features of the horizontal cooker already referred to include quick oven heating, thermostatic oven control, a rapid boiling plate with simmering control, and increased grilling and warming space. All the features will also be incorporated in vertical cookers for use in premises where there is not enough space for the horizontal model.

In designing the built-in refrigerator the members of the Domestic Electric Refrigeration Association have pooled their technical resources and have incorporated an air-cooled compressor unit which is mechanically interchangeable as between different makes. Proposals for an electrically driven washing machine visualise a unit square in section and mounted on castors. Its external dimensions will not exceed 22½ in. square and its height will be made to suit the height of the sink, 36 in., which is the standard working level adopted in the kitchen generally, The 20-gal. water heater will be 33 in. high and 20 in. in diameter. With a total loading of 3 kW its two heats will each be thermostatically controlled.

Included in the brochure, from which our illustrations have been taken, are the names of the B.E.A.M.A. members responsible for the above and other contemplated post-war electrical appliances.

Canadian Restrictions Ended

LAST month all electricity restrictions in Ontario and Quebec were lifted. Similar action is being taken in other areas of Canada except British Columbia, where an unprecedented drought combined with a most difficult oil situation makes it absolutely essential that all limitations now imposed locally shall be continued. The restrictions in Quebec and Ontario, now removed, were imposed in September, 1942, in order to provide continuous power to war plants. Advertising signs, shop window lighting, and the use of power for rural extensions were prohibited and street lighting was reduced.

ELECTRICITY SUPPLY

Tees Water Power. Barrow Rural Extensions.

Barnard Castle (Co. Durham). — WATERFALL POWER SCHEME.—The Rural District Council has discussed the possibility of utilising Cauldron Snout, a waterfall in the River Tees, for generating electricity. Before the war Mr. G. F. Kennedy prepared a report for the South-West Durham Development Board which outlined a hydro-electric scheme capable of producing approximately two million kWh annually at an initial outlay of £29,000.

Barrow-in-Furness. — RURAL SUPPLIES. — The Electricity Committee is to provide supplies to Baycliffe at a cost of £283, Greenford (£63), Field Boughton (£799), Barber Green (£985) and Atside (£2,002), subject in the last three cases to a guaranteed revenue of 15 per cent. per annum on the capital expenditure for five years. In connection with the growth of the load in the rural area the Corporation Electricity Committee recommends the installation of a further 4,000-kVA transformer at the Buccleuch Street works and the laying of a 11,000-V feeder between Barrow and Ulverston and is seeking sanction to borrow £16,378 for the scheme.

Brierfield.—FIVE-YEAR ESTIMATE.—The Council has decided to inform the Electricity Commissioners that estimated expenditure for the five-year period following the end of the war will be £41,400.

STREET LIGHTING CONVERSION.—Application is being made to the Ministry of Health for sanction to borrow £2,850, the estimated cost of converting 157 street lamps from gas to electricity with the provision of an additional 36 electric lamps.

Durham.—POWER STATION SCHEME SUPPORTED. —The County Council at its quarterly meeting decided to support the plan by the North-Eastern Electric Supply Co., Ltd., to erect a £3,500,000 power station at Kepier just outside the boundary of Durham city. The Council in approving the scheme expressed the view that the power station would assist employment, help in attracting new industries, bring additional rateable value to the county, and have other advantages. It suggested, however, that the company should take all steps to prevent nuisance and to have due regard to the amenities of the area.

Easington (Co. Durham.) — ELECTRICITY CHARGES.—The Rural District Council is taking steps to secure the standardisation of electricity charges throughout the area in view of the probable increased use of electrical appliances in houses after the war. At present electricity is supplied in bulk by the North-Eastern Electric Supply Co., Ltd., to smaller undertakings, including colliery compames who sell it to consumers. The North Eastern Co. has offered to take over the distribution throughout the area. The Council has decided to ask the various undertakings to provide adequate supplies and to reduce charges.

Hereford.—SUBSTATION.—The S.W.S. Electric Power Co. is to erect a substation in Belmont Road.

Huddersfield.—STREET LIGHTING CONTROL.— By September 17th, 1,000 street lights had been converted from "starlight" intensity to the newly authorised values. Of these, 50, situated in main thoroughfares, and each with an intensity of 0·2 ft.-candle, are controlled by the Metropolitan-Vickers "Ripplay" system, while 950 with intensities of 0·02 ft.-candle, are controlled by time switches. The latter are being transferred to the "Ripplay" system as quickly as labour and equipment permit, and the borough electrical engineer, Mr. F. A. Ellis, has now been authorised to proceed with the lighting of all the electric street lamps in the borough, more than half of which have not been in use during the black-out years. Before the war there were over 2 000 electric street lamps in operation, and it is expected that all these will be equipped and controlled by the "Ripplay" system at an early date. The town's lighting is shared by the Electricity and Gas Departments. It is considered that the expenses incurred in installing the control system will be more than justified in the post-war years, when advantage will be taken of the spare "channels" for controlling blocks of heavy current consuming appliances during peak load periods.

London.—LIGHTING PLANS.—Islington Lighting Committee is to replace electric street lamps in main roads and install mercury vapour discharge lanterns and fittings at a cost of £3,800.

Manchester.—COST OF STREET LIGHTING.— The Highways Committee estimates that the cost of extending the new standard of lighting throughout the city will be £42,300.

Plymouth.—ELECTRICITY PROFIT.—Last year there was a profit of £15,000 on the city's electricity undertaking, compared with large losses in previous years.

South Shields.—SUPPLY EXTENSION.— The Electricity Committee is to supply electricity to premises in Leam Lane, and for this purpose application is being made for permission to borrow £6,925.

St. Austell.—CHEAPER ELECTRICITY.—The St. Austell & District Electric Lighting & Power Co., Ltd., announces alterations in tariffs to operate as from the commencement of the first quarterly cycle of meter readings for 1945. The flat rate for heating and for domestic power purposes will be reduced from 3d. to 1½d. per kWh (the flat rate for cooking is already 1½d.). The following tariff for small industrial power users (up to 10 HP connected load) will be introduced; first 500 kWh per quarter at 3d. per kWh; all further consumption at 1½d. per kWh.

Stretford.—LACK OF UNIFORMITY IN LIGHTING. —At a meeting of the Highways Committee attention was drawn to the variation in the lighting of streets under the new "dim out" system. The opinion was expressed that, in the interests of public safety, there should be a uniform standard even if this involved a reduction in the illumination of streets where

there was central control. The borough engineer was authorised to take steps to secure uniformity.

Watford.—CABLE REPLACEMENT.—The Electricity Committee is to replace cables at a cost of £1,250.

EXTENSIONS APPROVED.—The Electricity Committee has obtained sanction to borrow £3,500 for extensions to Boxmoor.

West Hartlepool.—SUPPLY TO FACTORIES.—The Town Council is to apply for sanction to borrow between £1,500 and £2,000 for supplying electricity to a factory site.

TRANSPORT

Blackpool.—TRAMWAY ROLLING STOCK.—The Transport Committee is making application to the Ministry of Transport for sanction to borrow £5,400, the cost of two sets of tramcar trucks and four sets of tramcar electrical equipment.

Brighton.—PROPOSED NEW TROLLEY-BUS ROUTE.—A trolley-bus service from Race Hill by way of Whitehawk to Arundel Road and Marine Parade has been recommended by the Public Utilities Committee of the Corporation. The cost of providing the new route is estimated at £17,500. The general manager of the Transport Department (Mr. Winston Robinson) stated last week that, having regard to the present national situation, normal transport services might be restored in the not too distant future and that the authorised trolley-bus extensions could be brought into operation.

The Brighton, Hove & District Bus Company is empowered by the Brighton Corporation Transport Act to run 20 per cent. of trolley-bus miles on the Corporation's overhead system and has given notice of its intention to use trolley-buses. The proposed new route would enable the company's Whitehawk garage to be used for trolley-buses.

Glasgow. — SEATING ACCOMMODATION INDICATOR.—The Transport Department has equipped a vehicle with an electrical device by which the public, driver and conductress are informed when all seats are occupied. If the trial proves beneficial the device may be introduced on all trams and buses.

Manchester. — NEW TROLLEY-BUSES. — In a report to the City Council, the Transport Committee states that it will be necessary to purchase 41 new trolley-buses at an estimated cost of £127,000. Requirements are for 31 four-wheeled vehicles, estimated at £3,000 each. and 10 six wheelers at £3,400 each.

Spain.—TROLLEY-BUS SERVICES.—According to *Metalurgia y Electricidad*, the Companhia de Ferrocarriles de Santander has recently been granted a concession to operate a direct service of trolley-buses between Bilbao and Algorta to replace two tramway lines.

Additional Power Plant

New Station and Extensions

REPRESENTATIVES of the Central Electricity Board and of Merz & MacLellan, consulting engineers, were present at a meeting of the Birkenhead Corporation Electricity Committee when the proposed new electricity station at Bromborough was discussed. Mr. C. T. S. Arnett (manager, North-West England and North Wales Area, C.E.B.) expressed the Board's view as to the extreme urgency for the Bromborough scheme. He intimated that it was now intended that the ultimate capacity of the station should be increased from 120,000 kW to not less than 200,000 kW, with an initial installation comprising two 50,000-kW turbo-alternators instead of two of 30,000 kW. The estimated cost of the initial station would be increased from £1,250,000 to £3,500,000.

