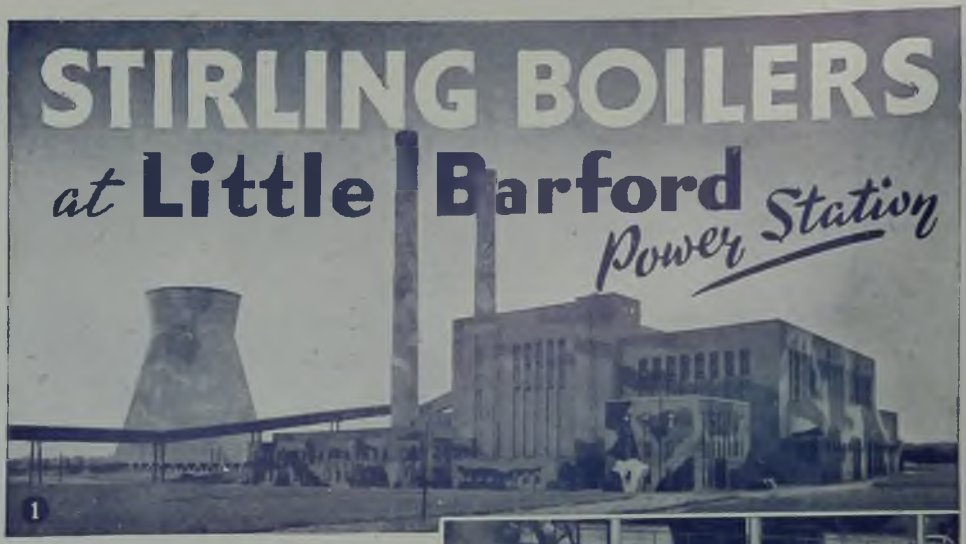
ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXIX. No. 3596 OCTOBER 25, 1946 9d. WEEKLY

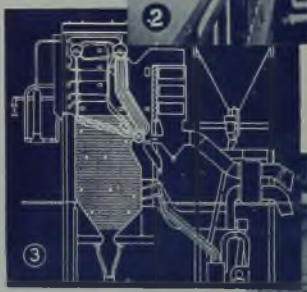
STIRLING BOILERS at Little Barford Power Station



THIS Station is of novel design as there is no division wall between the boiler house and turbine room. Each 30,000 k.W. set is normally supplied by steam from the boiler immediately adjacent.

Two Stirling Boilers are installed, each for 300,000 lb. of steam per hour at 675 lb. per square inch and 925°F. Each is equipped with a Bailey furnace, pulverised fuel fired from Type "E" Mills.

The Boilers have maintained consistently long runs at full load.



THE ILLUSTRATIONS SHOW:—

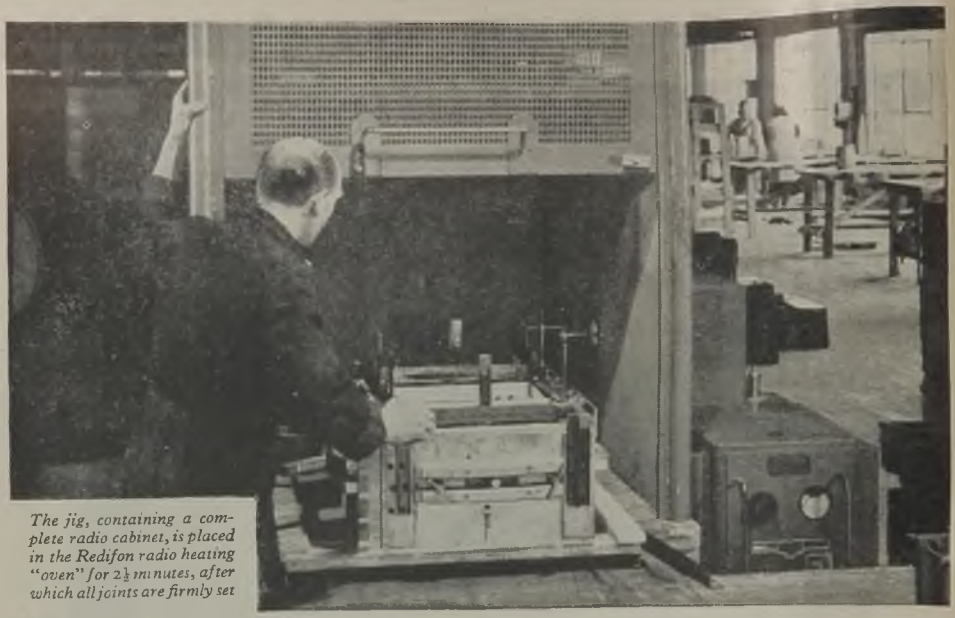
1 Exterior view of the power Station.

2 View in the Turbine Room with the Boilers in the background.

3 Side sectional elevation through one of the Boilers.

4 Control panel for No. 1 Stirling Boiler and Turbo Generator.

THE STIRLING BOILER CO., LTD., 34 FARRINGDON ST., LONDON, E.C.4



The jig, containing a complete radio cabinet, is placed in the Redifon radio heating "oven" for 2½ minutes, after which all joints are firmly set

ANOTHER OUTSTANDING PRODUCTION INCREASE

Radio cabinets glued up hard in 2½ minutes by Redifon Heating

ANOTHER application of Redifon heating is at work in the factory of Messrs. Chas. H. Challen & Sons, Ltd., in London, where full-sized radio cabinets, every joint in which has been glued up hard, are being produced at a rate of one every 2½ minutes.

Only three jigs are used in rotation, and the total floor area used is less than 200 sq. ft. No other method is capable of producing work of such high quality, at such speed, and with such economy in factory space.

The Redifon Model R.H.7 radio heating set which is the foundation of this installation is also extremely suitable for use in the pre-heating of plastic powders and pre-forms, and the drying-out of ceramics, fats, and textiles. This versatile Redifon heater can also be used for tempering and brazing steel parts and carrying out extremely fast and accurate case-hardening work.

For full details of how Redifon heating can help you increase production, write to our Industrial Electronics Sales Division, giving full details of the work involved.

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Designers and Manufacturers of Radio Communication and Industrial Electronic Equipment

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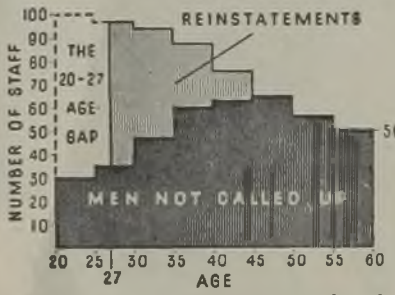
FILLING THE 7-YEAR GAP

Need for young men in business

FOR seven years, war had first claim on manpower. Business and industry had to forgo the recruitment of promising young men to train for responsible posts.

In many firms this absence of young men is not yet felt to be a problem. The reinstatement of pre-war employees has, for the moment, masked a dangerous gap — but it has not filled



In this chart, the whole area represents the male administrative, executive and managerial staff of a typical engineering firm before the war, analysed by age-groups. The white portion is the present 20-27 gap which must be filled to restore proper balance.

it. And it cannot. As the diagram shows, the 20-27 age-gap in the staff remains, threatening the *future* efficiency of business.

Unfilled, this gap will mean, in ten years, a lack of responsible men aged 30-37; in twenty years, of those aged 40-47. And it can only be filled by the young men of 20-27 now coming out of the Forces.

The opportunity to secure the most capable and talented among them arises *now*, while they are looking for good openings. To help employers find men with the right aptitudes, and at the same time to prevent waste of first-class abilities in unworthy jobs (as after the 1914-18 war), the Government has established a nation-wide appointments service.

An Index of Talents

At fourteen Regional Appointments Offices the registers form an index of able men (and, of course, women) from which employers' particular needs are met. As the 20-27's are released from the Forces, all those of the requisite standard who apply are interviewed, their qualifications and talents recorded. Those whose choice of a career is undecided are assisted by modern methods of "screening," which reveal their aptitudes for various types of work. And eligible candidates may apply for assisted training under the Business Training Scheme — a 3-months' general course, which may be followed by up to two years' practical training in a particular firm.

The aim of all this is to match men with the jobs they will do best. The employer can draw on the whole country, if need be, for the right men to fill the 20-27 age-gap. Since *only* likely candidates are submitted for his choice, he is saved many fruitless interviews.

Appreciation from Employers

More than 30,000 responsible posts have been filled since VE-day, and hundreds of employers and applicants have written to express their satisfaction. A Lancashire manufacturer says: "*We wish to thank you for the trouble taken on our behalf in selecting candidates. It has been very hard to choose in our final selection, but we feel satisfied that the successful person is entitled to the job.*"

To take full advantage of this free service, and to get their pick of the most promising men, employers are invited to make their needs known to their nearest Regional Appointments Office, which will supply all details. Offices are in the following towns: London, Cambridge, Reading, Winchester, Bristol, Birmingham, Nottingham, Leeds, Manchester, Liverpool, Newcastle-on-Tyne, Edinburgh, Glasgow, Cardiff.

Two Training Schemes

To help selected men and women from the Forces or other war service to make up for lost time in acquiring professional or business skills, two training schemes of direct interest to employers are in operation:

Business Training Scheme: A 3-months' course in the general structure, practice, and administration of business, followed by practical training in a particular firm. Financial assistance where necessary.

Further Education and Training Scheme: Financial assistance in completing higher professional or technical studies interrupted by war service.

Issued by the Ministry of Labour and National Service, Appointments Dept., 1-6 Tavistock Square, London, W.C.1

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with lowest maintenance costs

The Outer Sign of

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CONTROL GEAR
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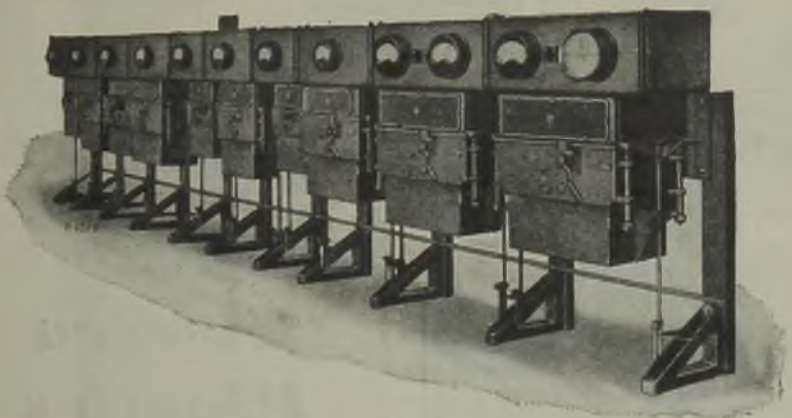

The fundamental success of "Erskine Heap" products lies in the fact that they are designed specifically to fulfil the buyer's basic requirements, UTMOST RELIABILITY with LOWEST MAINTENANCE COSTS.

May we have your enquiries?

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E.H.529

EVERYTHING connected with industrial rubber has our wholehearted interest. Our technical people welcome the opportunity to delve into new and difficult problems. And into every job, from beginning to end, goes the knowledge, the skill and the experience accumulated through the years.

Empire Rubber Mouldings are playing a big part in post-war production, and in connection with the Electrical Industry, where rubber is now in much greater use than ever before, our practical knowledge of Rubber and Rubber Moulding is definitely helping the march of progress.

If you have a particular problem and feel that Rubber may be the answer, our Research Department will be glad to discuss the matter with you. Why not get in touch with us—right away?

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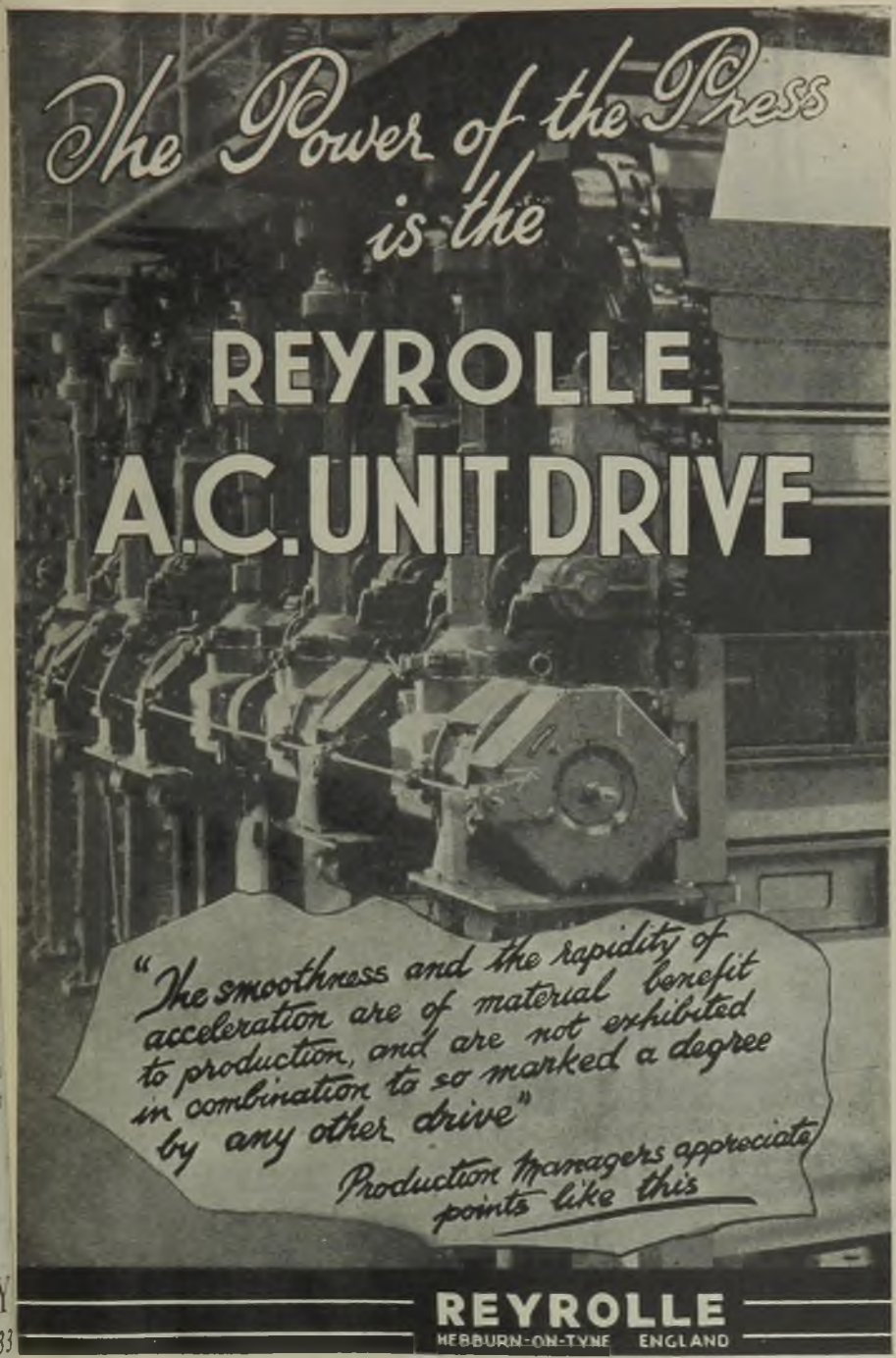
The Power of the Press is the
REYROLLE
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"The smoothness and the rapidity of acceleration are of material benefit to production, and are not exhibited in combination to so marked a degree by any other drive"
Production Managers appreciate points like this
REYROLLE
HEBBURN-ON-TYNE ENGLAND

J. & P. RETURN TO FULL C.M.A. STANDARDS

This is one farewell at which no one will cry. Gone are the substitutes occasioned by war economies, and "W.E." can be happily forgotten.

Once again J. & P. are manufacturing cables and flexibles to conform to the exacting standards set by the Cable Makers' Association—standards recognised throughout the World as the surest guarantee of quality and craftsmanship offered to the rubber cable user.

There is still a gap between supply and demand, but if you can get J. & P. cables you will know you have the best. And we are sparing no efforts to hasten the day when you can order "off the shelf."

By the way—
J & P are Foundation Members of the C.M.A and have always been to the fore in the manufacture of high quality cables—
worth remembering!

JOHNSON & PHILLIPS LTD.

Electrical Engineers and Cable Makers since 1875

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The mark that means that "little more" in quality

If Aladdin could 'clock-in' at M·E·M

If only the wonderful lamp were at our service we could work wonders and every order for M.E.M. gear could be met overnight. But even the wonders of modern production efficiency have their limits, especially with present day shortages, controls and restrictions. None the less, every effort is being made to improve output and an increasing stream of supplies is going out to the wholesalers. They in turn are doing a grand job of work in distributing all available equipment fairly and equitably. That's a point to remember when you deal with *your* wholesaler.

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

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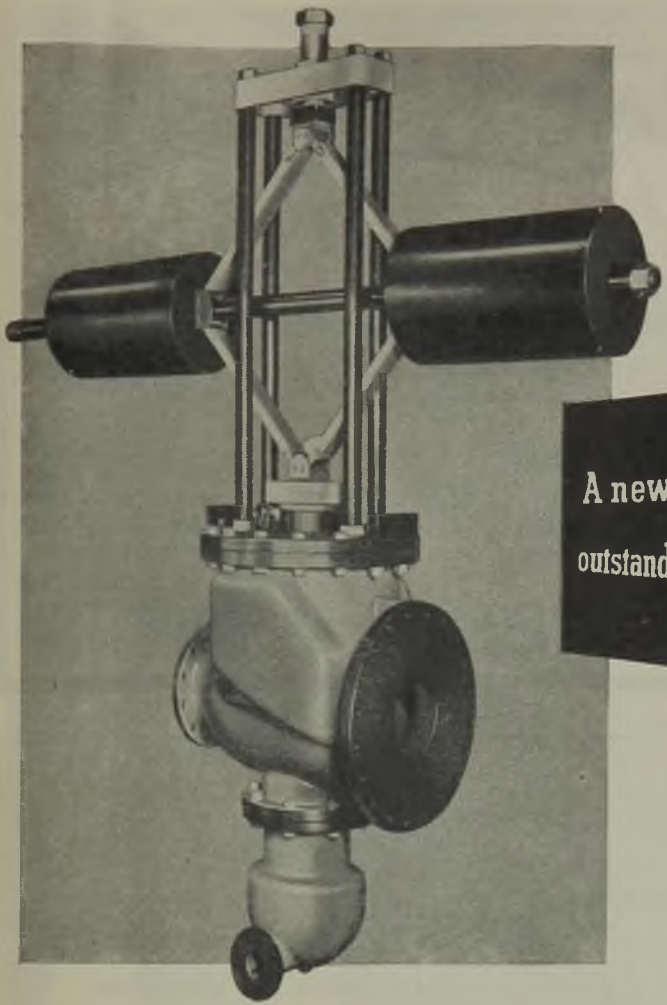
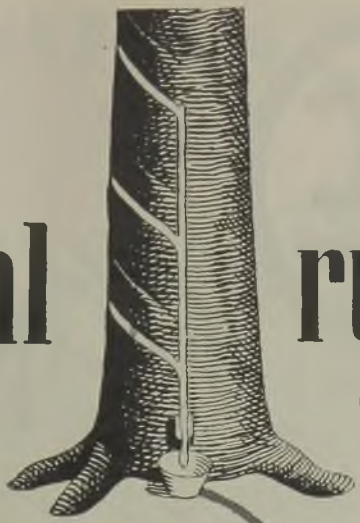


A new Relief valve of outstanding performance

Amongst the many outstanding developments in the Blakeborough range of valves for steam duty is the Full Bore relief valve (Turner's patent No. 36854). This valve gives the unprecedented discharge of six times that of an ordinary relief valve under equal conditions, and three times that of a high lift pattern. It opens to the full area of the seat bore with only 3% accumulation pressure — less than one third of that otherwise required — and returns promptly without blow-down loss. Other features give freedom from wire drawing, and a setting pressure unaffected by spring hogging, differential expansion, or wear. The valve is available in versions suitable for pipe line, boiler, or superheater duty; in globe and junction patterns; and in cast iron, cast steel or bronze. Full details from **J. Blakeborough and Sons Ltd.**, Brighouse, England.

BLAKEBOROUGH VALVES



natural rubber again

No restriction is now placed on the full use of natural rubber in Cable making.

As from October 1st therefore these will be available in 250v. and 660v. C.M.A. grade Crompton Rubber Insulated Cables of the highest possible quality bearing the C.M.A. label and sold at current prices.

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If you are one of the lucky people, you must have a "Westric" in your garage. If not, then now is the time to get one and ensure easy starting throughout the winter.

It works from the A.C. mains, replaces the energy taken from the battery during the day, and costs about ½d. a night to run.

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Get a Westric from your Local Garage or direct from Dept. E.R.

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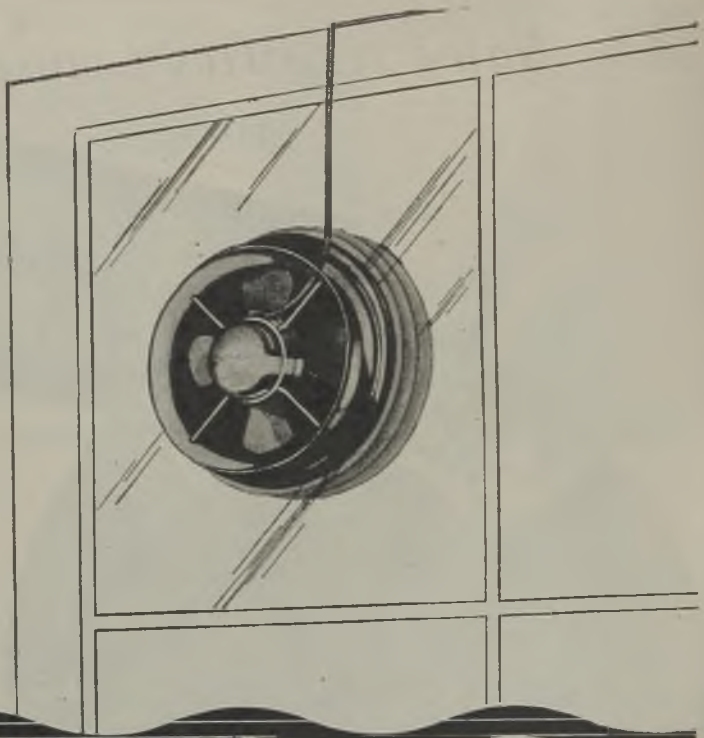

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- Silent in operation.
- Consumption only 25 watts.
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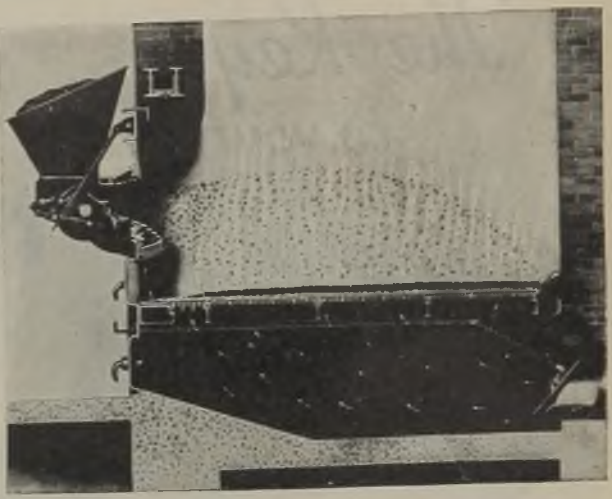
A G.E.C. PRODUCT

BABCOCK-DETROIT

ROTOSTOKER WITH STATIONARY GRATE

ROTOGRATE
BABCOCK DETROIT STOKER
ROTOSTOKER



THE Babcock Detroit Spreader Stoker with Stationary Grate as shown in these illustrations is suitable for Marine boilers or small installations on land. No basement for ash handling purposes is required.

The drawing shows such a Stoker installed under a single pass Marine boiler. The air chamber under the grate is divided longitudinally so that each feeder and its related section of grate may be isolated for cleaning of the grate. Steam output is maintained during ashing by an increase of fuel to the adjacent feeder.

FRONT & REAR VIEWS OF ROTOSTOKER WITH STATIONARY GRATE

BABCOCK & WILCOX LTD., 34-35 FARRINGDON STREET, LONDON, E.C.4

ELECTRICAL REVIEW

October 25, 1946

Managing Editor:
Hugh S. Pocock, M.I.E.E.

Technical Editor:
C. O. Brettelle, M.I.E.E.

Commercial Editor:
J. H. Cosens

Contents:—

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Building Supplies

Accessories Makers and "Priorities"

THERE have recently been vague statements, and indeed some definite charges, that makers of electrical accessories are "by-passing" the Government's housing programme. It has been said that while there seems to be an insufficiency of fittings for new houses, such fittings may be seen in abundance in electrical retailers' and other shops and stores. There have been shortages and accessories may occasionally be seen in shops, but the manufacturers are not to blame and indeed they feel aggrieved that they should be held blameworthy.

"W.B.A." Loophole

The trouble has arisen largely through the exercise of "priorities" (a word of which everybody is becoming heartily sick). In April last, with the aim of securing the proper allocation of building materials and components in "short supply" (another overworked word), the Ministry of Works introduced the "W.B.A." scheme by which building licensing authorities would indicate to manufacturers that preference was to be given to certain orders. The arrangement, primarily intended to apply to house-building, contained a loophole: W.B.A. priority could also be granted to "a limited number of other essential projects, e.g., work on essential public utilities and factories."

Thus it became impossible for manufacturers to know whether W.B.A. orders were actually for the housing programme or not. Their difficulty has been increased by the practice of some contractors, either to make sure of securing adequate supplies or for less creditable reasons, of ordering beyond the quantities for which priority has been granted.

On top of this is imposed inter-departmental competition. The Ministry of Works is only one of the Government Departments requiring electrical equipment, and while it rightly believes that housing is entitled to the first call on production, the Services (whose needs were paramount during the war) consider that their claims are still the most important. The bewildered manufacturer confronted with these conflicting "priorities," of apparently equal weight, has to endeavour to meet them all.

No Distinction of Purpose

Consequently when the Ministry of Works weighs up the equipment delivered for houses against the total production of the manufacturers it comes to the conclusion that supplies are being diverted for less essential purposes. Apparently in seeking to ascertain manufacturers' total production little effort is made to distinguish between what is suitable for houses and what is not. Switches are switches, for instance, whether of the imple tumbler type or of an ironclads Admiralty pattern, and accordingly the Ministry obtains an unreal picture of the position.

In many cases, too, manufacturers are still experiencing difficulties in obtaining the necessary supplies of labour and material. They find that merely mentioning "W.B.A." to suppliers of raw materials

and semi-finished products is ineffective, for the suppliers are bombarded with W.B.A. orders from all quarters. In any event it is impossible to quote actual W.B.A. numbers which for one material order may run into hundreds.

The manufacturers contend that if new houses are to receive preference they must know definitely whether W.B.A. orders are for this purpose and a distinguishing symbol should be used. But this by itself will be insufficient. There should be a Minister with powers to decide which of several competing Government Departments is to have "first cut." Such measures would be of considerable assistance to an industry which claims to be loyally doing its best to meet the nation's urgent need for houses and is capable of satisfying all the requirements.