The Committee recommended approval of the increase in the capacity of the station, and, with regard to contracts, suggested that these should be given to the following firms, the second choice in each case to be submitted only in the event of an allocation not being possible in the first choice: Boilers.—(1) Babcock & Wilcox, Ltd.; (2) International Combustion, Ltd. Turbines.—(1) English Electric Co., Ltd.; (2) C. A. Parsons & Co., Ltd. With regard to the construction of the station, quotations are to be invited from Sir Lindsay Parkinson, Ltd., Holloway Bros., Ltd., and G. Wimpey & Co., Ltd.

Birkenhead Town Council, on November 9th, approved the scheme.

At a meeting of the Bristol City Council on November 9th the Electricity Committee recommended that approach should be made to the Electricity Commissioners for their consent to the extension of the Portishead generating station and to borrow £1,454,300 the estimated cost of the additions, which include a 350 ft. chimney stack.

The West Midlands Joint Electricity Authority has been directed by the Central Board to carry out, by stages, extensions at the Ocker Hill and Walsall generating stations. The cost is estimated at over £4,000,000. In addition, the J.E.A.'s plans for five years after the war provide for an expenditure of £5,000,000 on distribution work, including £1,500,000 in the Shropshire area.

The City of York Electricity Committee has been informed by the Central Electricity Board that a direction is to be issued shortly to install a further 20,000-kW turbo-alternator at Foss Islands power station and that the new plant will be required to be in commercial use by the autumn of 1946. To accommodate this new plant certain alterations to the engine room will be required involving the removal of some existing plant.

I.E.E. By-Laws

A SPECIAL general meeting of corporate members of the Institution of Electrical Engineers is to be held on Thursday, November 23rd, for the purpose of considering and, if thought fit, approving certain alterations in the by-laws. The proposed alterations principally relate to the method of election of candidates for membership in the various grades and for the holding of office within the Institution.

South African Notes

By Our Cape Town Correspondent

Big Pretoria Extensions Planned

FUTURE extensions to Pretoria's electricity undertaking, at a cost of £6,000,000, have been recommended by the city electrical engineer, Mr. D. J. Hugo, in the course of a report on the subject of the city's power supplies. The maximum continuous output of the power station is at present 58,125 kW which, together with 20,000 kW to be imported from the Victoria Falls & Transvaal Power Co., Ltd. (available in May, 1945), will give a total maximum available capacity of 78,125 kW. Three 3,000-kW turbo-alternators are, however, over 20 years old. Allowing for one of the larger sets being out of commission at the time of the peak load the safe capacity is 62,500 kW.

Extensions are at present in hand for increasing the maximum capacity of the station to 95,625 kW. The City Council is aware, however, that the British Government, while authorising the manufacture of all other items of plant, has so far withheld authority for the manufacture of the most essential item, namely, the turbo-alternators. It will take at least two and a half years to complete the extensions from the date the manufacture of the turbo-alternators is authorised. When the present extensions are completed the safe capacity of the power station will be of the order of 75,000 kW which, together with 20,000 kW imported, makes the available capacity 95,000 kW.

The report points out that conditions introduced by the war make it extremely difficult to prepare estimates of costs which are likely to be realised in the subsequent period of construction. Apart from the substantial increases in the cost of materials required in the manufacture of heavy plant, Great Britain has already indicated officially that her manufacturing facilities will be fully occupied for some years after the war. Consequently, it may be necessary to procure plant, say, from the United States, with the added complication that at present the future course of rates of exchange is unpredictable.

Bearing these factors in mind an approximation of the capital cost involved in the construction of a new station is as follows: Stage one, to be in commission by 1949 (50,000 kW installed), £2,500,000. Stage two, to be in commission by 1952 (25,000 kW extension), £500,000. Stage three, to be in commission by 1955 (25,000 kW extension), £500,000. Total expenditure for 100,000 kW (m.c.r.) installed capacity £3,500,000. The years in which the expenditure falls due for stages two and three are subject to variation due to changes in the rate of growth of load, as the result of post-war reconstruction and development schemes. The city electrical engineer also feels that provision should be made for the expenditure of £1,500,000 on distribution extensions during the first five years after the war and a further sum of £1,000,000 during the next five years.

Forty-Hour Week

There is a proposal to introduce a 40-hour week into the electrical among other engineering industries in South Africa, but this has not been well received by the manufacturing side of the industry. It is insisted that the electrical manufacturing industry built up in South Africa would not then be able to exist in the face of overseas competition. As it is, the Department of Posts and Telegraphs recently placed an order overseas for certain electrical equipment, which could have been made in South Africa, for delivery when possible. In other words, the goods could be delivered after the war. This attitude certainly does not seem to indicate that the local industry is so successful as it feels it is.

Suburban Train Service Curtailed

The Cape suburban electric train service has been running a curtailed service, but for all that the lines have been overloaded and the number of breakdowns has been on the increase. This condition is due entirely to the wartime difficulty of importing sufficient replacement equipment for the electric track and the substations. It is impossible to produce this equipment in South Africa, particularly as much of it has to be specially designed for a certain locality. The key substations which supply electricity for the Cape suburban train service are owned by the Electricity Supply Commission and they are now working at full capacity. The passenger traffic on these lines has risen from the 46 millions of the last pre-war year to nearly 68 millions, but there has been no increase in the power plant and rolling stock.

Hire-Purchase Scheme Suspended

During the war it has not been necessary to impose restrictions on the use of electricity in Cape Town, but the Council's hire-purchase scheme under which a large number of domestic electrical appliances were sold has now had to be suspended. In fact, no important sales have been made since 1941, when the last supplies of cookers, refrigerators, etc., were received, and the three-year period of payment has now expired. Over 26,000 electric cookers have been installed in Cape Town under the scheme, and the bulk of these are still in good condition.

Imported Electric Furnaces

Some engineering workshops in South Africa have recently added American electric furnaces to their equipment, although in many cases they have had to wait a considerable time for them to be delivered. Some of these furnaces have been specially constructed for hardening high-speed tools. Special oil and water quenching apparatus is also used.

Locally Manufactured Apparatus

A Cape Town firm, United Africa Electric, Ltd., has been making coil-winding machines for the manufacture of small radio transformers and small transformers up to 2 kW for other purposes. The firm is also producing wireless-testing instruments such as condenser bridge and multi-range meters.

Electric kettles are still being made in South Africa, and although the price is well over £3 for a 2-pint kettle they are said to be not so good as imported kettles.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Aberdare Cables, Ltd.—Despite a falling off in the demand during the past year the company's cable factory has been kept moderately busy. At the annual general meeting last week Sir George Usher, the chairman, said that the prospects for the immediate future were a little brighter and they had already received a certain amount of export business. South Wales Switchgear, Ltd., had made remarkable progress, and although the period under review was the first full operating year of this subsidiary since they acquired it, the number of employees had grown to almost equal the number of employees of the main cable works. They had been entrusted with large Government contracts for switchgear and other specialised service requirements. The whole organisation was rapidly expanding and they were playing an important part in the absorption of labour in this particular area. Post-war prospects were particularly bright.

Crabtree Electrical Industries, Ltd.—The accounts of the operating company, J. A. Crabtree & Co., Ltd., for the year ended July 31st last show a trading profit, with other receipts, after deducting all working expenses, of £246,431 as compared with £245,760 in the previous year. Income tax and E.P.T. absorb £162,451 (£166,113) and after allowing for depreciation and writing off all capital expenditure incurred during the year there remains a surplus of £72,439 (£53,305) which with £79,435 brought forward makes £151,874. From this £65,000 in tax-free dividends is paid to Crabtree Electrical Industries, £10,000 is transferred to reserve and £76,875 is carried forward.

As already announced, Crabtree Electrical Industries is paying a final ordinary dividend of 5 per cent. and a cash bonus of 7½ per cent., again making a total distribution for the year of 17½ per cent. The balance carried forward is £22,483 (£19,933).

Murex, Ltd.—Mr. George P. Joseph, the chairman, stated at the annual general meeting last week that the subsidiary company, Murex Welding Processes, Ltd., had again shown satisfactory expansion. During the year extensions had been made to the main factory and to the laboratory and research buildings, and in order to provide for the further extension of the factory at Waltham Cross when circumstances permitted they had recently purchased approximately six acres of freehold land. During the latter part of the company's last financial year there had been a falling off in the demand for the company's main products. Up to date this had been partially arrested, but any substantial improvement in the position was dependent on the decision of the Government to release material for manufacture for export and post-war requirements.

Ultra Electric, Ltd., the operating company, has decided, in consequence of expansion of business, to issue 65,000 £1 ordinary shares at par to Ultra Electric (Holdings), Ltd. To finance the issue the holding company is offering to its shareholders 200,000 5s. ordinary shares at 7s. each in the proportion of one for every four held on October 27th last. The new shares will rank *pari passu* with the existing ordinary shares. The list will close on November 24th.

The Rangoon Electric Tramway & Supply Co., Ltd., reports that after again providing £8,000 for debenture interest the net loss for 1943 was £13,428; this compares with £51,621 in 1942. The credit carried forward is £35,710 (£41,938). Arrears of dividend on the 6 per cent. cumulative shares for 1942 and 1943 amount to £30,000. There have been no developments regarding the company's claim for compensation for war damage, but plans for reconstruction of the undertaking have been drawn up.

Adelaide Electric Supply Co., Ltd.—At extraordinary meetings held in Adelaide in October resolutions were passed raising the company's capital from £3,625,000 to £4,750,000 by the creation of 1,125,000 ordinary shares of £1 each and converting the existing preferred ordinary stock into ordinary stock. Now the company is offering holders on the London register of the preferred ordinary and ordinary shares 11,448 new ordinary shares (part of the issue of 1,125,000) at par. Acceptance of the offer or requests for the sale of the rights in the shares must be sent in by December 1st.

The new capital is required in connection with the construction of Osborne "B" power station and for general purposes.

The company is maintaining its final dividend at 5 per cent., again making 10 per cent. for the year.

Thos. W. Ward, Ltd.—At the company's annual meeting last week Mr. Ashley S. Ward (chairman and managing director) referred to "interesting proposals" which he said were before them, and added that there was every indication that the company's organisation would be stretched to the full in business in years to come.

Dealing with the general question of controls, he suggested that in the interests of British trade there should be much quicker replies to applications and the attitude of the Controller should be not to say "No" to everything but to say "Yes" unless it was seen that the proposition was contrary to public interests.

British Rola, Ltd., reports a net profit of £45,304 for 1943-44 (against £39,237) from which £34,300 is allocated to taxation, £1,275 for preference share redemption and £2,000 for deferred repairs. The ordinary dividend is again 15 per cent. and £2,132 is carried forward.

Peto Scott Electrical Instruments (Holdings), Ltd., are to hold an extraordinary general meeting on November 27th for the purpose of changing the name to Peto Scott Electrical Instruments, Ltd., and bringing the articles of the company more into line with modern practice.

Pye, Ltd., are maintaining the interim dividend on the 8 per cent. participating preferred ordinary stock at 5 per cent.

(A short series of open letters by L.S.E., commenting on some famous letters of the past.)

To Christopher Columbus, who wrote reporting on his voyage to the 'Indian Ocean.'

Norwich, 1944

Dear Columbus,

So it is true that you didn't know where you were going or, when you got back, where you'd been. You simply sailed West until you hit something. It happened to be America, that 'island' whose inhabitants, you say, are very liberal with everything they have in which respect they do not seem to have changed much.

When we started our voyage over sixty years ago we had our sailing orders and they have never changed. They were to concentrate our energies on the manufacture of electric motors and allied machines of the highest quality. Our voyage has brought us a considerable measure of success and we have made some useful discoveries. You, excellent as a navigator, failed as statesman and colonial administrator. There seems to be a lesson in this.

With admiration for your courage,

Yours sincerely,

LAURENCE, SCOTT & ELECTROMOTORS LTD.

The General Cable Manufacturing Co., Ltd., proposes to increase its capital to £250,000 by the creation of 400,000 5s. ordinary shares ranking *pari passu* with the 300,000 existing shares of this denomination.

The British Electric Resistance Co., Ltd., announces the payment of a dividend of 20 per cent. for the past year (same).

Johnson & Phillips, Ltd., are maintaining their interim dividend at 7½ per cent.

The Revo Electric Co., Ltd., is again paying an interim dividend of 5 per cent.

The Paterson Engineering Co., Ltd., is again paying a first and final dividend of 10 per cent., with a bonus of 2½ per cent.

The St. Austell & District Electric Light & Power Co., Ltd., is maintaining its interim dividend at 4 per cent.

The Cawnpore Electric Supply Co., Ltd., is to pay an interim dividend of 3 per cent., 1 per cent. more than last year.

New Companies

Ackland Electrical Services, Ltd.—Private company. Registered November 2nd. Capital, £5,000. Objects: To carry on the business of electrical, motor, wireless and cinematograph engineers and contractors, service agents, etc. Directors: A. J. Ackland and H. H. Ackland, both of 16, Hartfield Road, Hook, Surbiton, Surrey. Registered office: Arcade Parade, Elm Road, Hook, Surbiton, Surrey.

Canaan, Ltd.—Private company. Registered November 2nd. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, radio valves and apparatus, electric lamps and signs, wireless, X-ray, electro-medical and scientific apparatus, etc. Directors: G. W. Brown, 58, Erlanger Road, S.E.14 and Winnie Wood, 59, Vale Road, Claygate. Registered office: 105, Newington Causeway, S.E.1.

Magneto Dynamo & Electrical Repairs, Ltd.—Private company. Registered November 3rd. Capital, £2,500. Objects: To carry on the business of electrical, motor and general engineers, etc. Directors: C. D. Herniman, 39, Beach Avenue, Chichester, and two others. Registered office: Adcocks Chambers, East Street, Chichester.

Instructional Equipment, Ltd.—Private company. Registered November 1st. Capital, £100. Objects: To carry on the business of electrical, mechanical, and consulting engineers, manufacturers of, and dealers in, insulated wires, bells, telegraphic machines, wireless installations, hoists, etc. Directors: A. C. Mallinson, Springhill, Chelford Road, Prestbury, director of Mallinson & Eckersley, Ltd. and H. P. de Looze, 486, Wilmslow Road, Manchester, director of Systemex, Ltd. Registered office: Worsley Street, Salford, 3.

Mallinson & Eckersley (Engineers), Ltd.—Private company. Registered November 1st. Capital, £5,000. Particulars as above.

Radio & Cinevision, Ltd.—Private company. Registered November 6th. Capital, £1,000. Objects: To acquire the business of an electrical and wireless service carried on by Leslie Shann, as Auto Electric Wireless Services, at 355, Harehills Lane, Leeds 9. Directors: L. Shann, 25, Willow Crescent, Halton, Leeds 9, and L. Manning, 61, Stainburn Road, Leeds 7. Registered office: 355, Harehills Lane, Leeds 9.

Clifford King, Ltd.—Private company. Registered November 6th. Capital, £1,000. Objects: To acquire the business of an electrical engineer and contractor carried on by Clifford King at Templar Street, Leeds, 2. Directors: C. King and Mrs. Lily King, both of 78, Gipton Wood Road, Leeds, 8.

Companies' Returns

Statements of Capital

Vactite Wire Co., Ltd.—Capital, £25,000 in £1 shares. Return dated July 5th. 15,000 shares taken up. £3 paid. £14,997 considered as paid. Mortgages and charges: £10,000.

Sussex Electricity Supply Co., Ltd.—Capital, £197,000 in £1 shares. Return dated July 5th. All shares taken up. £197,000 paid. Mortgages and charges: Nil.

Wigtownshire Electricity Co., Ltd.—Capital, £175,000 in £1 shares (all ordinary). Return dated July 19th. 160,000 shares taken up. £160,000 paid. Mortgages and charges: Nil.

Mortgages and Charges

Britannic Electric Cable & Construction Co., Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated October 24th, 1944, to secure £25,000 (supplemental to debentures dated June 28th, 1938, October 11th, 1939, May 15th, 1940, October 20th, 1941, November 26th, 1942, and July 5th, 1943). Holders: Westminster Bank, Ltd.

Mechanical & Electrical Industries, Ltd.—Charge on proceeds of contracts, dated October 18th, 1944, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Lan-Elec, Ltd.—Charge on proceeds of contracts, dated October 11th, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Bankruptcies

T. Johnson, 233, The Wheel, Ecclesfield, Yorkshire, lately carrying on business at 25, Granville Street, Sheffield, under the style of Tom Johnson & Co., mechanical and electrical engineer and contractor.—This debtor's application for discharge was heard recently at the County Court Hall, Sheffield. The Official Receiver stated that the business was commenced in 1936. Between January 31st, 1938, and April, 1940, there was a loss incurred of approximately £650. The debtor had drawn nothing from the business apart from expenses totalling £37. Applicant, who did not attend at the hearing owing to illness, was granted his discharge, subject to one month's suspension.

E. C. Mould, electrical retailer, trading as the Empire Electrical Co., 24, Westrow Gardens, Seven Kings, Essex, and lately carrying on business at 28, Clements Road, Ilford, and the Facade, High Road, Goodmayes, Essex.—Application for discharge to be heard December 12th at the Shire Hall, Chelmsford.

STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange markets are attracting increased public attention. There is a fair amount of business going on, more particularly in specialised sections such, for instance, as the market for radio shares. Gilt-edged ordinary shares are showing up well. The increased dividend on Tube Investments caused a sharp rise in the price. Home railway stocks have improved upon their previous position. The demand for electrical manufacturing equipment shares is on an expanding scale, and where shares can be obtained—which cannot be said in every case—the price is usually higher than that of a week or two ago. The fall in prices last September has been largely recovered, and the Government's offer of 1¾ per cent. Exchequer Bonds, emphasising as it does the cheap money policy of the Treasury, serves to direct capital into stocks and shares which offer a living rate of return upon money employed in them.

A Score of Rises

De La Rue at 9⅞ are up 2s. 6d. on the agreement with the Powell Duffryn Company for research work on plastics. Advances of 1/16 or more have made Callender's 5⅜, Murex 5 1/16, Ericssons 51s. 3d., Ransome & Marles 87s. 6d., Reyrolle 69s. 3d., and Thorn Electrics 27s. 6d. Revo at 42s. 6d. are 1s. 6d. higher. General Electrics hold their previous gain at 94s. Enfield Cable ordinary strengthened to 62s. Improvements have occurred in Associated Electrical ordinary, Automatic Telephone, Crabtree, English Electric, Ever Ready, Hall Telephone, Henley's, Siemens and others. Newman Industries have changed hands at 7s. 3d., against a middle price of 6s. 3d. last week. Home electricity supply ordinary shares are practically unchanged. In the overseas group, Victoria Falls ordinary are better at 86s. 3d. Dollar stocks responded with advances to the success of President Roosevelt in last week's election.