"Leakages"

As we have said, there have been "leakages" of electrical accessories into non-essential channels, but these have not been of the enormous proportions which the sensational press has suggested. But whatever the quantity the manufacturers are not to be blamed. When they receive W.B.A. orders they can only investigate obvious cases of over-ordering. Generally they cannot be expected to know whether quantities ordered are correct or not, quite apart from the question of the purpose of the orders which we have discussed above. The responsibility for diversions must therefore be fixed elsewhere.

Electricity Prices

A FEW years before the war the costs of electricity supplied at usual load factors from coal-fired stations tended towards equality with those charged for hydro-electricity, excluding Canada. Comparative figures given by Mr. H. Nimmo in his presidential address to the A.S.E.E. show that in 1944 prices for domestic and commercial supplies in Great Britain were below those in the United States (one-third from water power) and in Sweden and rather more than 25 per cent above Switzerland. The overall figure, however, was greater by 7, 15 and 27 per cent. This is accounted for by costs for industrial power in Britain having advanced by 25 per cent since 1937–38 to 0·803d. per kWh, which compares with 0·55 to 0·58d. in the other three countries, reflecting the operation of coal clauses.

Transformer Iron

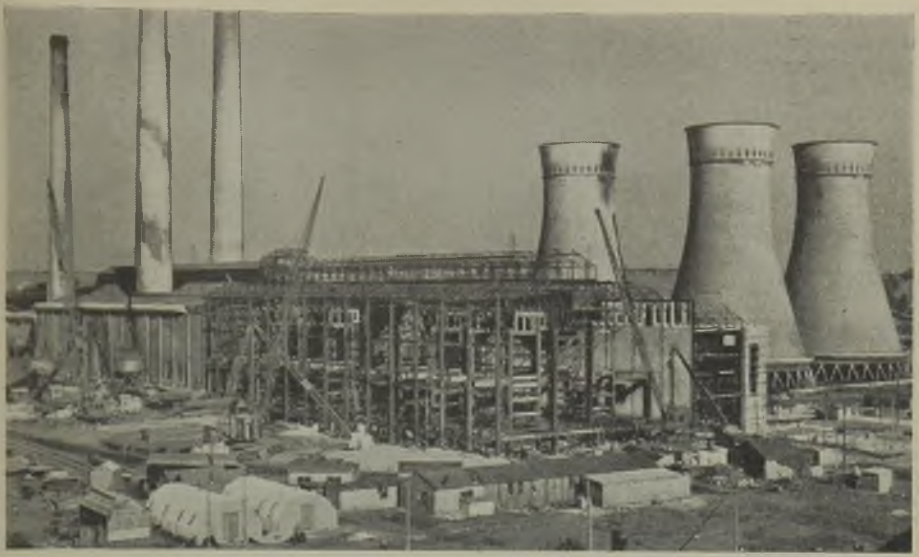
IMPROVEMENT in the magnetic properties of sheet steel for building transformers and other electrical machines is at present of critical importance. In most cases a lower loss in watts per lb is very desirable, in others greater compactness of design. In the solution of short-term problems of this kind, the contribution of the new Sankey research laboratories, described in this issue, should be a material one, the more so for their close association with a well-established production organization. More fundamental investigations to be made there for determining the structures of alloy steels and their variations with different works processes are not likely to be of smaller ultimate value on account of the longer period required for their maturing.

Engineers and Export

MUCH of Mr. J. F. Shipley's address to the Installations Section of the I.E.E. was a restatement of fundamental requirements for the successful sale of engineering products in overseas markets, but, in addition, he put forward a plea, based on his own experience, that engineer-representatives should not be forgotten by their principals at home. It is mutually advantageous that the closest possible human contact should be maintained, difficult though this sometimes may be. One cogent point in the address was that "export trade in engineering is not merely selling goods surplus to the home market," a fact that our manufacturers would do well to remember.

Trade Union Rivalry

We reported recently that the County of London group of electricity supply companies had recognized the Clerical and Administrative Workers' Union as a negotiating body for its employees. This union claims to have enrolled 85 per cent of the clerical workers in the County of London group and in this way has cut across the activities of the National Association of Local Government Officers which recently extended membership to the staffs of all public utility undertakings. This is considered by the Clerical and Administrative Workers' Union to be "poaching" and it threatens to begin recruiting members from local authority undertakings, a field which it has hitherto left to N.A.L.G.O.



Kearsley Extensions

First Installation of Rotary Coal Distribution on Forward-moving Grates

THE first of the three generating stations serving the Lancashire Electric Power Co.'s area of 1,100 sq miles south of the River Ribble is at Radcliffe, its present capacity being 52,500 kW. It was inaugurated in 1905 and was one of the stations "selected" at the inception of the national interlinking grid scheme. Both of the company's subsequently built plants were similarly "selected," being directly connected to the main transmission lines of the Central Electricity Board.

The second station, which is at Padiham, commenced operating commercially in 1927 and in the two following years established records for low fuel consumption and thermal efficiency. An extension in 1942 raised its steaming capacity to 30,625 kW. Meanwhile the third station at Kearsley on the River Irwell had commenced operating in the autumn of 1929 and set up thermal and fuel records which it kept for two consecutive years.

In this station the two initial turbo-alternators of 32,250 kW each and eight boilers of 95,000 lb/hr each operated at a steam pressure of 320 lb/sq in. and a temperature of 700 deg F. In 1936 one 51,600-kW generating set with four boilers operating at 620 lb/sq in. and 820 deg F were installed and duplicated in 1938.

In 1944, at the request of the C.E.B., work commenced on the installation of a complementary addition which, when completed in 1948, will raise the company's total generating capacity to 354,825 kW, or 475,000 H.P. The installed capacity at the Kearsley station will then be 271,700 kW at a cost approximating £7,000,000.

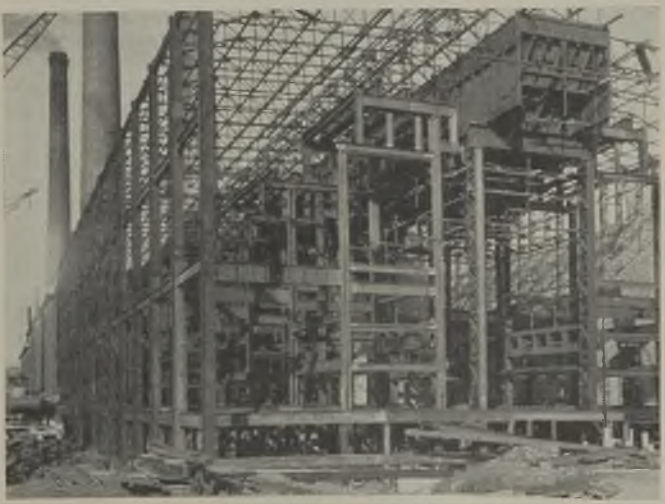
The station commenced with river water circulating through the steam condensers and now alternatively employs cooling towers with comparable efficiency, but at a cost that has risen from about £35,000 for each of the first three towers to something like £100,000 for each of the two now nearing completion. The first section of the Kearsley plant cost £14 per kW installed, including towers, land, railway sidings and roads, whereas the third section which is now being built will cost about three times that amount.

The present extension has been designed by the company's own staff, without the aid of consultants, under the direction of Mr. M. H. Adams, chief engineer and manager.

The building and civil engineering work is being done by J. Jarvis & Sons, Ltd. Each of the two B.T.H. sets will consist of a 50,000 - kW main and 2,000 - kW auxiliary alternator, generating at 33 and 3·3 kV respectively, on the same shaft operating at 3,000 r.p.m. The steam pressure is 600 lb per sq in. at a

Panoramic view of Kearsley power station site showing boiler house extension with turbine room and switch house additions behind

normal temperature of 800 deg F with three-stage feed heating to a final water temperature of 287 deg F. The blades on the last low-pressure "wheels" of the turbines will be among the largest in use in this country by reason of the single-ended exhausts, instead of the usual divided type.



Present state of boiler extension structure with two chimneys at roof level

Associated with each of the two sets of Worthington Simpson twin condensers of 50,000 sq ft will be two 60 per cent duty constant speed circulating water pumps capable of delivering 25,500 gallons per minute when running together; two condensate extraction pumps, each of which is designed for 100 per cent duty; and two sets of three-stage steam-operated air ejectors, each of 100 per cent capacity.

The two hyperbolic cooling towers being built by Fred Mitchell & Sons, Ltd., will each serve one 52,000-kW generating set, their diameter and height being 208 and 290 ft respectively at and from pond level. They are constructed entirely of ferro-concrete, the use of timber internally not now being permitted.

The hot water is delivered to the towers centrally, following outward, in contrast to the more usual circumferential circulating trough which has been abandoned for expansion and contraction reasons.

The " works " transformers and both main cellular and auxiliary switchgear will be of B.T.H. make. All switching will be done at 33 kV. The main power source circuit-breakers are to be of 1,500 MVA and those to control distribution of 750 MVA rupturing capacity. All cables are of British Insulated Callender's make.

The eight boilers will be Babcock & Wilcox single pass, high head, single drum type, CTM series, of 172,500 lb per hr capacity at 620 lb per sq in. and 820 deg F. Each of six Weir feed pumps will deliver 550,000 lb per hr; four will be electrically driven and two (for emergencies) turbine driven. The steel tube economizers in four boilers will be of the B. & W. flash-welded plain type; in the other four they will be of the Green diamond cast-iron-sleeved type. The B. & W. air heaters are to be arranged for gas flow outside and air flow through the tubes. There will be Pratt Daniel grit arrestors between the economizers and air heaters. The Davidson fans, two forced and two induced draught for each boiler, will be driven by constant speed motors. The two brick chimneys being built by P. C. Richardson & Co., Ltd., will be 325 ft high and of 22 ft 8 in. internal diameter at the base.

The novelty of this station is the Babcock-Detroit spreader type of stoker to be installed, being the first installation of its kind in this country, apart from the three-section experimental model at the makers' Renfrew works. The " Rotograte " is divided longitudinally into six sections, travelling forward in opposition to the customary direction. Six corresponding fuel feeders are disposed across the width of the furnace front. They are of reciprocating pusher-plate form, causing the small coal to spill over the edge of a distribution plate so that it is struck by rotary "paddle" vanes, curved for over-throw; in this way creating sufficient trajectory to " spray " the fuel evenly as far as the rear end of the grate. The common driving shaft, which is carried in water-cooled bearings and needs 0·5 H.P. per feeder, is arranged to allow any one pusher-feeder to be stopped quite independently of the over-throw rotor; the grate is separately driven.

The coal needs to be of a size that will pass through a 1·5-in. ring. The fine

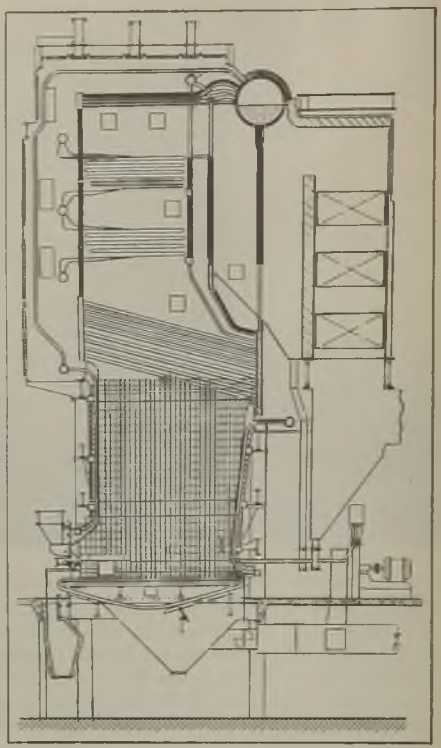
One of the pair of hyperbolic cooling towers nearing completion

particles ignite in the furnace flame and burn out in suspension, but a large proportion burns on the grate, by ignition in contact with the active fuel bed which is about 1 in. thick.

Below this flaming layer, both the ash and grate surface are maintained substantially at the temperature of the incoming air. Thus clinkering tendency is minimized; low fusion temperatures result in slightly friable ash.

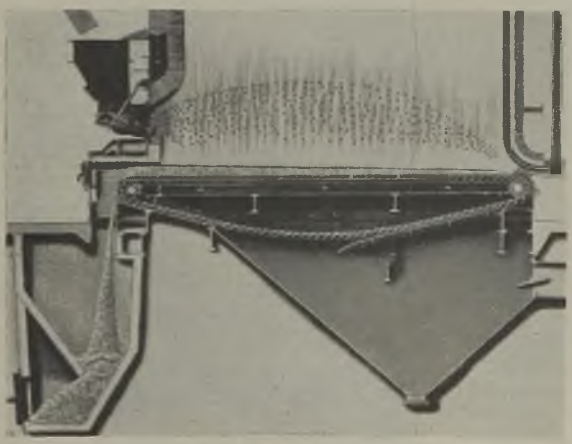
The presence of the layer on the grate is of importance in protecting the grate bars against overheating, as primary air for combustion from the forced draught fans is introduced through rows of venturi nozzles in the grate bars. Turbulence is, as usual, promoted by the delivery of secondary air at high pressure through the front and rear walls of the combustion chamber, according to length of grate. Cooling air circulating round the rotor housing is discharged through segmented tuyères which shield the feeder from radiant heat.

Plant for ash handling on the mono-rail bucket system is being installed by the British Ropeway & Engineering Co., Ltd., and the Drag Scraper & Engineering Co., Ltd. The coal handling plant, including two railway wagon side tipplers, two inclined rubber belt and gravity bucket conveyors, are of B. & W. make with two automatic Avery 30-ton weighbridges. All pipework is by Aiton & Co., Ltd., with Hopkinson steam valves and Blakeborough water valves.



General arrangement of Babcock Detroit steam boiler of 172,000 lb per hr evaporation

From the company's generating stations underground cables and overhead lines go to 700 substations throughout the area which is served by 950 miles of high-voltage and 1,330 miles of l.v. mains. In the last three years before the war the company spent £750,000 on consolidating and extending its distribution network. Thirteen local authorities are provided with bulk supplies and the company distributes in one borough, 20 urban districts and 56 rural parishes.



Representation of the forward-moving Babcock & Wilcox "Rotograte" showing the front deposition of ash below the rotary fuel injector

Never before in the 40 years' history of the company has there been so marked a turning to electric power in the textile industry. In the last twelve months 35 textile factories in the area have adopted electricity or were in course of conversion. Fourteen urban and three rural councils are co-operating in house wiring

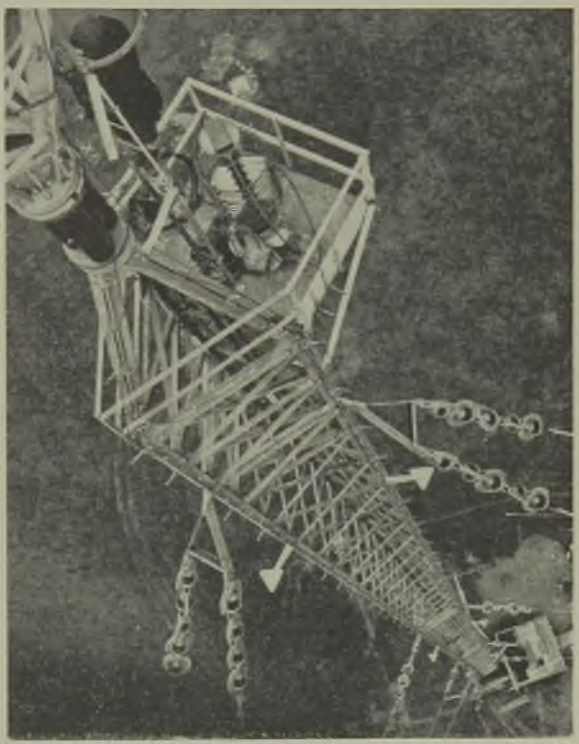
Of the 2,000 houses in course of construction by local authorities and private builders, 83 per cent will be wired for electric cookers, water heaters and wash-boilers. Nearly all will be wired on the ring-main principle, each house having not less than eight plug-socket outlets. Although the company is finding it possible to keep pace with the equipment of new houses, farm development is being held up by shortage of poles, cables and other equipment, but 40 per cent of the farms in the company's area—that is, 1,300 out of 3,000—are taking electricity. The company has already established a standard form of charge under its domestic two-part tariff throughout its area. Over 88 per cent of its domestic and farm consumers have adopted the two-part tariff.

New B.B.C. Mast

Improving Reception on "Home Service"

IN order to improve reception of the London "Home Service" programme on 342·1 metres the B.B.C. decided to erect at Brookman's Park transmitting station a 500 ft vertical radiator, with insulators at the base, 400 ft level and in all guys.

The mast, which was designed and erected by British Insulated Callender's Cables, Ltd., is a parallel-sided lattice steel structure of triangular section, each face approximately 6 ft in width, guyed at every 100 ft. A pivot is provided just above the 400-ft level, so as to facilitate the introduction of the insulator dividing the mast into rigid lower and upper sections about 400 ft and 100 ft long. The steelwork, supplied by Painter Bros., Ltd., was galvanized by the hot-dip process after fabrication.



New 500-ft vertical radiator erected at Brookman's Park

The mast is supported and insulated from earth at the base on three 1-ft hollow cylindrical porcelains. The upper section, which carries a capacity loading unit, is insulated from the lower by a low-capacity insulator unit of the "safety-core" type supplied by Electric Transmission, Ltd. It consists of three oil-filled 3-ft cylindrical porcelain insulators, approximately 9 in. in diameter, with fabric cores pre-stressed in tension so as to relieve the porcelains themselves of all tensile stress. The twenty-one guys which support the mast are insulated at their anchorages and mast attachment points, as well as at 70-ft intervals along their length, by Lapp-type porcelain insulators. An adjustable capacity loading unit is fitted at the mast head consisting of a number of 30-ft tubular steel radial booms jointed at their extremities carrying peripheral wires.

The maximum working design load at the base of the mast is 200 tons, of which the dead weights of the mast structure, guys, and insulators are 50, 15 and 22 tons. Ten aircraft warning obstruction lights are fitted at the top and on all three faces of the mast at intermediate levels.

The radiator was put into operation on September 29th, the same day as the new Third Programme was started, and has greatly improved reception in areas where it had hitherto been unsatisfactory.

Views on the News

Reflections on Current Topics

THE latest "chief's" salary trouble has cropped up at Bradford. The Corporation, stating that it was no party to the agreement arrived at by local authorities and their chief electrical engineers, has refused to raise the salary of Mr. T. H. Carr, city electrical engineer, to the scale level. (In April last Mr. Carr's salary was increased to £2,000.) Upon securing this decision the Electrical Power Engineers' Association (of which Mr. Carr is still a member) put the matter before the National Arbitration Tribunal. The appeal was heard in London last week, when the Associated Municipal Electrical Engineers were represented though not taking an active part. I am told that the Tribunal's decision went against the E.P.E.A., but so far I have not seen a copy of the award giving reasons for the decision.

* * *

Although a small industrial concern cannot afford a laboratory, that does not prevent its enjoying the benefits of research. As Sir Edward Appleton pointed out at the conference on "Research and the Smaller Firm," arranged by the Manchester Joint Research Council, it can draw upon the reservoir of knowledge provided by co-operative research associations. A factor essential to success is the efficient distribution of the information they make available. I have come across smaller concerns than those dealt with in the papers of Dr. F. C. Toy and Messrs. C. J. T. Cronshaw and C. G. Renold on the same occasion, the principals of which were kept very much abreast of developments through fixing the responsibility on suitably qualified men of bringing to their notice, with reasoned commentary, any data received from research bodies or culled from the technical press that had any possible bearing on the companies' activities.

* * *

How difficult it is to compare space-heating requirements here and abroad is illustrated by the joint report of the Ministry of Fuel and Power and the Department of Scientific and Industrial Research on "Domestic Heating in America" (Stationery Office, 3s.). Over a large part of the United States winter temperatures remain for long periods at 30 deg F or more below those normally found in Great Britain, where a mild winter spell may be warmer than a cold summer's day. Summers there, however, are generally much hotter than they are with us in any case. They are also more sunny; hence, possibly, high-temperature radiant heating has not the same attraction. Indoor temperatures, too, are maintained at quite 10 deg above values that most Britons find comfortable, even when they are not averse from uniformity of temperature throughout a house.

* * *

Attention in the United States is generally concentrated on keeping a high level of warmth (to which ventilation is decidedly a secondary condition) in adverse natural circumstances, and this has resulted in the reasonable fuel consumption of about 4½ tons of coal or its equivalent per household. It is not surprising that the more obvious advantages of electric space heating are not so widely and increasingly appreciated as they are with us.

* * *

The new Coinage Bill has produced some interesting arguments for and against the use of cupro-nickel in substitution for silver. Many contend that pure nickel should be used since it is harder and more durable, less subject to corrosion, of better appearance, more hygienic and more difficult to counterfeit. In support of the last point it is worth mentioning that pure nickel is magnetic, but its alloys are not. It is thus possible to distinguish between genuine and spurious coins by the use of magnets and I believe this is actually done in India.

* * *

The *Daily Herald* has been criticized by a number of its readers for publishing the electricity supply companies' advertisement containing the statement "Less nationalization now means better living sooner." Our contemporary rightly disclaims any "profit motive," for it is turning away advertisements: it thinks it proper to present the views of those opposed to its principles, which is very laudable. The *Herald* goes on, however, to refer to "the empty arguments and vapid slogans of Conservatism." This is not quite fair to the supply companies although to be candid the slogan quoted is a trifle pedestrian.—**REFLECTOR.**

Choosing Electrical Machines

Influence of Situation and Conditions

By "Works Engineer"

IN order to secure long and trouble-free service, in choosing an electrical machine regard must be paid to the actual site and operating conditions. Different forms of enclosure and protection, which affect temperature rise, are defined in B.S. 168 and 169. The limiting temperature rises there laid down are based on the thermal strength of the insulating materials employed and upon the performance of other components, e.g. slip-rings, bearings and commutator.

Temperature rise varies approximately in proportion to the copper losses, which increase as the square of the current, and iron losses, which increase as the square of the voltage. For intermittent operation, the rise will depend upon the nature of the duty cycle and the ratio of the " on-load " to the " off-load " period. B.S. 168 stipulates that machines designed for continuous operation must withstand 50 per cent overload in torque for 15 sec. These tests are carried out at the makers' works.

Restriction of Air Flow

Excessive temperature rise can be caused by adopting a type of enclosure that is unsuitable for the operating conditions. Thus, screen-protected machines may be installed in a dusty situation, as found in the wood, paper, textile and cement industries, without any special protection and over a period of time sufficient matter may be deposited in the air ducts, on the windings and other parts to restrict the air flow. Under such conditions the temperature rise may be 40 to 50 per cent higher than normal. Careful maintenance is obviously important in these circumstances and the installation of machines in separate rooms is advantageous although not always practicable. Where the atmosphere is free from dust, fumes and other deleterious matter and skilled attention is available, the open type of machine can be specified, either of open-pedestal or the open end-bracket design.

The open-pedestal machine consists essentially of the yoke or stator frame, end guards and pedestal bearings. The combination is mounted on its own bed-plate or, in the case of a generator, upon an extension of the bed-plate which carries the prime mover and is protected by hand-rails. All parts are readily accessible and this arrangement is usually specified only when plant can be installed in permanent well-built engine rooms and can receive experienced attention.

The open end-bracket machine is fitted with end-brackets which carry the bearings and are attached to the yoke or frame. Greater protection is given to both machine and operator, but this type is not much specified now for general industrial driving, although adopted for generators, which usually receive better attention and maintenance than motors.

For general industrial work the protected or screen-protected type is probably more used than any other. Contact with live or rotating parts of the former is prevented by doors or ribs over frame openings, but accidental contact with rotating parts may still be made in certain circumstances. Manufacturers therefore usually supply screen-protected machines for applications for which a protected type is specified and no increase in cost or size is normally entailed. These machines can be installed where site and atmospheric conditions are reasonably good, but periodical inspection, cleaning and dismantling of internal parts are necessary.

Cover-screen Sizes

A screen-protected machine is defined as one in which the ventilating openings are protected with wire-screen, expanded-metal or other perforated covers having apertures not exceeding $\frac{1}{2}$ sq in. and not less than 1/50 sq in. in area. A machine with fine-mesh covers has similar protective screens but with the apertures smaller than 1/50 sq in., which can easily become completely clogged in service. B.S. 168 provides for this in requiring that, in respect of the limiting operating temperature, such a machine shall be regarded as totally enclosed and shall comply with the limiting temperature rise when the machine is tested with the openings closed. This necessitates an increase in the rating. The limiting temperature for the windings of a screen-protected machine is 80 deg C with a cooling-air temperature not exceeding 40 deg C, the temperature rise being measured by a

thermometer. B.S. 1156, however, which is a War-Emergency Specification, permits a temperature rise of 45 deg C with the same maximum cooling-air temperature.

A useful variety of protected machine is the drip-proof motor, which is fitted with louvred covers and is defined as a protected machine in which the frame and end-shields are provided with openings for ventilation so protected as to exclude falling water or dirt. It became very popular during the war and there is a tendency to regard it as a general service motor. It is not, however, designed to cope with splashing liquids. As suspended matter in the air can be drawn into the machine, periodical cleaning is necessary. Of all machines using ambient air for direct cooling the drip-proof is probably the most adequate and the increase in size or cost is usually negligible.

If a machine has to be installed where the air is laden with fumes, dust or other matter in suspension, it may be necessary to dispense with intentional ventilation and rely on casual cooling and dissipation of heat from outside surfaces. This is the province of the totally-enclosed machine. It follows, however, that for a given output it is the largest and most costly of all the alternative forms of enclosure, and the motor must be liberally rated. The rate of heat dissipation will be influenced by changes in the local ambient-air temperatures, and to cover the whole machine by a protective box, which the maintenance staff might easily do, would raise the machine winding temperature to an unduly high figure.

Cooling Totally-enclosed Motors

Totally-enclosed machines and machines with short-time ratings are not capable of carrying sustained overloads. They will, however, carry 100 per cent overload in torque for 30 sec. The specified limiting temperature rise of the windings is given in B.S. 168 as 50 deg C, whilst B.S. 1156 permits a 5-deg increase on this. The total winding temperatures are then 90 and 95 deg. The disadvantage of lack of directed ventilation has been overcome by various makers who have introduced the totally-enclosed fan-cooled machine. Here an internal fan, mounted on the motor shaft, blows the local air through a series of ducts between the outer casing and the motor casing proper and this air-blast considerably assists cooling.

Further improvements in cooling are incorporated in the latest a.c. machines of this type, which for the same output are smaller and lighter than the plain totally-enclosed motor. Outer air is blown by external fans through ducts in the stator core; these ducts are isolated from the interior of the machine, there being no contact between exterior and interior air. The air inside the motor is driven by an internal fan through the rotor ducts and then, via channels between the outside of the stator laminations and the outer case, back to the rotor ducts. The two air streams are in opposite directions and cross each other in the stator-core end plates, which are provided with special channels.

Pipe Ventilation Systems

A pipe-ventilated machine is one in which a continuous supply of fresh ventilating air is conveyed to and/or from the machine through pipes or ducts attached to the enclosing case. It may have an inlet duct or an outlet duct or both. Cooling may be either by self-ventilation, forced draught or induced draught. When ordering a machine of this type the desired features should be fully stated.