E.M.I. and Others

Electric & Musical Industries are an outstanding feature amongst popular shares. The price rose to 37s. 6d. before reverting to 36s. 9d. at which latter figure the shares are 1s. 9d. up on the week. Cossors continue steady at 25s. 6d., E. K. Cole at 33s. 6d. and Pye Deferred at 32s. 6d.—Philco are 6d. better at 13s. Public interest, which seemed to be waning, has revived in this section of the market; maybe the boomlet which lifted the 1s. shares of Decca Records to 57s., has exercised a sympathetic effect upon E.M.I. and the rest of the group.

Apart from the radio shares quoted in the weekly price lists, there are others in companies connected with the same branch of industry. Certain of the them are closely associated with the gramophone trade. In view of the interest taken in this particular market, it may be of service to set out some of the companies, with the nominal value and the present price of their shares :—

Share	Price		Nominal Value	
	s.	d.	s.	d.
Broadcast Relay	17	3	5	0
McMichael	8	3	5	0
Max Stone	4	3	2	0
Peto Scott	5	0	2	0
Radio Rentals	26	6	5	0
Rothermel	2	6	1	0
Scophony	4	6	5	0
Stone (J. & F.)	8	4½	5	0
Ultra Electric	8	6xr	5	0

Ultra Electric

Ultra Electric (Holdings) offers its shareholders 200,000 5s. ordinary shares at 7s. each, in the proportion of one share for every four held, fractions being ignored. The new shares are quoted at about the same price as the old; the useful premium of 1s. 6d. should not be ignored by those who have the right to subscribe to the new issue. It might be thought that no shareholder would miss the opportunity for applying for any new issue at a price well under that at which the old shares stand in the market. But the recent experience in connection with the Reyrolle issue shows otherwise.

Something like 10 per cent. of the new Reyrolle shares were not subscribed by those who had the right to apply for them. As the premium at the time of issue stood at 7s. 6d. per new share, this was a loss to them, and equal gain to those who guaranteed to take up whatever shares were not applied for by the existing shareholders.

Ultra Electric (Holdings) is to pay a commission of 4½d. per share, which, in view of the bonus offered in the price of issue, appears to be something of an extravagance.

Tube Investments

Tube Investments rose 5s. 9d. to 5⅛ on the increase of 2½ per cent. in the final dividend, making it 12½ per cent., and bringing the year's distribution to 22½ per cent. In the three years 1941–1943 inclusive, the dividend was 20 per cent. per annum. In the four previous years, 1937–1940 inclusive, the company paid 23¾ per cent. to which it was raised from 17½ per cent. in 1936. The company works through subsidiaries, of which one of the principal is Accles & Pollock. The issued capital is a little over £4,000,000, of which 3¼ million is in £1 ordinary shares. There are 500 liaison shares, of £1 each, entitled to 1,000 times the rights of £1 of

(*Continued on page* 718)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Nov. 14	Rise or Fall	Yield p.c. £	s.	d.
Home Electricity Ordinary							
Bournemouth and Poole ..	12½	12½	62/6	..	4	0	0
British Power and Light ..	7	7	33/-	..	4	4	10
City of London ..	7	5½	30/-	..	3	13	4
Clyde Valley ..	8	8	42/-	..	3	16	0
County of London	8	8	43/-	..	3	14	5
Edmundsons ..	6	6	31/-	..	3	17	5
Elec.Dis.Yorkshire	9	9	45/6	..	3	19	6
Elec. Fin. and Securities ..	12½	13½	60/6	..	4	9	0
Elec. Supply Corporation ..	10	10	49/-	..	4	1	8
Lancs. Light and Power ..	7½	7½	37/-	..	4	1	1
Llanelly Elec. ..	6	6	26/6	..	4	10	7
Lond.Assoc.Electric	5	4	26/-	..	3	1	6
London Electric..	6	6	30/6	..	3	18	8
Metropolitan E.S.	8	8	43/-	..	3	14	5
Midland Counties	8	8	41/6	..	3	17	0
Mid. Elec. Power	9	9	44/-	..	4	1	10
Newcastle Elec.	7	7	32/-	..	4	7	6
North Eastern Elec.	7	7	34/6	..	4	1	2
Northampton ..	10	10	50/-	..	4	0	0
Northmet Power	7	7	41/-	..	3	8	4
Richmond Elec.	6	6	26/-	..	4	12	4
Scottish Power ..	8	8	40/6	..	3	19	0
Southern Areas	5	5	23/-	..	4	7	0
South London ..	7	7	29/6	..	4	15	0
West Devon ..	5	5	24/-	..	4	3	4
West Glos. ..	4½	3½	25/-	..	2	16	0
Yorkshire Elec...	8	8	43/-	..	3	14	5
Public Boards							
Central Electricity :							
1955–75 ..	5	5	114½	..	4	7	4
1951–73 ..	4½	4½	107	..	4	4	1
1963–93 ..	3½	3½	104	..	3	7	4
1974–94 ..	3¼	3¼	100	..	3	5	0
London Elec. Trans.	2½	2½	98½	..	2	10	9
London & Home Counties 1955–75	4½	4½	112	..	4	0	4
Lond.Pass.Trans.Bd.							
A	4½	4½	120½	..	3	14	8
B	5	5	121½	..	4	2	4
C	3	3½	68	..	4	15	7
WestMidlandsJ.E.A. 1948–68 ..	5	5	106½	..	4	14	0
Overseas Electricity Companies							
Atlas Elec. ..	Nil	Nil	7/3	..	—		
Calcutta Elec. ..	6*	6*	45/6	−6d.	2	12	9
Cawnpore Elec.	10	7	39/9	..	3	10	4
East African Power	7	7	34/6	..	4	1	4
Jerusalem Elec...	7	5	29/-	..	3	9	0
Kalgoorlie (10/-)	5	5	11/6	..	4	7	0
Madras Elec. ..	Nil	4	29/-	..	2	15	4
Montreal Power	1½	1½	23½	+1½	—		
Nigerian Elec. ..	8	10	33/6	..	5	19	5
PalestineElec."A"	5*	5*	39/-	..	2	11	3
Perak Hydro-elec.	6	7	13/6	..	—		
Tokyo Elec. 6%	6	6	28	+1	—		
VictoriaFallsPower	15	15	5 1/16	+ 1/16	3	9	7
WhitehallInv.Pref.	—	6	26/-	+6d.	4	12	4

Company	Dividend Previous	Dividend Last	Middle Price Nov. 14	Rise or Fall	Yield p.c. £	s.	d.
Equipment and Manufacturing							
Aron Elec. Ord.	15	15	61/-	..	4	18	4
Assoc. Brit. Eng.	6	7	57/6	..	2	8	9
Assoc. Elec. :							
Ord.	10	10	54/-	+6d.	3	14	1
Pref. ..	8	8	39/6	..	4	1	0
Automatic Tel.&El.	12½	12½	65/-	+1/-	3	17	0
Babcock & Wilcox	11	11	52/6	..	4	3	10
British Aluminium	10	10	47/6	..	4	4	1
British Insul. Ord.	20	20	5 9/16	..	3	12	0
British Thermostat (5/-)	18½	18½	20/-	..	4	12	6
British Vac. Cleaner (5/-)	30	30	29/6	..	5	1	8
Brush Ord. (5/-)	8	9	10/9	..	4	3	9
Burco (5/-) ..	15	17½	17/-	..	5	3	0
Callender's ..	15	20	5⅝	+ 1/16	3	14	4
ChlorideElec.Storage	15	15	85/-	..	3	10	7
Christy Bros. ..	12½	17½	75/-	..	4	13	4
Cole, E. K. (5/-)..	10	15	33/6	..	2	4	10
Consolidated Signal	24	27½	6¾	..	4	3	6
Cossor, A. C. (5/-)	7½*	10*	25/6	..	1	19	4
Crabtree (10/-) ..	17½	17½	41/-	+6d.	4	5	4
Crompton Parkinson Ord. (5/-) ..	20	22½	32/-	..	3	7	3
De La Rue ..	35	40	9¾	+¼	4	1	8
E.M.I. (10/-) ..	6	8	36/9	+1/9	2	3	6
Elec. Construction	10	12½	57/-	..	4	7	9
Enfield Cable Ord.	12½	12½	62/-	+1/-	4	0	8
English Electric	10	10	52/6	+6d.	3	16	4
Ensign Lamps (5/-)	25	15	21/3	..	3	10	8
Ericsson Tel. (5/-)	22*	20*	51/3	+ 1/16	1	19	1
Ever Ready (5/-)	40	40	41/6	+6d.	4	16	7
Falk Stadelmann	7½	7½	34/6	..	4	7	0
Ferranti Pref. ..	7	7	31/3	..	4	9	7
G.E.C. :							
Pref.	6½	6½	33/3	..	3	18	4
Ord.	17½	17½	94/-	..	3	14	6
General Cable (5/-)	15	15	15/-	..	5	0	0
Greenwood&Batley	15	15	45/9	..	6	11	0
HallTelephone(10/-)	12½	12½	31/6	+6d.	3	19	4
Henley's (5/-) ..	20	20	26/3	+3d.	3	16	5
4½% Pref. ..	4½	4½	24/-	..	3	15	0
Hopkinsons ..	15	17½	71/3	..	4	18	2
India Rubber Pref.	5½	5½	23/-	..	4	15	9
Intl. Combustion	30	30	6½	..	4	12	4
Johnson & Phillips	15	15	75/-	..	4	0	0
Lancashire Dynamo	22½	22½	100/-	..	4	10	0
Laurence, Scott(5/-)	12½	12½	13/-	..	4	16	2
London Elec. Wire	7½	7½	37/6	..	4	0	0
Mather & Platt..	10	10	55/-	--9d.	3	12	9
Metal Industries (B)	8	8½	50/6	..	3	7	6
Met.Elec.CablePref.	5½	5½	21/3	..	5	3	6
Mid. Elec. Mfg.	25	25	7⅛	..	3	10	3
Murex	20	20	5 1/16	+ ⅛	3	19	0
Newman Ind. (2/-)	20	20	7/3	+1/-	5	10	4
Philco (2/-) ..	—	—	13/-	+6d.	—		
Power Securities	6	6	29/-	..	4	2	9
Pye Deferred (5/-)	25	25	32/6	..	3	17	0
Ransome & Marles	20	20	87/6	+ 1/16	4	11	4
Revo (10/-) ..	17½	17½	42/6	+1/6	4	2	4
Reyrolle ..	12½	12½	69/3	+1/9	3	10	2