Where the air in the vicinity is heavily dust-laden the pipe-ventilated machine may be used. A supply of clean air must be available within, say, 25 to 30 ft. Whether air is to be piped both to and from the machine will depend upon circumstances. If a piped inlet only is used the machine exhausts direct into the local atmosphere, which may be beneficial in some circumstances.

With piped inlet and free outlet, contaminated air could find its way into the machine via the exhaust outlet while the motor is stationary. If the deposited matter is chemically inert, no great harm would be done as it would be expelled when the machine was started up. On the other hand, if the pollution could have a deleterious effect upon insulation, the exhaust air must be piped away from the machine and discharged where the atmosphere is relatively clean.

As ducting offers resistance to the free flow of ventilating air, a machine which is so fitted for both inlet and exhaust tends to be larger and more costly than one which has piped inlet only. As the length of piping and number of bends influences the size of the machine, full details of the proposed installation should be given when calling for tenders. Information should be obtained from the manufacturer regarding the maximum length of piping of a given diameter

that can be used without causing the permissible temperature rise to be exceeded. Where the piping has egress to the open air, the ends should be cowl-protected against rain.

Machines which have to operate in explosive vapours, e.g., in cellulose spraying, must carry a Buxton certificate as to their flame-proof construction. In addition no explosive vapour must be able to find its way into the interior, even through the wide flanges of a flame-proof machine. For that purpose it may be necessary to supply the ventilating air under slight pressure, so that leakage can only be outwards from the machine and no explosive vapour can be drawn into it.

Use of Air Filters

Where clean air is not available within a short enough distance to permit the use of a pipe-ventilated motor, a screen-protected machine fitted with an air filter is often satisfactory. Air filters are not, however, designed to deal with fume-laden air and should be supplied by the maker of the machine. For general industrial work pipe-ventilated motors usually have integral fans, as have also filters. For large-power units of low speed the ventilating air is sometimes supplied under pressure from a separately driven blower, thus effecting a saving in cost and size. The manufacturer is the best judge of whether the adoption of this course would be advantageous.

In the totally-enclosed water-cooled machine cooling is augmented by water-cooled surfaces embodied in the machine itself. This has applications where a considerable amount of heat has to be dissipated in a relatively small space, but, as in the previous case, the manufacturer should be given full details of the operating conditions. Where the ventilation facilities necessary for a pipe-ventilated machine cannot be provided, a totally-enclosed closed-air-circuit motor may be used. In this the enclosed air is passed through an external cooler using water, air-draught, or other heat-dissipating medium.

Certain general observations apply to all machines with assisted or directed ventilation. The maintenance of continuity of supply of the cooling medium is of the first importance, as any interruption of this may result in serious overheating and consequently shortened life. In important installations alarm devices may be so connected as to give audible or visible warning in such cases. The correct functioning of these devices should be checked at intervals. The speed of any auxiliary fans should also be checked occasionally, for if this drops appreciably the cooling of the main unit will be adversely affected. The source of the supply of cooling air for a pipe-ventilated machine must not be adjacent to the exhaust outlet, otherwise hot air may be drawn in again.

Regarding the sustained overloads which may safely be carried by continuously rated motors, when the cooling-air temperature in service does not exceed 35 deg C, B.S. 168 prescribes 25 per cent for two hours for 10 H.P. and upwards per 1,000 r.p.m., 25 per cent for half an hour for sizes below 10 H.P. and down to 4 H.P. per 1,000 r.p.m., and 25 per cent for 15 min for sizes below 4 H.P. and down to 1 H.P. per 1,000 r.p.m.

Machines with short-time rating or totally enclosed are not capable of carrying sustained overloads. It is worth noting, however, that B.S. 1156 permits a 5 deg C increase in temperature rises and total temperatures as compared with B.S. 168, and that the sustained overloads previously stated have to be carried even when the cooling-air temperature of 35 deg C is exceeded. An exception is made in the case of generators inasmuch as the percentage overload is 10 per cent in current instead of 25 per cent.

Beehive Heating

A SECOND report on "Electric Heating of Beehives," Ref. W/T13, has been compiled for the British Electrical and Allied Industries Research Association by its former director, Mr. E. B. Wedmore. In the earlier report, Ref. W/T5, the prospects of using electric heating in beehives were critically examined and as a result a heating unit was designed and tested. The present report deals with two series of tests made at Rothamsted. Neither produced results showing any significant gain; indeed the actual figures showed some disadvantage from electric heating, but such differences were not established.

In the first series, heat was supplied from the top, with and without thermostatic control. The results statistically examined disclosed wide variations due to chance which are discussed. In the second series a novel heating unit was tried, designed to heat the cluster from within. Again the differences were not significant, neither were those due to the use of top and bottom entrances. A concluding section examines the scale proper to comparative experiments with stocks of bees. The report is obtainable from the Association at 2s. net.

Electrical Sheet Steel

New Research Facilities

NEW research laboratories at the Manor Sheet Iron Works, Wolverhampton, of Joseph Sankey & Sons, Ltd., were officially opened on October 17th by Professor Sir Lawrence Bragg. The function was presided over by Sir Samuel Beale, chairman of the company, and the party was conducted over the laboratories and works by Mr. N. F. Astbury, director of research. Electrical sheet steel has been produced at these works since 1905. "Stalloy" (4 per cent nickel steel) which has a resistivity five times that of ordinary steel, was first processed there and is still the chief subject of investigation in the laboratories, which are intended also to cope with the technical problems of the five factories of the company, where 6,000 people are employed.

Almost all the silicon-steel is hot rolled, but an important aspect of the research in hand relates to the orientation of the material to give it a high degree of isotropy and annealing properties nearly those of a single crystal (as in "Crystalloy") through cold rolling. For this purpose a four-high Steckel mill, in which all power is put into the coilers, has been installed ; this gives a speed of travel of 3,000 ft per min and is driven by a 600-H.P. d.c. motor, fed from a Ward-Leonard set. A second mill of the same type is expected to be running in about a year's time to replace older mills.

Furnace Equipment

Heat treatment is also carried out in the works, including large scale experiments in annealing. Low-temperature electric furnaces are gradually superseding gas-fired units, partly for cleanliness. There is also a continuous-roller hearth furnace for cold reduced strip and high-temperature electric furnaces for annealing "Crystalloy" in controlled atmospheres. By means of sequence switching (devised in the laboratory) the maximum demand of the latter can be controlled. A 15-cwt arc furnace has been installed in order to study the proportion of alloys that can be tolerated in steel used for various purposes. The general aim is to make commercially available electric sheet steel with a watts loss of 0·5 per lb.

Close liaison is maintained between the works and the research department, which is divided administratively into three sections—electrical (Mr. S. Emmerson), physics (Mr. A. E. De Barr) and metallurgy and chemistry (Mr. A. E. Pugh). In the electrical section the Lloyd-Fisher method forms the basis of routine measurements on production material, and associated with this is a "home-made" calculating machine which gives results from the test-board directly in watts loss per lb and given thickness.

A novel instrument has been devised for ascertaining total loss on straight strips in terms of torque developed in a short-circuited coil embracing the test specimen. An experimental space-factor testing machine enables measurements to be made of the properties of insulating coating and varnishes. By means of a simple electrical circuit the silicon content of a specimen can be read directly from a meter dial.

An Owen bridge for measurement of complex permeability under various conditions of polarization demonstrates on a cathode-ray tube screen the contrasted hysteresis loops of hot- and cold-rolled steels. Statistical analysis of results of numerous routine tests is being extended to provide not only a means of process control but also to accumulate data on electrical properties of steel otherwise unobtainable.

Electrical Laboratory Aids

Notable among the features of the chemistry laboratory are the conductometric method adopted and the simultaneous estimation of carbon and sulphur contents (in each case reduced to less than 1 per cent), and giving the weight of the trace element as a direct dial reading; a Strohlein apparatus for high-carbon contents; a high-temperature hydrogen annealing furnace ; and a Spekker photo-electric absorptiometer for estimating trace elements.

The metallographic laboratory includes a Vickers projection microscope and an experimental electrolytic polishing cell; difficulties encountered in applying the latter to silicon-iron alloys are under investigation. Various techniques for the examination of spectrum photographs are being studied with the aid of a Hilger large quartz spectrograph.

Among the short-term activities of the physics section are measurements of the physical properties of steel for works processing and for this purpose model hot- and cold-rolling mills are employed. Variations of elastic properties with direction in oriented material are measured as a basis for providing data regarding similar variations of elastic properties. Consequences of anisotropy are indicated by torque magnetometers and correlated with elasticity measurements on the same material. Apparatus for the production of magnetic patterns ("Bitter figures") has been installed for research into the mechanism of magnetization. Considerable use is made of X-rays in assessing the value of works processes such as annealing.

"Your Business."—A new monthly news sheet which the Birmingham Corporation is circulating to its ratepayers, includes an appeal for economy in the use of electricity and some notes on rural electrification in the Corporation's area.

CORRESPONDENCE

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

School Lighting

IT has just come to my notice that the authorities are proposing to install fluorescent lighting, with a minimum intensity of 10 foot-candles, in all Council schools. This is appalling, combining as it does a quite unnecessary and dangerously high intensity with a particularly injurious type of light.

Very few adults, if they would take the trouble to measure the intensity all over their homes or offices, would find they were getting an average of as much as 4 or 5 foot-candles, while our grandparents usually had an average of perhaps one-tenth of a foot-candle. Normally, children can see almost without light; yet instead of giving them smooth, well diffused, glareless and shadowless light of moderate intensity, we are going to ruin their eyesight with high intensities of a harmful type of light, involving glare, intensified alternations and flicker.

Most of your readers have children or young relatives. Surely, therefore, they should make an effort to prevent this disaster to the nation's eyesight for which, incidentally, as ratepayers and taxpayers we shall have to pay heavily.

*London, W.C.*1. G. V. DOWNER.

[The B.S. Code of Practice for Schools prescribes 12 ft-candles at 2 ft 9 in. above floor level as the minimum illumination required for the adequate lighting of classrooms. It also makes provision for avoidance of glare and recommends that the artificial light shall be of a kind that blends well with natural light. That and the fact that the surface brightness of the 80-W fluorescent lamp is only about 3 candles per sq in. are in favour of its use.—EDITORS, *Electrical Review*.]

Electric Motor Shortage

IT is well known in the engineering industry that the shortage of electric motors in this country is an extremely serious matter. Our manufacturers are finding it necessary to quote delivery times greatly in excess of anything which has been known in the history of the trade and there is, naturally, a tendency to blame the manufacturers for this state of affairs. Production of electrical machinery is running at a very high level and I believe that the chief factors which are preventing an improvement in the situation are shortages of electrical steel sheets, copper wire and iron castings. These shortages are not the fault of the electrical machinery manufacturer.

There are good reasons for stating that the British electrical machinery manufacturing industry is highly efficient and in support of this view I should like to point out that electric motors are being sold in this country at a lower price than anywhere else in the world, and that foreign manufacturers are in a very bad position as regards time required for delivery. The quality of the British product, as a whole, compares favourably with the foreign article.

Recently there has been brought to my notice a case where American machinery manufacturers are finding it necessary to export their products to the Continent minus the electric motors required to drive the machinery, which form a part of the contract. An attempt is being made, with some success, to obtain the necessary motors in this country and ship them separately to the Continent.

I am not suggesting that our home manufacturing and selling organizations are by any means perfect, but I do feel that persons who are over ready to offer criticism should first inquire into the world situation. These views are not based on hearsay. Recently I have had the opportunity of inquiring into the position abroad, including a visit to Central Europe. W. E. LAWTON,

*London N.*1. *Chairman*,
Association of Electrical Machinery Traders.

Unsafe Installations

PERHAPS it is time that someone got to a rational view of this so-called safe or unsafe installations business. The terms "safe" and "unsafe" are quite arbitrary and must vary with the state of the art of electrical installation at any given period. I have not noticed that the advocates of better installations, or shall I say safe ones, have interested themselves in helping to save life on the roads; their efforts there would be more fruitful and more noble because it would probably help to empty their pockets rather than fill them.

What is to be gained from these so-called safe installations? Are the insurance companies going to offer reduced rates? I like

good work and I have in my time seen hundreds of jobs here and in the Colonies—of various ages. I have seen what to me are appalling installations (some in a country that has a system of inspection) but they work and go on working, without fires and without loss of life.

May I suggest that the *Electrical Review* publishes an accurate report of the causes of loss of life due to private installations, so that those who are interested can see what proportion of deaths are caused by "unsafe" installations. Loss of life has not increased in proportion to the use of electricity, and insurance companies consider electricity the safest source of lighting, heating and power, I believe.

Electricity also saves lives, very fortunately, far more than it takes—human endeavour will never reach perfection because of human nature, which takes risks, partly because it is a question of what will it cost and what can be afforded. Then if one installation costs more than another is the difference a good "insurance premium"?

"RATIONAL."

Growth of the Grid

Transmission Section Chairman's Address

EXTENSION of the national grid was the subject of the address delivered in London last week by MR. J. ANDREW LEE (Central Electricity Board) as chairman of the Transmission Section of the Institution of Electrical Engineers.

Mr. Lee recalled that the original constructional programme was completed by 1933, in about half the time allowed. During the next five years construction work slowed down, but the prospect of war accelerated the rate again. Between 1940 and 1942 some 535 miles of overhead lines were erected. Since then there had not been any major extensions, but there had been line deviations on account of Air Ministry requirements, or factory and building developments.

Wartime movement of industry from east to west necessitated the rapid erection of some 365 miles of 132-kV lines with associated substations and equipment, mostly to augment the output of supply undertakings. But "rushed" supplies were given to twenty-five Government factories and in every case energy was made available by the time the factory was ready to accept it.

Aluminium was needed for other purposes, so 850 miles of cadmium-copper overhead conductor had to be imported from the United States. Cone and rolled joints had been employed and both had been satisfactory. A relatively small amount of steel-cored conductor with cone joints was also used. About 10,000 tons of steel for tower construction was imported from America.

If the beneficial effect of Stockbridge dampers in preventing strand breakage due to conductor vibration were to be confirmed, it might permit reversion to 3,450-lb stringing tension, which would shorten tower heights by 5 ft; the 2,560-lb tension now employed had not prevented vibration. There was urgent need for research into conductor corrosion; that due to salt-laden atmospheres along the south coast showed marked signs of spreading.

Reversal of the flow of industry when hostilities ceased was causing load to build up again in the eastern half of the country. At the present time 67 miles of additional 132-kV overhead lines were being constructed and contracts had been placed for a further 23 miles, but many more miles would be required during the next two years. Therefore a length of experimental 264-kV line was to be erected, but this would operate at 132 kV for the time being in order to clarify mechanical design.

Experiments in this country seemed to indicate that two steel-cored aluminium conductors per phase, each of the same cross-section and make-up as the present 132-kV grid conductor, would give the best results. It would be a single-circuit line with flat spacing of conductors and double earth wires for a mile from each of the terminal substations; a single earth wire would be used on the remainder of the route. Insulator strings would be made up of 20 discs of the anti-fog type and perhaps both arcing rings and horns would be unnecessary. The normal span would be 1,200 ft long. If load development warranted it, the 264-kV system would probably become a "super-grid," forming the backbone of the existing 132-kV network, connected to it at selected points.

Mr. Lee concluded by pointing out that design often lacked provision for rough handling on erection sites. Standardization of such line fittings as joints and clamps would be advantageous; the fixing of base sizes and external dimensions of transformers, switches and control gear would save time and a great deal of work.

Timekeeping System in Whaler

The whale factory ship *Balaena*, which last week left for the Antarctic, is equipped with a Gents' marine type electric master clock and forty time dials, together with a complete staff locator system.

Engineers and Export

Advice to Overseas Representatives

MUCH useful guidance for engineers engaged in the representation of their firms in overseas markets or those contemplating the taking up of this branch of work was contained in MR. J. F. SHIPLEY'S address as chairman to the Installations Section of the I.E.E. Mr. Shipley's views were based largely upon experience gained just after the 1914–18 war when conditions were very similar to those now prevailing.

First the speaker stressed the importance of export to this country and the leading part taken in overseas trade by the electrical industry. Among the points which he made was that engineering export trade was not merely the sale of goods surplus to the home market. Many countries were now able to produce for themselves the standard lines and looked to us to supply only the heavier plant and that which required superior skill in its manufacture. This represented progress and an expanding market. What we had to do was to make sure that we always had something better or entirely new to offer.

Mr. Shipley wanted a Government Department of Overseas Trade better informed than those of other countries and he urged that markets should be surveyed in the first place by a director or special envoy. He touched upon the question of technical "literature," again urging the use of the customers' own languages and methods, and he favoured the high-grade textbook type of catalogue which was kept and used for many years. The importance of appointing competent agents was stressed.

Maintenance of Contact

Turning to the engineer-representative, Mr. Shipley said that firms should not expect too much of him in the early stages. He would at first reap the fruit of the labours of his predecessors but would, in turn, prepare further ground for those who followed him. He counselled moderation in personal expenditure and urged that the representative should learn the language of the country. One drawback to an overseas job was the loss of close contact with the home office. This could only be remedied by more frequent refresher trips to this country and by the provision of more news from home. Long absence was apt to make a man a complete stranger upon his return and firms should do all they could to remedy this. The question of succession was most important and it was suggested that young men should be sent out to act as assistants for short periods. They would liven up the overseas office and in return would broaden their own outlook and discover most of what was necessary in an overseas office.

Adaptability and versatility were two important qualifications for an overseas representative. Mr. Shipley also advised constant contact with the Institution as far as possible and urged those concerned to prepare papers for the *Journal* or for reading by other members at meetings.

The speaker did not think that the tendency of other countries towards industrialization was disastrous to prosperity here. The raising of the standard of living would increase the effective demand which we would help to satisfy. In most countries overseas, private plants for mines, factories and workshops would be required for many years, although the tendency was towards public electricity supply where this was possible.

In his concluding remarks Mr. Shipley mentioned the possibility of smoothing out trade cycles and affirmed his faith in the future of electricity. He thought that the future of the British electrical industry, and with it that of the Section and its members, depended largely upon the degree to which expansion could take place overseas.

Steel Cable Drums

FROM automatic cigarette machines to steel cable drums, bobbins and reels is the unusual change-over in production undertaken since 1939 by Dean Bros., Nottingham. During the war approximately one million drums and reels were made for the Ministry of Supply. All-steel drums, bobbins and reels are now being produced for industrial use and over 100 different types have been developed for the cable and wire rope industry since the war ended.

Flanges are made with a beaded edge from 12-in. to 3-ft diameter, in thicknesses ranging up to $\frac{1}{8}$-in. In the small type of beaded reel the flanges are, where necessary, embossed to give added strength. With a plain rim the flanges are made up to 3 ft diameter, in thicknesses up to $\frac{1}{4}$-in. in mild steel or saw blade steel; barrels of any dimensions required can be fitted. The flanges are made completely in the factory from steel sheets, passing from the guillotines to the power and hand presses and then, if required, to the beading machines.

The barrels are manufactured from drawn tube, also from steel sheets, rolled and welded, and then processed to a true diameter, after which they are turned to ensure that the correct distance is obtained between the flanges and that the flanges fit true to the ends of the barrel. The bores, made from mild steel tubes, are fitted to the flanges by small plates, both by riveting and welding, to prevent movement. After assembly, the whole unit is trued to ensure smooth running on the spindles.

NEW BOOKS

Fundamentals of Engineering. Modern Telecommunications Practice.

To Be An Engineer. By Lt. Col. J. A. W. Morland, A.M.Inst.C.E., A.M.I.E.E. Pp. 180; index. Methuen & Co., Ltd., 36, Essex Street, W.C.2. Price 7s. 6d.

There can be little doubt that the expressed aim of this timely book—to assist all who think of making engineering their profession, especially those in the services awaiting demobilization—will be amply fulfilled. By its summary of the common fundamentals of engineering it gives in brief form sound guidance to prospective entrants to any of the three main branches in regard to the means of acquiring the requisite training and qualifications.

The practical outlook of the author is shown by the information he gives on the financial aspects of education and training (though necessarily based upon pre-war figures) and his hints on applying for a job, which will probably be as useful for their purpose as are the particulars given of the requirements of the three senior engineering institutions for membership. In the table of salaries attached to typical posts, it would give a better idea of the remuneration open to chief electrical engineers and managers of electricity supply undertakings, if figures had also been given for one of the large concerns.

While insisting on the value of theoretical training and academic qualifications, the author points out that these by themselves are not enough to ensure a successful career and names five other essential pre-requisites, a deficiency in any one of which would prejudice an engineer's chances. These include a knowledge of the world, which with the other essentials cannot be acquired if specialization is started too early in life.

About half the number of pages are devoted to clear commentary which bears the mark of first-hand experience and is in accord with the most recent views on education and training. The other half consists of twelve appendices setting out in convenient form factual data relevant to the preceding chapters.—C. O. B.

A Handbook of Telecommunication (Telephony & Telegraphy over Wires). By Bertram Cohen, O.B.E., M.I.E.E. Pp. 437; figs. 231; index. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, Kingsway, London, W.C.2. Price 30s.

This book contains a mass of information on the subject indicated by the title. Since it is a record of what has been done and what is latest practice and does not advance views of the author which might be open to criticism, a review can only indicate the field covered.

Chapter 1 is introductory and deals with acoustics and electro-acoustics. Other chapters follow on microphones and receivers; telephone instruments, manual and automatic; manual telephone exchange equipment, relays and principles of C.B. exchange systems, manual and automatic; toll, trunk and auto-manual systems; automatic telephone equipment; automatic telephony, embracing such matters as local and junction calls, tandem working, satellite exchanges and coin box lines, rural automatic exchanges, non-director and director areas, PBX and PABX operation; non-standard systems and power supplies for telephone exchange purposes; telephone transmission, simulating networks, losses, gains, levels and transmission planning; thermionic valves, amplifiers, repeaters and echo suppressors; multi-channel carrier telephony modulation, filters, frequency generators, cable and open wire carrier systems; external plant; telegraphy and measurement. This last section is of exceptional value and such as would be expected from the author. All the sections are accompanied by appropriate references to other writers and these form a most valuable part of the book.

The reviewer must confess to a feeling of disappointment with the section on telegraphy. The enormous advances in the operating technique of long submarine cables in recent years, such as the interlinking of land line offices with the cable so as to form an extension of the cable head, the transformation of codes permitting five unit operation on unloaded submarine cables, the great changes introduced by the application of the regenerative repeater, and the application of electronic devices to cable operation should all have found place in a handbook of this nature. It is true, as Sir Stanley Angwin points out in his foreword, that the subject is now so vast that it really requires a range of textbooks to deal adequately with the various sections. It is to be hoped that this will come to pass and that some of the contributors will be selected from administrations experienced in those branches of communication not handled in this country. Our distances are so short that many communication phenomena which are familiar to engineers in other countries do not confront us.

This book will be useful to the student not only for what it contains itself but as a guide to what he should read, this being furnished by the 438 references accompanying the various chapters.—H. H. H.

General Discussion on Transformer Oils. Pp. 110; 18 figs. Institute of Petroleum, 26, Portland Place, London, W.1. Price 7s. 6d.

Reprint of eight papers on different aspects of the subject, including the E.R.A.'s contribution thereto, with full report of the general discussion.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IN connection with the reorganization of the technical staff of the Shoreditch Borough Council Electricity Department, a number of promotions, appointments, etc., have been approved by the Borough Council including the following:—**Mr. H. Lawson,** A.M.I.E.E., from mains engineer to chief assistant engineer (Grade 2); **Mr. H. W. Scott,** A.M.I.E.E. (deputy distribution engineer, Finchley Electricity Department), distribution engineer (Grade 3); **Mr. J. P. Cauley,** power station superintendent (Grade 3); **Mr. E. Jerrom,** consumers' engineer (Grade 4); **Mr. A. F. Cox,** from electrical maintenance engineer to assistant distribution engineer (Grade 5); **Mr. J. F. Heath,** from assistant mains engineer to assistant distribution engineer (Grade 5); **Mr. A. R. Groom,** B.Sc. (Eng.), A.M.I.E.E. (junior technical assistant, Norwich Electricity Department), distribution technical assistant (Grade 6); **Mr. E. W. Newman,** A.M.I.E.E. (assistant meter engineer, Woolwich Electricity Department), meter superintendent (Grade 7). All grades are in Class F.

Mr. M. Wadeson, deputy electrical engineer at Nottingham, has been recommended for appointment as city electrical engineer in succession to Mr. G. H. Lake who recently retired.

Mr. J. D. Ferguson, B.Sc.(Eng.), chairman of the Irish (Dublin) Branch of the Institution of Electrical Engineers for the 1946-47 session, received his mathematical and technical education at the Municipal College of Technology, Belfast, his native city. He entered the Post Office Engineering Department, Belfast, in 1908 and has had a wide practical experience of Post Office engineering. In 1921 he was transferred to the P.O. Research Station, Dollis Hill, London, and was promoted chief inspector in 1923. On returning to Ireland early in 1923 he was promoted to assistant engineer, Department of Posts and Telegraphs, Dublin, afterwards attaining the ranks of assistant staff engineer, and staff engineer (1931). Mr. Ferguson has had experience as a teacher of electrical engineering subjects, including radiocommunication, and was for eight years examiner in magnetism and electricity, telegraphy and telephony for the Department of Education. He is a member of the American I.E.E. and a senior member of the I.R.E.

Mr. J. D. Ferguson

In the notes on the chairmen of the I.E.E. centres recently published we stated that **Mr. T. P. Allen** was chairman of the Irish Centre. This should, of course, have read Northern Ireland Centre. During the last session the Northern Ireland Sub-Centre in Belfast was raised to the status of a Centre, whilst the Irish Centre in Dublin was changed to an Overseas Branch.

Mr. H. W. Richardson, B.Sc., M.I.E.E., editor of the *G.E.C. Journal* which he started in 1930, has retired after twenty-seven years' service with the General Electric Co., Ltd. He was responsible for the engineering publicity of the company and was widely known among the engineering and electrical trade press. He was senior prizeman at University College, London. For a year he was assistant to Dr. J. A. Fleming on research into oscillating discharges and subsequently for two years before joining the G.E.C. he was assistant editor of the *Electrical Times*. In the early days of the war he was appointed materials controller at the Witton Engineering Works of the G.E.C. and he held this position up to the time of his retirement.

Mr. H. W. Richardson

Mr. W. M. Lapper, manager for the Mid-East and North-East England Areas of the Central Electricity Board, has been awarded the American Legion of Merit, degree of Officer. This honour follows the recent award of the O.B.E. for services as head of the Public Utilities Division of the Allied Control Commission for Italy, in which capacity Mr. Lapper was responsible for the rehabilitation of electricity supply in that country after the landings of the Allied armies in 1943. He holds the honorary rank of lieutenant colonel.

Mr. H. L. Oura, M.B.E., B.Sc., M.I.E.E., has been appointed by E.K. Cole, Ltd., to take charge of the company's Western Development Unit at Malmesbury, Wiltshire. Mr. Oura, who will work directly under Mr. A. W. Martin, chief engineer, took up his duties on October 7th. Mr. Oura was previously a director of E.M.I. Engineering and Development, Ltd.