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Nov. 14	Rise or Fall	Yield p.c. £	s.	d.
Equipment and Manufacturing (*Continued*)							
Siemens Ord. ..	7½	7½	36/3	+3d.	4	2	9
Strand Elec. (5/–)	10	12½	12/–	..	5	4	2
Switchgear & Cowans (5/–) ..	20	20	18/6	..	5	8	1
T.C.C. (10/–) ..	5	7½	23/9	..	3	3	2
T.C. & M. ..	10	10	56/–	..	3	11	6
TelephoneMfg.(5/–)	9	9	12/–	..	3	15	0
Thorn Elec. (5/–)	20	20	27/6	+1/16	3	12	9
Tube Investments	20	22½	5½	+5/9	4	8	0
Vactric (5/–) ..	Nil	22½	17/6	+3d.	6	8	6
Veritys (5/–) ..	7½	7½	8/–	..	4	13	9
Walsall Conduits(4/–)	55	55	50/6	..	4	7	0
Ward & Goldstone (5/–)	20	20	30/–	..	3	6	8
WestinghouseBrake	12½	14	75/–	..	3	14	8
West, Allen (5/–)	7½	7½	7/6	..	5	0	0
Traction and Transport							
Anglo-Arg. Trans.:							
First Pref. (£5)	Nil	Nil	2/6	..		—	
4% Inc. ..	Nil	Nil	7½	..		—	
Brit. Elec. Traction:							
Def. Ord. ..	45	45	1215xd	+27	3	14	0
Pref. Ord. ..	8	8	180	..	4	9	0
Bristol Trams ..	10	10	57/–	..	3	10	2
Brazil Traction..	1¾	2	27½	+⅜	7	9	7
Calcutta Trams	6½	7½	73/6	+1/–	2	0	9
Cape Elec. Trams	5	6	26/–	+6d.	4	12	4
Lancs. Transport	10	10	47/6	..	4	4	3
Southern Rly.:							
5% Prefd. ..	5	5	76½	..	6	10	9
5% Pref. ..	5	5	116½	..	4	5	10
T. Tilling ..	10	10	61/–	–1/–	3	5	6
West Riding ..	10	10	46/–	..	4	7	0
Telegraph and Telephone							
Anglo-Am. Tel.:							
Pref.	6	6	123	+½	4	17	7
Def.	1½	1½	30	..	5	0	0
Anglo-Portuguese	8	8	27/6	+6d.	5	16	6
Cable & Wireless:							
5½% Pref. ..	5½	5½	115½	+1	4	15	1
Ord.	4	4	81½	+1	4	18	2
CanadianMarconi$1	Nil	4cts.	9/–	..		—	
Globe Tel. & Tel.:							
Ord.	8¼*	5*	39/6	+6d.	2	10	8
Pref. ..	6	6	31/–	..	3	17	5
Great Northern Tel. (£10)	Nil	Nil	28	–½		—	
Inter. Tel. & Tel.	Nil	Nil	20	..		—	
Marconi-Marine..	7½	7½	36/6	..	4	2	4
Oriental Tel. Ord.	16	10	49/6	..		—	
Telephone Props.	Nil	6	21/3	..	5	13	0
Tele. Rentals (5/–)	10	10	12/–	..	4	3	4

* Dividends are paid free of Income Tax

Stocks and Shares (*Continued from page* 716)

ordinary stock. In the dark days of 1940, after the collapse of France, the price of Tube Investments fell to 58s. The current quotation is the highest touched for a decade or more.

Aron Meters

The dividend of 15 per cent. on Aron Electricity Meter shares is the same as that of last year. It succeeded 10 per cent. for the year ended March, 1942, 7½ per cent. in the previous twelve-month and nothing for 1940. Previously to that, the company had paid 15 per cent. for five consecutive years and the loss which occurred in the year ended March, 1940, had the effect of putting down the price of the shares at one time to 13s. 9d., the lowest touched for many years. The present price of 61s. is the best reached since 1937. The issued capital is £151,936 in ordinary stock in £1 units. At to-day's price the yield on the money is £4 18s. 4d. per cent.

Calcutta Trams

Calcutta Tramways shares, after a dip to 70s., rose to 73s. 6d. on announcement that, in reply to the Calcutta Corporation's recent advertisement, over a score of tenders for working the tramways had been received. Estimates of the purchase price now place it at a probable five crores of rupees, approximately £3½ million. This would give the Calcutta Tramways shareholders about £4 per share. As already notified, negotiations cannot be concluded until the results of the present year's working of the Tramways Company have been ascertained.

Indian Investments

Calcutta Electric Supply shares at 46s. are unaffected by the Government of Bengal's decision to acquire the undertaking in 1958, instead of ten years earlier. The Government has the right to buy the Corporation's undertakings, at different rates, between now and 1980, at the market value as a going concern. Some years ago, the Corporation of Calcutta wanted to buy that portion of the electricity supply company's undertaking which came within its own area, but the Government of Bengal refused to give permission. The present price of the shares gives a return of £2 12s. 9d. per cent. free of tax, equal to 5¼ per cent. on the money, taking tax at 10s. in the £. The Cawnpore Electric Supply Corporation has announced an interim dividend of 3 per cent. on account of 1944, against 2 per cent. a year ago. The company cut its dividend for 1943 to 7 per cent. for the year, after having paid 10 per cent. per annum for ten years. The price of the shares now stands at a shade under £2 per share. It is hoped that the increase in the interim dividend implies an advance in the final, though whether the company will pay its old 10 per cent. remains to be seen six months hence.

NEW PATENTS

Electrical Specifications Recently Published

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

ALDIS Bros., Ltd., and A. C. W. Aldis.—"Signalling lamps." 11748. September 13th, 1941. (565051.)

R. N. Arnold and Metropolitan-Vickers Electrical Co., Ltd.—"Damping of vibrations in members." 3815. March 9th, 1943. Addition to 549893. (565068.)

Asea Electric, Ltd., and N. J. E. Haglof.—"Means for obtaining half-wave rectification from transformers." 14785. September 9th, 1943. (565111.)

British Thomson-Houston Co., Ltd.—"Resinous condensation products." 16325/42. November 28th, 1941. (565059.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—"Electric current converting arrangements comprising valves of the immersion igniter type." 3024. February 24th, 1943. (565148.)

G. Bryden and Marshall, Sons & Co., Ltd.—"Electric drive of wire-drawing machines and the like." 11783. July 20th, 1943. (565169.)

General Electric Co., Ltd., and A. B. Sowter.—"Hand-operated cutting devices." 6978. May 3rd, 1943. (565139.)

A. J. Gunn and Dowsing Co. (Electrical Manufacturers), Ltd.—"Dish and like washing machines." 15713. September 24th, 1943. (565113.)

B. M. Hadfield.—"Alternating current generators whose frequency is proportional to and controlled by a direct current." 4370. March 17th, 1943. (565099.)

W. T. Henley's Telegraph Works Co., Ltd., F. T. Griffiths and R. P. S. Buckle.—"Change-speed gears." 6369. April 21st, 1943. (565078.)

Igranic Co., Ltd.—"Electric driving systems." 1071/43. January 21st, 1942. (565085.)

Igranic Co., Ltd., and P. W. Townsend.—"Electric circuit system for causing a given operation to take place at a predetermined time interval after a prior operation." 6404. April 21st, 1943. (565131.)

G. Liebmann and Cathodeon, Ltd.—"Screening of amplifying valves." 252. January 6th, 1943. (565063.)

P. H. Morrison and Plessey Co., Ltd.—"Electrical contacts." 7190. May 6th, 1943. (565045.)

Mullard Radio Valve Co., Ltd., K. E. Latimer and S. C. Smith.—"Plug-and-socket joints suitable for electrical conductors carrying high-frequency currents." 3115. February 25th, 1943. (565149.)

Parmeke, Ltd., S. N. S. Mee and F. J. Toone.—"Electric transformers." 7482. May 11th, 1943. (565152.)

H. W. Pook and Battery Construction, Ltd.—"Dry galvanic batteries and cells." Cognate applications 2944/43 and 12451/43. February 23rd, 1943. (565094.)

Pritchett & Gold & E.P.S. Co., Ltd., E. M. O. Honey and C. R. Hardy.—"Micro-porous materials." Cognate applications 14563/42 and 3987/43. October 17th, 1942. (565022.)

M. P. Rubert.—"Electric testing device." 12085. July 24th, 1943. (565049.)

Siemens & General Electric Railway Signal Co., Ltd., F. Horler and J. Sulston.—"Electrically controlled route-setting systems for railway points and signals." 3169. February 26th, 1943. (565096.)