Mr. A. C. Green, sales engineer of the Norwich Corporation Electricity Department, retired on October 15th after forty years with the undertaking. During the whole of that time he was employed in the development of the undertaking, latterly in the rural area. At a

farewell gathering of the staff, Mr. Green was presented with an electric clock and a cheque by the city electrical engineer (Mr. J. A. Sumner). He and the Lord Mayor of Norwich and the Sheriff, who are chairman and vice-chairman of the Electricity Committee, spoke appreciatively of Mr. Green's valuable services.

Mr. Vernon Hope, chairman and managing director of Parmiter, Hope & Sugden, Ltd., is leaving for Australia and New Zealand on November 9th by the Blue Funnel liner *Nestor*. He will be in Australia for several months, and letters may be addressed to the Wentworth Hotel in Sydney. He will be visiting South Africa and Southern Rhodesia on his return.

The Chesterfield Electricity Committee has passed a resolution of appreciation of the services rendered by **Alderman H. Varley** during the twenty-one years he has been its chairman.

Mr. G. A. Smithson has resigned his appointment with Benjamin Electric, Ltd., to take up a position with Birmingham Power Transmission, Ltd. Mr. Smithson received his early training with Chamberlain & Hookham, Ltd., and has been in the service of the Shoreditch and Torquay electricity undertakings and with the Powell Duffryn Associated Collieries, Ltd. He has recently been released from the Army in which he held the rank of captain in the R.A.O.C., having served in India and Japan.

A number of new appointments and promotions have been made by the Gravesend Corporation Electricity Department following upon reorganization of the staff. Among these are the following:—**Mr. W. A. Black,** A.M.I.E.E. (North-Eastern Electric Supply Co.) appointed technical assistant, Grade 3; **Mr. L. C. Bond,** consumers' engineer, promoted from Grade 4 to Grade 3; **Mr. G. E. Barnes,** assistant distribution superintendent and **Mr. W. Blake,** assistant consumers' engineer, promoted from Grade 7 to Grade 5; and **Mr. Read,** meter superintendent promoted from Grade 8a to Grade 7. All grades are in Class F.

Mr. M. C. Toner is relinquishing his position in charge of the lighting department (North Western area) of the Revo Electric Co. to join the Britmac Electrical Co., Ltd., as sales representative in the North-Western area.

Mr. W. J. Bensley has been appointed deputy managing director and **Mr. H. F. Guildford** has been appointed to the board of the Sloan Electrical Co., Ltd.

Jarrow Rotary Club has made a presentation to its president, **Mr. F. W. Tomlinson,** managing director of the Pyrotenax Co., Ltd., Hebburn-on-Tyne, to mark his recent marriage.

Dorman & Smith, Ltd., and D S Plugs, Ltd., held their joint works picnic on October 12th. The large party were conveyed by motor coach to Bowness for lunch. From there they travelled via the lakes in launches to Ambleside, where they were again picked up by coach and taken to Morecambe for tea. The party included **Mr. T. Atherton,** managing director, and staff executives.

Our Australian correspondent reports that visitors to the country during the past few weeks have included **Mr. W. J. Terry,** chairman and managing director of the London Electric Wire Co. & Smiths, Ltd., and **Mr. S. Aninga,** technical director of Philips' London office, who is going on to New Zealand.

Mr. N. V. Blair, recently released from the Forces, has joined the Progress Cables & Accessories Co., Ltd., as sales representative for Scotland and will reside in Edinburgh.

Obituary

Mr. H. M. Hobart.—We regret to learn of the death of Mr. Henry Metcalf Hobart, one of the pioneers of the electrical industry, which occurred at Schenectady, New York, on October 11th. Born at Boston, Mass., in 1868, Mr. Hobart graduated from Massachusetts Institute of Technology, and gained experience in the design and manufacture of electrical machinery at the Lynn (Mass.) and Schenectady works of the Thomson-Houston Electric Co. (afterwards the General Electric Co.). In 1895 he took up an appointment on the engineering staff of the British Thomson-Houston Co. in London and was technical adviser to the company in connection with the design and preliminary operation of the electrical equipment for the Central London Railway, the Middlesbrough Corporation Tramways, the Dublin United Tramways, etc. From 1900 to 1903 he served with the Union Elektrizitäts Gesellschaft, Berlin, and thereafter engaged in consulting engineering practice in London until 1911 when he returned to America to become consulting engineer to the General Electric Co.

Mr. Hobart was a full member of the Institutions of Civil, Electrical and Mechanical Engineers in this country, as well as of the American I.E.E., and he lectured on electrical design at University College, the Northampton Institute, E.C., Faraday House and the School of Military Engineering at Chatham. He was a delegate to the Berlin meeting of the International Electrotechnical Commission in 1913, and in 1915 visited London on a mission associated with the standardization of electrical machinery. Among Mr. Hobart's many contributions to technical literature was a special article on "Electricity in the Propulsion of Ships" which he wrote for the Jubilee issue of the *Electrical Review* on November 17th, 1922.

Llanover Plan Rejected

As the result of an inquiry held into the proposal of the South Wales Electric Power Co. to erect a power station at Llanover, Mon., the Minister of Town and Country Planning has declined to give his consent to the scheme.

Northmet Film Unit

SUPPLY authorities are constantly seeking new means of encouraging local interest in the part played by them in industrial, domestic and social development and the latest effort in this direction is the establishment by the Northmet Power Co. of a film unit. Last week we attended a pre-view at the Wood Green showrooms of the Northmet News Reel No. 1. In his introductory remarks, Mr. W. N. C. Clinch (general manager) explained that this was the first of a series which the company proposed to release showing some of the interesting events taking place in its area of supply.

The production programme will cover many aspects of Northmet service, including the construction of the Rye House power station, the appliance repair service, electricity in farming, industry and the home. Support programmes will be made up from E.D.A. films and others borrowed from film libraries. It is intended to give shows to selected audiences, including schools, women's institutes, youth movements, horticultural societies, and other organizations.

News Reel No. 1 commences with shots of Lord Ashfield (chairman), directors and chief officials on a tour of inspection of the company's electricity works, and most of the remainder of the film is given over to the recent Hertfordshire Show in which the company combined with the Watford Corporation in giving a display of electrical farming and horticultural equipment. The electrical side is not overdone and most of the shots are of the general features of the show. The newsreel is in Kodachrome and both the photography and colouring are extremely good, while the commentary given given by Mr. G. Barrett (commercial manager) is excellent. Supporting films in the programme were "Power Lines," a documentary film dealing with electric cable manufacture, "Turn of the Furrow," showing the development of the tractor in the farm, and the E.D.A. film, "Their Invisible Inheritance."

Australian Notes

From a Correspondent

THE West Australian Electrical Contractors' Association is concerned about the serious shortage of skilled electrical tradesmen throughout the State. The forthcoming change-over from 40 to 50 cycles, coupled with the extensive schemes to serve remote country districts, will mean a much increased demand for electrical workers, and it is realized that it may be necessary to import additional skilled labour from outside the State. In view of the talk about immigration, it may be interesting to record that present rates of pay in the industry are:—Electricity works: turbine driver, £1 4s. 2d. per day; auxiliary plant attendant, £1 2s. 3d.; fireman, £1 1s. 10d. to £1 3s. 8d.; greaser, £1 0s. 7d.; boiler cleaner, £1 0s. 5d. to £1 2s. 3d.; and engine or plant cleaner, 19s. 3d. per day. Electrical fitters and electrical mechanics are earning £6 10s. per week.

PROGRESS OF POWER SCHEMES.—The site of the new power house at South Fremantle has been levelled, and it is officially reported that the foundations are ahead of schedule. Specifications for additional plant for the Collie Station are nearly completed, and it is expected that tenders will be called for at an early date.

Commercial Cooking Display

GREAT Yarmouth Corporation has opened an extension of its electricity showrooms to display heavy-duty cooking equipment. It was reported at the opening ceremony that

Commercial cooking equipment at the Great Yarmouth showrooms

during the past six months the Electricity Department had sold fish-frying ranges, cafe sets and boilers, refrigerators and other commercial apparatus to the value of £12,000. Mr. G. T. Allcock, the engineer and general manager, said that this was only a beginning. They had proved that a demand existed and that the Department could meet it.

Plastics Institute

THE annual meeting of the Institute of the Plastics Industry was held in London this week. Mr. Howard V. Potter is the new president. Mr. S. B. Turner, the chairman, read the address of the retiring president, Mr. S. M. Mohr, which referred briefly to the improvement of plastic materials, particularly for electrical insulation purposes and especially at the higher frequencies, with a reiterated warning against improper use: plastics were not substitute materials and any articles incorporating them needed to be specifically designed.

Most of the address was concerned with the increasing activities of the Institute and its educational and apprenticeship training schemes.

Forthcoming Events

Monday, October 28th.—BIRMINGHAM.—James Watt Institute, 6 p.m. I.E.E. South Midland Centre Radio Group. Chairman's address by J. Aspin.

Grand Hotel. Birmingham Electric Club. "Major Electronic Developments," by Dr. W. Wilson.

NEWCASTLE-ON-TYNE.—Neville Hall. Westgate Road 6.15 p.m. I.E.E. North Eastern Centre. "The Extinction of Arcs in Air-Blast Circuit-Breakers," by A. Allan and D. F. Amer.

GLOUCESTER.—I.E.E. Western Centre. "Steel Tower Economics," by P. J. Ryle.

LONDON.—Institution of Electrical Engineers, 5.30 p.m. Informal Meeting. Discussion on "Electricity" to be opened by the President.

Tuesday, October 29th.—LONDON.—E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, W.C.2. Forty-fourth Illumination Design Course, to November 1st.

MANCHESTER.—Engineers' Club, Albert Square, 6 p.m. I.E.E. North Western Centre (Transmission Group). "Rural Electrification: the use of the Single-Phase System of Supply," by J. S. Pickles and W. H. Wills.

Wednesday, October 30th.—LONDON.—Institution of Electrical Engineers, Radio Section, 5.30 p.m. Symposium of papers on Direction-Finding.

2.30 p.m. I.E.E. London Students' Section. Visit to Mitcham Works, Ltd., Mitcham, Surrey.

Savoy Hotel, W.C.2. 12.30 for 1 p.m. Gauge & Tool Makers' Association. Luncheon. Speaker, Sir Ernest Benn, Bt.

SHEFFIELD.—Victoria Hall, 7.30 p.m. I.E.E. North Midland Centre. Faraday Lecture, "Atoms, Electrons and Engineers," by Dr. T. E. Allibone.

Friday, November 1st.—LONDON.—The Royal Institution, 21, Albemarle Street, W.1., 9 p.m. Friday evening discourses. "Problems in Electrical Engineering," by Dr. P. Dunsheath.

Saturday, November 2nd.—LONDON.—Royal Hotel, Woburn Place, Russell Square, W.C.2 (7 to 11 p.m.) London Students' Section. I.E.E. Informal dance.

Monday, November 4th. — BIRMINGHAM.—James Watt Institute, Great Charles Street, 6 p.m. I.E.E. South Midland Centre. Informal meeting. "Rehabilitation of Electricity Supplies —Italy," by Col. W. M. Lapper.

Tuesday, November 5th.—LEEDS.—Corporation Electricity Department, Whitehall Road, 6 p.m. I.E.E. North Midland Centre. "Rural Electrification: the use of the Single-Phase System of Supply," by J. S. Pickles and W. H. Wills.

LONDON.—At E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, W.C.2, 7 p.m. Electrical Power Engineers' Association (London Local Group). "Flue-Gas Treatment," by Dr. W. Francis.

The Oddfellows' Hall, 186, Hammersmith Road, 7 p.m. Association of Supervising Electrical Engineers (West London Branch). "Post-War Utilization," by W. Gilchrist.

GLASGOW.—The Gordon Restaurant, 7, Gordon Street, 7.30 p.m. Electrical Society of Glasgow. "Fluorescent Lighting," by H. R. Ruff.

Urban Distribution

Methods Employed at Swansea

SEVEN years' development of the urban distribution system of the Swansea Corporation was described by MR. J. F. WRIGHT in his address as chairman of the West Wales (Swansea) Sub-Centre of the Institution of Electrical Engineers.

The system, he said, now consisted of 33/6·6-kV transformer-feeders radiating from the two 33-kV switchboards at the generating station to primary substations which (excepting two with very large individual loads) were interconnected through the network serving the 6·6/0·4-kV secondary substations, thus providing standby flexibility which proved itself during many heavy air raids.

New areas had at times been developed at reduced cost for substations by the use of 6·6/0·4-kV transformer-feeders without high-voltage switchgear in the transformer stations. Discriminative protective gear on all the 33/6·6-kV feeders and many of the 6·6-kV distributors had permitted interconnected operation. Since 1939 pilot cables had been laid whenever opportunities permitted, to provide for communication and supervisory facilities.

On the low-voltage network distributors from any one substation were not interconnected, but those connecting two substations were fed from both ends. Thus very few feeder pillars were needed, but those installed were usually of the duplicate busbar type.

Illustrations were used to indicate the smaller substations now being built to house switchgear of greater ratings. All outdoor 33/6·6-kV transformers now had automatically controlled tap-changers, and Buchholz protectors were specified as standard equipment. Most of the indoor 6·6/0·4-kV transformers had off-load tapping switches, but 5 per cent were equipped for on-load automatic tap-changing. Outdoor distribution transformers were arranged for future fitting of on-load tap changers.

Diagrams and illustrations were used to describe in some detail the make-up of the switch and fuse gear installed in the 0·4-kV substations and Mr. Wright said that, from system operation and development aspects, the very great value of permanent metering on each phase of every distributor had to be experienced to be fully appreciated.

The address concluded with comments on load estimation with reference to council housing estates (3 kW per house) and means of regulating voltage drop.

Transmission Losses

Assessment of their Annual Value

By J. L. Taylor,
A.M.I.E.E., M.Amer.I.E.E.