C. S. Smith.—"Electrical servo systems." 6585. May 14th, 1942. (565116.)

Standard Telephones & Cables, Ltd.—"Electric dry plate rectifier." 16115/43. November 3rd, 1942. (565173.)

Standard Telephones & Cables, Ltd., C. T. Scully and L. W. Houghton.—"Protective arrangements for electrical circuits." 6564. April 23rd, 1943. (565134.)

Surgical Equipment Supplies, Ltd., and R. G. Krau.—"Thermo-regulating switches to electrically heated apparatus such as hot-water baths, sterilisers and the like comprising the same." 6498. April 22nd, 1943. (565106.)

J. C. De Wardt.—"Dynamo-electrical machines." 7040. May 4th, 1943. (565141.)

Western Electric Co., Inc.—"Electric cables for connection to switching bank terminals." 8092/43. June 19th, 1942. (565047.)

TRADE MARK APPLICATIONS

THE following applications have been made for trade marks. Objections may be entered within a month from November 8th :—

CANNON (design). No. 627,703, Class 11. Electrical and other installations and apparatus for lighting, heating, steam generating, cooking, cooling, evaporating, refrigerating, drying and water supply purposes; boilers (not parts of machines), etc.; and parts (not included in other classes) of all the said goods.—Cannon Iron Foundries, Ltd., Deepfields, near Bilston.

CIRCOIL. No. 629,167, Class 11. Installations and apparatus for heating, and parts thereof not included in other classes.—Aidas Electric, Ltd., Sadia Works, Rowdell Road, Northolt, Greenford, Middlesex.

MORNING SALUTE. No. 629,289, Class 14. Clocks.—Smith's English Clocks, Ltd., Cricklewood Works, Edgware Road, N.W.2.

Post-war Telecommunications

ADDRESSING the Radio Industries Club recently Dr. L. D. Bennett, chairman and managing director of the Philco group of companies, said that after the war there would be a demand for more and better communications. Facilities brought about during the war would remain in peacetime. This would make common the use of the teleprinter and would call for a great expansion of the telephone system. The great industry Britain had built up and the growth of our knowledge would enable the demand to be met with reliable equipment of good quality at reasonable cost. This country must develop and maintain technical excellence surpassing that of any other country.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

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

Australia.—Western Australian Government Electricity Supply, Perth. Boilers, pulverised coal equipment, economisers, feed pumps, air heaters, mechanical draught plant, pipework, buildings, etc.; two 25,000-kW turbo-alternators and condensing plant, etc.; and one 25,000-kW frequency changer. (October 27th.)

Blackpool. — November 27th. Borough Council. Supply and installation of three vertical-spindle axial-flow pumps of 20 c.f.s. capacity each, together with electric motors, starting gear and accessories. Forms of tender from the borough surveyor, Municipal Offices, Talbot Square (deposit, £3 3s.).

Chichester.—November 23rd. City Council. Underground cables. (November 3rd.)

Manchester.—November 30th. Electricity Department. Lamp columns and fittings. (See this issue.)

North West Midlands.—November 27th. Joint Electricity Authority. Outdoor transformers. (November 10th.)

Tredegar.—November 30th. Urban District Council. Two kiosks, complete with e.h.v. and l.v. control gear, transformers and accessories; e.h.v. 3-core and l.v. cable. (November 3rd.)

Orders Placed

Hastings.—Electricity Committee. Accepted. Voltage regulators and balancers (£471).—Ferranti.

Newcastle-on-Tyne.—City Council. Accepted. Ten miles of copper trolley wire (£1,220).—T. Bolton & Sons.

Notts.—County Establishment Committee. Accepted. Electric lighting and power installation at offices, St. Mary's Gate, Nottingham (£82).—F. Lamb, Ltd.

Oldham.—Electricity Committee. Accepted. Alterations to cooling tower at Electricity Works.—Davenport Engineering Co.

Sunderland. — Corporation. Accepted. Eight tramcar trucks (£5,280).—Maley & Taunton.

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.

Ashton-under-Lyne.—Additions to foundry; Carlson Foundries, Ltd., Hope Foundry.

Aspull.—Houses (70), Withington Lane; H. G. Barnes, surveyor, Council Offices, Aspull, near Wigan.

Birmingham.—Extensions to University; V. O. Rees, architect, 51, Queen Caroline Street, London, W.6.

Bolton.—Central kitchen, Tonge Moor; C. Herbert, borough engineer, Town Hall.

Cheshire.—Elementary School, Bramhall; E. M. Parkes, county architect, The Castle, Chester.

Coventry.—British Restaurant, Tile Hill Lane (£4,320); D. E. E. Gibson, city architect, 1a, Warwick Row.

Durham.—New police station at Chester-le-Street; county surveyor, 43, Old Elvet, Durham.

Evesham.—Additions to Grammar School (£2,989); Espley & Co., Ltd.

Hull.—Houses between Hornsea and Stoneferry; H. Needler, builder, Dunstan Road.

Inverness.—Proposed new municipal buildings, public library, new police buildings and new primary and nursery schools (post-war schemes); burgh surveyor.

Kendal.—Additions to kitchen wing at Westmorland County Hospital; M. G. Shaw, architect, 45, Highgate, Kendal.

Leicestershire. — Farm institute (£30,000); county agricultural organiser.

Middlesbrough.—Establishment of nautical school (£10,000); Education Committee, in conjunction with the Constantine Steamship Co., Ltd.

Prefabricated extension to the Kirby Secondary School; C. Gorman, borough surveyor, Town Hall.

Newcastle-on-Tyne.—Rebuilding premises in St. Thomas Square; city property surveyor, Town Hall.

Nottinghamshire.—Additions, Albany School, Stapleford (£2,265) and two classrooms, Lincoln Street School, Worksop; county architect, Shire Hall, Nottingham.

Additions, County Institution, Basford (£16,117); Harper & Green, Ltd., Carlton.

Oldham.—Factory extensions, Vulcan Street; Granville Mill Co., Ltd., cotton spinners, Derker.

Pendlebury.—Office and works additions; Weston, Evans & Co., Ltd., lubricating engineers, Avanti Works, Manchester Road, Clifton.

Rochdale.—Police buildings and dwellings at Norden (£2,300); S. H. Morgan, borough surveyor, Town Hall.

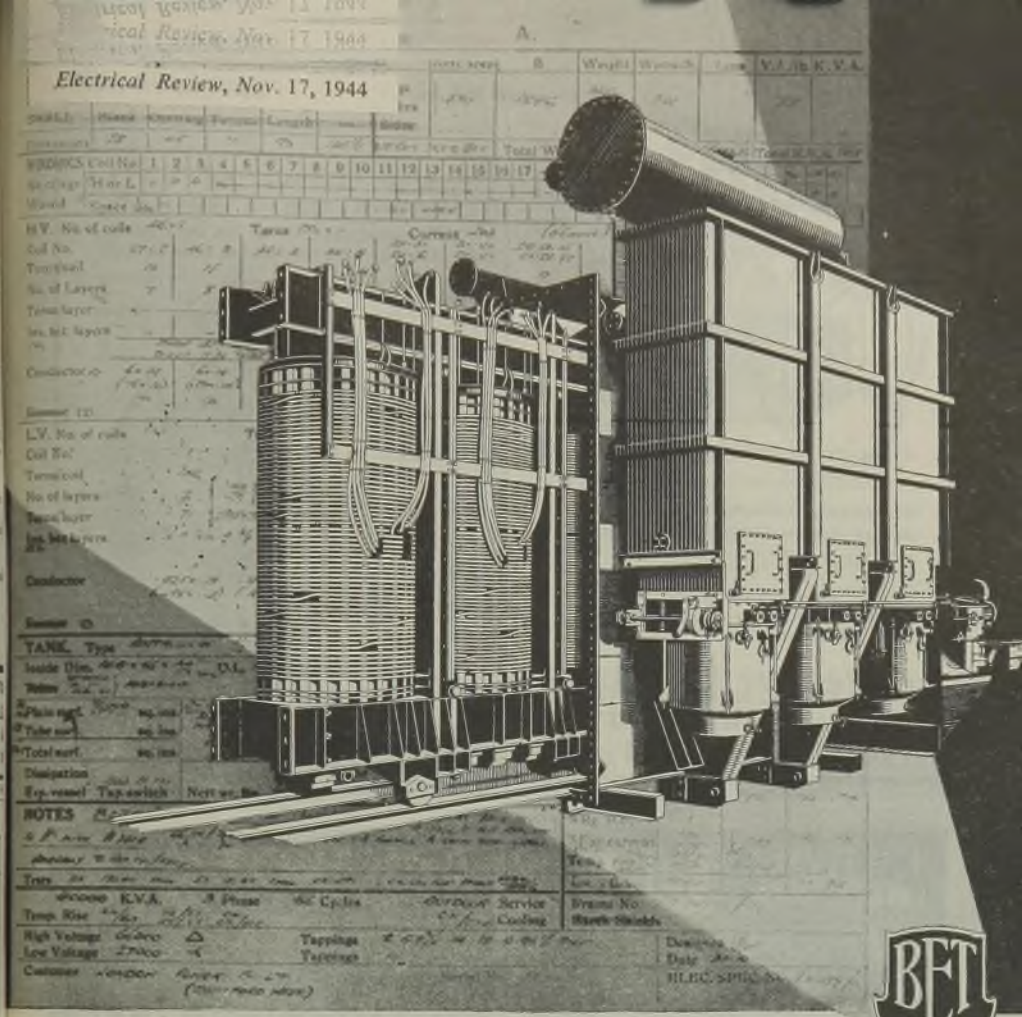
Warwickshire.—Extensions, maternity home (£12,100) and school additions, Hatchford Crescent, Solihull (£3,750); county architect, Warwick.

West Lancashire.—Houses on sites at Downholland, Scarisbrick, Hurlston and Todd's Lane; R. Rosbotham, surveyor, Council Offices, Derby Road, Ormskirk, near Liverpool.

Wigan.—Works extensions, Pottery Lane; Vulcanite, Ltd., felt manufacturers, Melperley Street.

Worksop.—Hut, Technical College (£1,206); T. & H. Hopkin.

York.—Secondary School at Acomb; C. J. Minter, city engineer, Guildhall.



A NEW WAY IN. This B.E.T. 40,000 kVA Transformer was for a site without headroom or lifting facilities. An end opening in the tank, and wheels on the transformer, solved the problem. Note the B.E.T. remote control on-load tap changer.

The
British Electric Transformer
Company Limited
In association with CROMPTON PARKINSON LIMITED

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

Original testimonials should not be sent with applications for employment.

OFFICIAL NOTICES TENDERS, ETC.

CITY OF MANCHESTER

THE Electricity Committee invites tenders for the supply and delivery, during a period of twelve months ending 31st December, 1945, of:—

Approximately 500 WELDLESS-STEEL LAMP COLUMNS AND FITTINGS (Specification No. 811).

Specification, etc., from Mr. R. A. S. Thwaites, Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2.

Tenders to be delivered by 10 o'clock a.m. on Thursday, 30th November, 1944.

P. B. DINGLE,
Town Clerk.

Town Hall,
Manchester, 2.
10th November, 1944. 990

SITUATIONS VACANT

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

BOROUGH OF DOVER

Electricity Undertaking

Appointment of Secretary

APPLICATIONS are invited for the above permanent appointment from persons not over 45 years of age, at a basic salary of £450 per annum rising by annual increments of £25 to £500 per annum.

Applicants must be members of either the Chartered Institute of Secretaries or of one of the professional Institutes of Accountants, and be experienced in the keeping and preparation of the financial accounts of an Electricity Undertaking.

The person appointed will have charge of and be responsible to the Electricity Committee for the whole of the financial side of the Undertaking up to the final accounts, the control of the clerical and meter reading staff and such other analogous duties as the Committee may require.

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

Applications, stating age, experence, qualifications and position under National Service Acts, accompanied by copies of not more than three recent testimonials, must be delivered to the undersigned not later than the 2nd December next.

Canvassing of any description will disqualify.

S. R. H. LOXTON,
Town Clerk.

Town Clerk's Office,
Brook House,
Dover.
10th November, 1944. 995

CITY AND COUNTY OF KINGSTON-UPON-HULL

Electricity Department

Technical Assistant

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

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

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

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

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

4th November, 1944. 973

MANCHESTER MUNICIPAL COLLEGE OF TECHNOLOGY

(Faculty of Technology in the University of Manchester)

Appointment of Assistant Lecturer in Electrical Engineering

THE Governing Body invites applications for an Assistant Lectureship in Electrical Engineering in the College of Technology, with the title and status of Assistant Lecturer in the University of Manchester.

Candidates should hold a degree in Engineering and should have had practical experience in Communication Engineering.

Salary: £300 per annum, rising by annual increments of £25 to £400 per annum, plus war bonus (which at the present time is £52 per annum). Commencing salary according to qualifications.

Conditions of appointment and form of application may be obtained from the Registrar, College of Technology, Manchester, 1. The last day for the receipt of applications is THURSDAY, 30th NOVEMBER, 1944.

Canvassing, either directly or indirectly, will disqualify a candidate for appointment.

J. E. MYERS,
Principal of the College.
972

AFTER the restrictions controlling the engagement of personnel are removed, old-established electrical and mechanical engineering firm of standing would consider the post-war engagement of a Mechanical Designer with sound academic and practical qualifications, including knowledge thermo-dynamics, hydraulics and mechanics. Must possess good personality, initiative and creative ability. The post would be of a permanent nature with salary according qualifications. Write, stating age, qualifications, etc., to—Box 921, c/o The Electrical Review.

NORTH WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

Shift Charge Engineer

APPLICATIONS are invited for the position of Shift Charge Engineer, as a war-time appointment, at the Stafford Generating Station.

Candidates must have had a good practical and technical training in mechanical and electrical engineering and experience in the operation of boiler and turbo-alternator plants.

The salary and conditions of service will be in accordance with the N.J.B. Schedule, Class E, Grade 8, at present rising from £361—£378 per annum.

Applications, stating age and giving full particulars of experience and training, accompanied by not more than three testimonials, are to be endorsed "Shift Charge Engineer," and sent to the undersigned.

F. FAVELL, Esq., M.I.E.E., M.I.Mech.E.,
Chief Engineer & Manager,
North West Midlands Joint Electricity Authority,
York Chambers,
Kingsway,
Stoke-on-Trent.
8th November, 1944. 989

CITY AND COUNTY OF KINGSTON-UPON-HULL

APPLICATIONS are invited for the post of Manager of the Hull Corporation Telephone Undertaking, at a salary of £1,000 per annum, rising by annual increments of £50 to £1,200 per annum. The post is superannuable.

The person appointed will be required (a) to pass a medical examination, (b) to reside within the City, and (c) to devote the whole of his time and attention to the duties of the office.

Forms of application and further particulars of the duties and conditions of service may be obtained from the undersigned.

Applications, endorsed "Telephone Manager," must reach the office of the Town Clerk, Hull, not later than noon on Monday, 1st January, 1945.

ALEXANDER PICKARD,
Town Clerk.
Guildhall, Hull.
October, 1944. 860

AFTER the restrictions controlling the engagement of personnel are removed, old-established manufacturers electrical equipment for transport services require Illumination Engineer for post-war engagement, capable designing fittings, with sufficient electrical knowledge undertake design miscellaneous associated accessories. Applicant must have experience and possess initiative. Permanent post suitable man. Salary according qualifications and experience. Write, stating age, experience, etc., to—Box 920, c/o The Electrical Review.

CHIEF Clerk (35-50) required to take charge of plant maintenance office in factory of 5,000 employees (S.W. London). Must be familiar with engineering and building terms (able to deal with W.R.O.'s, etc.) and work on own initiative, capable of controlling mixed staff, working knowledge of shorthand and typing an advantage. Salary £300 per annum. Good post-war prospects.—Box No. 855, L.P.E., 110, St. Martin's Lane, W.C.2. 913

CHIEF Engineer required by important London commercial house to take complete charge of mechanical and electrical installations.—Box 969, c/o The Electrical Review.

COUNTY Borough of Eastbourne Electricity Department: Chief Draughtsman and Constructional Assistant. Applicants must have had training and practical experience in the design, preparation of estimates and specifications, and the supervision of the erection of substations and other buildings associated with an electricity undertaking, and be capable of supervising building repairs, etc. The candidate would also be required to take charge of the mains drawing office, and must be fully conversant with modern methods of preparing and keeping mains records. The salary will be in accordance with Class F, Grade 8A, of the N.J.B. Schedule (at present £361 p.a.). The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination. Applicants should write, quoting D.976XA, to the Ministry of Labour and National Service, Room 432, Alexandra House, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 5th December, 1944. 958

ELECTRICAL contractors, with head office in London, require Area Manager for Birmingham with knowledge of all classes of power and lighting installations, preferably with a connection in the district. Details of experience, age and remuneration in confidence to—Box 916, c/o The Electrical Review.

ESTIMATING Engineers required by large electrical engineering firm (S.W. London area) for post-war positions. Applications are now invited. Employment subject to Ministry of Labour restrictions.—Box No. 899, L.P.E., 110, St. Martin's Lane, London, W.C.2. 949

F.H.P. Sales Engineers required by large firm of electrical equipment manufacturers for London, Midlands, Yorkshire and Scotland. Positions will be permanent and progressive and vacancies are available now and post-war. All applications will be considered in confidence and should state, qualifications, age, experience and present salary.—Box 963, c/o The Electrical Review.

FOREMAN Armature Winder and Repairer required, capable of taking charge of department. Experienced A.C. and D.C. rewinds, practical H.P. to largest sizes. Apply in writing, stating age, experience, salary required, enclosing copies of testimonials, to—The Manager, Employment Exchange, 36, Grange Road, Middlesbrough. 987

LADY Demonstrator. Applications are invited by the Mid-Cheshire Electricity Supply Co. Ltd. for the position of Lady Demonstrator of electric cooking and other appliances. Candidates must be ineligible for National Service, have had a good general education, and should preferably hold a diploma in cooking and/or electrical housecraft. Experience in lecture demonstrating desirable. Salary approx. £180 per annum. Applications, giving full particulars of training and experience, with copies of recent testimonials, to be sent to W. Fennell, M.I.E.E., Electricity House, Northwich, Cheshire, not later than November 30th, 1944. 965

LARGE Midland manufacturers of street and industrial lighting equipment, electric cookers and domestic appliances invite applications for post of Representative for London area and the East and South-East Coasts between The Wash and Southampton. Give full details of experience, connection, age and salary required in confidence to—Box 964, c/o The Electrical Review.

MANAGER required for electrical works in London district, must have had a thorough technical and practical training, and have knowledge all types of electric motors, etc., A.C. and D.C., this being most essential for the position; costing of work an advantage. Must be strict disciplinarian. State age and salary expected.—Box 955, c/o The Electrical Review.

POST-war Development Sales Engineer required by manufacturers lighting equipment. State age, experience and salary expected.—Box 6490, c/o The Electrical Review.

PROGRESSIVE firm, 20 miles west London, manufacturing light electrical apparatus, requires Manager for apprentices' training department. Applicants must be capable of instructing young people, have a good theoretical and practical knowledge light machining processes, and preferably sound theoretical knowledge electricity, magnetism and heat. Apply—Box 971, c/o The Electrical Review.

PUBLIC Lighting Expert required by manufacturers of street lamps to assist in design of equipment, promote post-war public lighting business, prepare schemes, estimates, etc. Salary according to qualifications. Applicants should state age, qualifications and experience. Write—Box 967, c/o The Electrical Review.

REPRESENTATIVE required by leading manufacturers of E.L.M.A. lamps, C.M.A. cable and lighting equipment, London area. Only experienced men need apply, giving full particulars of salary required, etc.—Box 904, c/o The Electrical Review.

REPRESENTATIVE required to work Midlands and North from Manchester area, for manufacturers of materials used extensively in radio and electrical trade (preferably with own car). Excellent opportunity with definite post-war prospects for right man. Own staff know of this vacancy. Write—Box 968, c/o The Electrical Review.

SALES and Wiring Superintendent required by an electricity supply undertaking in the Midlands. Applicants must have had practical experience in industrial power and domestic installations. Applications should state age, particulars of training and experience, salary required, and be accompanied by three recent testimonials addressed to—Box 956, c/o The Electrical Review.

SALES Outside Representative required for London and Home Counties by manufacturers of electrical measuring instruments. Must have had previous experience and be technically qualified. Write, stating age, experience and salary required.—Box 901, c/o The Electrical Review.

SALES Representative required for post-war development by manufacturers of lighting fittings, London area. State age, experience and salary required to—Box 936, c/o The Electrical Review.

SALES Representatives wanted by progressive transformer company for certain districts. Manufacturing programme comprises not only standard types up to 1,000 kVA, but also special types of great importance for industry providing many outstanding advantages. Good prospects for post-war business.—Box 922, c/o The Electrical Review.

STORES Assistant (permanent). Applicants, stating age and salary required, should have had experience and thus familiar with goods handled by—The Wholesale Electric Co. Ltd., 37, Vauxhall Bridge Rd., S.W.1. 898

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

APPOINTMENTS FILLED

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

SITUATIONS WANTED

A Mains Engineer (32), A.M.I.E.E., pub. sch. and univ., coy. and municipal experience all voltages up to 33 kV, seeks appointment as technical representative.—Box 6457, c/o The Electrical Review.

EGYPT. Position required as resident Salesman Representative, 6 years' previous experience Middle East, speaking Arabic and Italian.—Box 6473, Electrical Review, or BM/NWAW, London, W.C.1.

ELECTRICAL Tester, female, experienced on all types A.C., D.C. machines and equipment, either heavy or light current, desires position in North London area. Please send details to—Box 6443, c/o The Electrical Review.

ELECTRICIAN seeks post, Supervisor, or charge of factory plant, A.C. or D.C. layouts, 20 years' experience, excellent ref.—Box 6430, c/o The Electrical Review.

EXPERIMENTAL Engineer wishes to contact a firm of some standing interested in all electrical traction for aircraft, etc., for research, for post-war exploitation.—Box 6472, c/o The Electrical Review.

GENERAL Manager (41), with 20 years' experience in light electrical, mechanical and radio products, now available to join company in executive capacity. Specialist in all phases of factory organisation and administration, production, costing, purchasing and material control.—Box 6458, c/o The Electrical Review

MANAGER/Representative, age 40, 22 years electrical and radio trade, wishes to contact manufacturer or wholesaler with view to appointment in Birmingham.—Box 6474, c/o The Electrical Review.

PERSONNEL Manager desires permanent appointment. Fully conversant with Ministry of Labour, Essential Work Orders, Trades Union procedure, experienced in engagement of labour, welfare, management, etc. Accustomed to controlling up to 6,000 male and female workers.—Box 6440, c/o The Electrical Review.

PLANT Engineer seeks appointment.—Box 6477, c/o The Electrical Review.

PURCHASING Official requires post of responsibility in provinces. Twenty years' experience with important group electricity supply and transport undertakings. Thorough knowledge of these markets and highly experienced in organisation and control of central purchasing department with large turnover and staff.—Box 6492, c/o The Electrical Review.

QUALIFIED Mechanical and Electrical Engineer desires change as Works Manager. Wide experience with meter, instrument and small electrical precision manufacture, capable organiser, experienced disciplinarian. London area.—Box 6446, c/o The Electrical Review.

YOUNG Man (19), taking Ord. Nat. Cert. Elec. Engine, seeks progressive situation in radio engineering.—Box 6471, c/o The Electrical Review.

FOR SALE

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

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

REBUILT MOTORS AND GENERATORS

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

SEND US YOUR ENQUIRIES.

OVER 1,000 RATINGS ACTUALLY IN STOCK HERE.

DYNAMO & MOTOR REPAIRS LTD.,
Wembley Park, Middlesex.
Telephone: Wembley 3121 (4 lines).

Also at Phœnix Works, Belgrave Terrace, Soho Road, Handsworth, Birmingham.
Telephone: Northern 0898.

26

ELECTRIC POWER PLANT, 164 kW

COMPRISING Alternator vee-rope driven by Diesel engine For 50 cycles A.C. supply: single-phase, 250 v., and three-phase, 415 v.

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FOR sale, immediate delivery, 2 6,000-kVA Turbo-Alternators, 6,000 volts, 3-ph., 50 period, 3,000 revs. per minute, complete with condensing plant, circulating pumps and air pumps. Low price for quick clearance. Further details on application. Apply—Midland Iron & Hardware Co. Ltd., Cradley Heath. 862

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

GENERATING Sets for sale, 3 kVA, petrol, 230/1/50; 2½-kW crude oil, 220 v. D.C.; 250 and 300-amp. petrol Welding Sets; 18-kVA petrol, 400/3/50.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 986

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ONE Ironclad Switchboard for power, suitable for 3-phase, 440 volts, with 2 1,000-amp. ingoing main circuits with oil switches and 6 400-amp. outgoing circuits with 6 oil switches, fitted with the following Meters: One Power Factor Meter, one Frequency Meter, one Kilowatt Recording Meter, one Phase Voltage Meter, 6 400-ampere Meters. The board measures 19 feet long by 6 ft. 11 in. high.—A. B. Robertson & Son Ltd., 260, Union Street, Aberdeen. 961

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TWO brand new, 5-h.p., 1,500-r.p.m., Crompton-Parkinson Drip-proof, 460-volts D.C. Motors, with push-button starters.—D. J. Davies, The Garage and Service Station, Treforest Trading Estate, Glam. 988

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250 kVA Alternator, 400 volts, 3-phase, 50 cycles, 750 revs., with direct coupled exciter.—Midland Counties Electrical Engineering Co. Ltd., Grice Street, Spon Lane, West Bromwich. 36

330-h.p. G.E.C. 440/550-volt D.C. Motor, compound wound, 460 r.p.m., 3 bearings, on baseplate, £275. — Electric Machinery Co., New Union Works, Ancoats, Manchester. 926

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BATTERY Chargers Modernised. Your old Charger made like new by specialists. Conversion from valve to metal rectification. Send for interesting leaflet "Q.D." on this service.—Runbaken Electrical Products, Manchester, 1. 45

DON'T Disclose Your Plans. Produce blue prints and black line copies, etc., in your own office, without glass frame, privately and economically. "Arcoflex" Copiers from 28 shillings. As supplied to H.M. Government.—W. A. Boughton, 53, Kenley Road, Merton, S.W.19. 43

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NOTICE is hereby given that the Transfer Books and Register of Members of Aron Electricity Meter Limited will be closed from the 18th November, 1944, to the 9th December, 1944, both dates inclusive. By order of the board.—H. G. Burrows, F.C.I.S., Joint Sec. 966

PHOTOGRAPHY. A photograph says more than a thousand words. Realistic photographs for catalogues, brochures and general reproduction purposes for present and after-the-war uses. Records made of present work, premises, etc.—Miles & Kaye Ltd., Industrial Photographers, 100, Southampton Row, London, W.C.1. Telephone, HOLborn 6858. Established over 50 years. 865

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COMPANY MEETINGS

ABERDARE CABLES LTD.

THE Eighth Annual General Meeting of the above company was held on 6th November in London.

Sir George Usher (the chairman), who presided, said: In spite of the falling off in the demand for home and export cables during the past year, our cable factory has been kept moderately busy. The prospects for the immediate future are a little brighter, and we have already received a certain amount of export business. Our munitions sections have been kept very busy throughout the country on products of a very varied character.

Our subsidiary, South Wales Switchgear Ltd., has made remarkable progress. Although the year under review is the first full operating year of this subsidiary since we acquired it, it is interesting to note that the number of its employees has grown to almost equal the number of employees of our main cable works. We have been entrusted with large Government contracts for switchgear and other specialised service requirements.

The whole organisation is rapidly expanding and we are playing an important part in the absorption of labour in this particular area. Post-war prospects are particularly bright.

The report and accounts were unanimously adopted, and the dividend of 6 per cent. for the year, paid in January, 1944, was confirmed. 951

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this Journal should not be taken as an indication that they are necessarily available for export

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