INCREASED cost of larger conductors or a higher transmission voltage can often be justified when the annual reduction in the cost of load losses in transmission and distribution is higher than the interest and depreciation cost of the extra works to effect the reduction. These considerations are sometimes neglected owing to the supposed difficulty of accurately assessing the losses. This article describes simple methods which give values of sufficient accuracy for commercial needs.

From the basic expression for the instantaneous value of electrical power dissipated in a resistance, viz.:—$W = I^2 \times R$, where W = power loss in watts, I = current in amperes and R = resistance in ohms, the loss is proportional to the square of the current, and the current is directly proportional to the load for a fixed voltage therefore: power loss $\propto$ load^2. The operation of the square law oft-times leads to the uneconomic use of existing mains carrying increased loads.

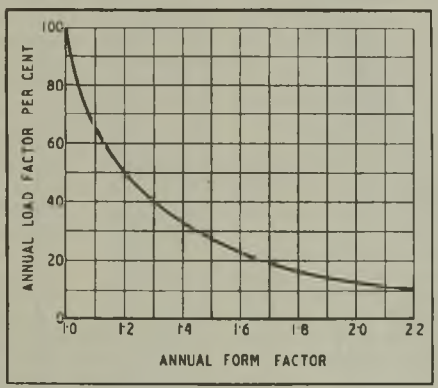


Fig. 1.—Derivation of approximate annual form factor (R.M.S. current) from annual load factor with typical load curves

The total annual cost of the losses is the sum of two factors:—Fixed charge incurred during the half hour of maximum demand; and running charge incurred during the year due to kWh consumed. The fixed charge loss can be obtained from the basic formula above. Thus, taking the three-phase case:—$W_{(fc)} = I^2_{(md)} \times R \times 3 \times 10^{-3}$ kW, where: $I_{(md)}$ = current at time of maximum demand = $\frac{kW_{(md)} \times 10^3}{\sqrt{3} \times \cos\phi \times E}$, $kW_{(md)}$ = registered or estimated maximum demand, $\cos\phi$ = system power factor (usually taken as 0·8 lag), E = line voltage, and R = resistance in ohms of one conductor. The annual cost of the increase in maximum demand registration due to losses is $W_{(fc)}$ times the cost per kW of maximum demand at the tariff under which energy is purchased.

The calculation of kWh lost per annum is more complicated, as the load and current are varying throughout the year and the losses are varying in proportion to the square of the current. A current value can be computed which if flowing constantly for a whole year would provide the same losses as the actual varying current. This value is the square root of the mean value of the varying annual current squared, known as the "annual R.M.S. current." Its relation to the "annual average current" is the "annual form factor." To obtain the annual R.M.S. current exactly would mean involved analysis of load curves. Academically it is not exactly related to load factor, but for practical purposes its relation is sufficiently near to obtain the "annual form factor" from the "annual load factor" shown in the accompanying graph (Fig. 1).

The kWh loss per annum $W_{(rc)}$ can then be obtained from the basic formulæ. Taking the three-phase case: $W_{(rc)} = I_{(rms)}^2 \times R \times 8{,}760 \times 3 \times 10^{-3}$ kWh, where: $I_{(rms)}$ = annual R.M.S. current = $\frac{\text{annual load factor per cent}}{100} \times I_{(md)} \times$ annual form factor, $I_{(md)}$ = current at time of maximum demand, annual load factor = $\frac{\text{kWh consumed per annum} \times 100}{kW_{(md)} \times 8760}$ and R = resistance in ohms of one conductor. The annual cost of kWh lost is $W_{(rc)}$ times the cost per kWh at the tariff under which energy is purchased.

Fig. 2 shows two curves for an 11-kV three-phase transmission system from which may be extracted loss values for fixed charge $W_{(fc)}$ and running charge $W_{(rc)}$ per ohm resistance of single conductor for any given

maximum demand at various annual load factors. The total three-phase loss values are given.

As an example, take the case of a 2,000-yd, 0·04 sq in. three-phase 11-kV line, each conductor of which has a resistance of 1·26 ohms. The maximum load is 800 kW at an annual system load factor of 30 per cent. From Fig. 2, 800 kW of maximum demand

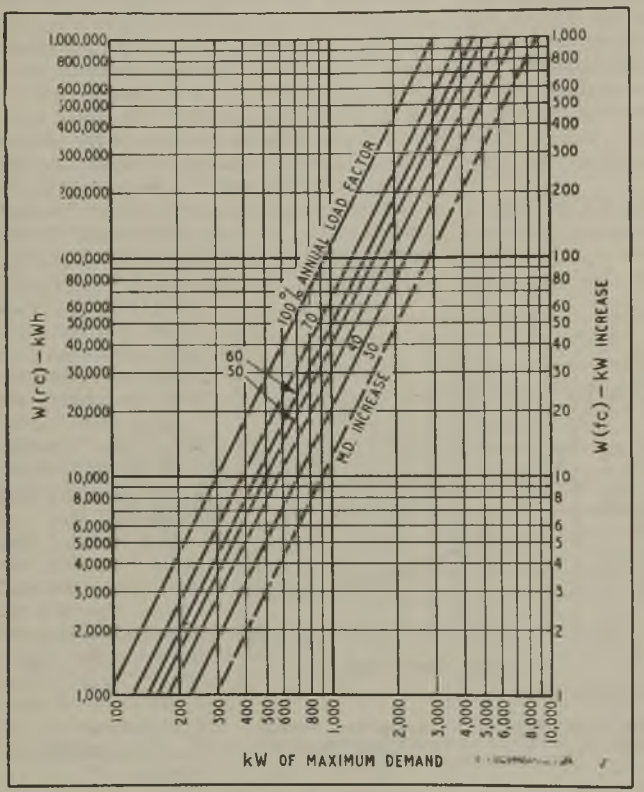


Fig. 2.—Value of losses on three-phase 11-kV system at 0·8 power factor per ohm of conductor. W(fc): increase in maximum demand from dotted line. W(rc): kWh loss for various annual load factors from full lines

gives a three-phase loss of 13,500 kWh per ohm of conductor; the total three-phase loss is, therefore, 13,500 × 1·26 = 17,000 kWh per annum. Also from the broken line 800 kW gives 8 kW increase of three-phase demand due to losses per ohm of conductor, so that the total increase of three-phase m.d. is 8 × 1·26 = 10·1 kW. The annual cost of losses at a tariff of £4 10s. per kW and 0·5d. per kWh is consequently £45 9s. 0d. plus £35 8s. 4d., giving a total figure of £80 17s. 4d.

Reconversion of Industry

Electrical Manufacturer's Views

SIR GEORGE NELSON (English Electric Co.) gave the fifth of a series of talks on the reconversion of British industry in the B.B.C.'s European Service on October 15th; his subject was, of course, the electrical industry. Sir George made brief mention of the leading part taken by the industry during the war and referred to the increased need for scientific and technically trained men and women to deal with current and future developments, e.g., the gas turbine, television and the application of atomic energy. During the war the output of its normal electrical equipment was maintained at the pre-war level and in addition it was responsible for a great deal of non-electrical war material, raising the total volume of its work by between 50 and 75 per cent.

As a result it was left with increased productive capacity, but this was all required. There was, however, a need for additional draughtsmen and designers, increased supplies of castings and ceramics, additional "balancing" plant and the replacement of lost labour by men from the Services and Government Departments.

Sir George advocated the spread of large-scale development over a long enough period to ensure continued employment. With regard to exports, he considered that the figure of £23 million, the pre-war value of electrical exports, could be raised to £65 million per annum and the number employed in the industry to 500,000 (as compared with 300,000 in 1930).

He deprecated the policy so prevalent before the war of charging uneconomical prices in export markets. This practice was unsound, and unfair to the home consumer.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Lieut. Col. Sharp asked the Minister of Supply whether he would arrange for overall priority in the supply of electricity generating plant and equipment to be given to the Central Electricity Board, so that industrial demands might be met with the maximum saving of coal.

Mr. John Wilmot said that orders for the Central Electricity Board were part of a long-term planned programme and to give them overall priority would not substantially hasten their completion and would interfere with the orders for export and other essential home requirements.

Coal Washing

In reply to questions by Lieut. Col. Sharp, the Minister of Fuel and Power (Mr. Shinwell) said that the need for using all the fuel that was available to meet the growing requirements inevitably meant some deterioration in the quality of coal supplied to consumers, including power stations, whose requirements in particular had increased very considerably in recent years. The extent to which increased tonnages of coal could be handled at existing washeries was limited by the overall availability of coal which was much less than it was when the existing washeries' capacity was designed. Everything possible was being done to speed up the installation of additional washeries, but this could only have a limited effect on the position during the coming winter.

Supply of Poles

Mr. Shinwell, replying to a question by Sir Ian Fraser, said that Barrow Corporation had applied for 235 wooden poles this year and the Electricity Commissioners had issued licences for 143. No more licences could be issued until more poles were available.

Mr. Spence asked the Chancellor of the Duchy of Lancaster when the first deliveries of poles for electrical transmission lines were expected from Germany and what the estimated monthly output would be.

Mr. J. Hynd said that the first shipment of timber suitable for carrying telegraph or electrical transmission lines was made on September 23rd. It was estimated that shipments during October would amount to 2,000 poles, and that the rate of delivery would rise to 8,000 per month by April, 1947.

Authorities' Interim Expenditure

Major Peter Roberts asked the Minister of Fuel and Power what were the arrangements which had been, or were being, made by him with regard to capital expenditure incurred by electricity undertakers on development of supplies during the period prior to any legislation affecting the industry; and if such arrangements had been communicated to the interested parties.

Mr. Shinwell said that after a meeting held last May between a committee representative of the electricity supply industry and officials of his Ministry, a formula was communicated to the committee, which, however, had not yet favoured him with its views.

Coal and Electricity

On October 16th, during a debate on coal, Capt. Crookshank, speaking of the decline in stocks, said that electricity undertakings had said publicly that they required 2,000,000 more tons to generate the same quantity of electricity because of the bad nature of the coal. At the end of August the power stations' stocks were given at 1,800,000 tons, and the corresponding figure in the previous year was 3,000,000 tons. Electricity consumption had been going up all the time in this country. To be on anything like a favourable basis, the stocks, instead of being 3,000,000 tons, ought to have been considerably more.

Mr. Shinwell, the Minister of Fuel and Power, replying, admitted that electricity coal stocks were very bad. He would like them to have five weeks' stock at this time. They were running into four weeks. What the Ministry was aiming at was a cushion at the end of the year of an amount, which need not be stated because it was merely an assumption, which would carry the electricity authorities through the rest of the winter period, but whether they could do it or not he was not certain.

Consumption was excessive, far in excess of last year, and in excess of what it was before the war. They had considered whether it would be possible to adopt a restriction scheme. A rationing scheme was quite impracticable, but the matter had not been finally settled.

With regard to a 10 per cent cut, if there were such a voluntary cut on the part of all consumers, it would mean a difference of about 17,000,000 tons of coal, and that was not intended. Many consumers had already economized to the limit and the Ministry expected no more from them. But if the remainder of the industrial consumers and the domestic consumers economized or promoted fuel efficiency methods to the same extent that the others had done, they would save sufficient coal to get through the winter without any disturbance.

Release of R.A.F. Electricians

Mr. Callaghan asked the Secretary of State for Air why there would be no releases of electricians from the R.A.F. in October; and

why they were falling further behind the general release rates, in view of the fact that special efforts to enable them to catch up were announced last May.

Mr. Geoffrey de Freitas said that the Ministry was still training as many electricians as it could, and as quickly as possible, but there were some serious shortages to be overcome before the release rate could be improved.

Production of Accessories

In reply to a question by Mr. Collins, the Minister of Supply (Mr. Wilmot) said that the production of electrical accessories for house wiring represented 65 per cent of the pre-war output in the first half of 1945 and 80 per cent in the first half of this year.

Mr. Collins asked what steps were being taken to ensure that current production of electrical components was directed for use in new housing. Mr. Wilmot replied that electrical components were included in the new priority distribution scheme under which new housing and other works of equal national importance had the first call on supplies. Present production of electrical components should be adequate to meet the demand arising from new housing schemes.

Electric Cooker Output

Answering another question Mr. Wilmot said that the present rate of production of domestic electric cookers was between 13,000 and 14,000 a month.

Lighting in Central London

New "Rythmatic" Control Installation

A SECTION of the network administered by Central London Electricity, Ltd., has just recently been equipped with "Rythmatic" street lighting centralized remote control. In the St. Martin's Lane substation are a control panel, equipment for generating currents of from 300 to 1,000 cycles and injection apparatus for superimposing the audible-frequency currents in accurately timed impulses on to the network. Street lighting in the area bounded by the Mall, Whitehall, Strand, Trafalgar Square, Leicester Square, Charing Cross Road and Northumberland Avenue is controlled by this installation, the 1,500-W lamps being directly switched by "Rythmatic" relays mounted on each lamp standard.

For injection, external series transformers are placed over the lead sheaths of the power cables of the main bulk supply transformers, each supplying sections of the area. This enables each feed to be individually treated and effects economies in the size of the injection equipment. Approximately 120 V is built up across the length of 11-kV power cable embraced by the injection transformer. The audible frequency is generated by a 10-kW induction alternator driven by a squirrel-cage motor and energized by a d.c. field, which is derived from the 400 V, three-phase mains through three-phase selenium rectifiers.

The inductor does not require slip-rings or brushes as all the windings are static. The multi-pole rotor interrupts the local magnetic fields formed between adjacent pole pieces in the stator. This induces the audible-frequency current into the windings, which lie in slots between the pole pieces. An auto-transformer starter limits the starting current. Since the "Rythmatic" relays will operate over a frequency band with a greater variation than that permitted on the "grid," the synchronous speed of the motor is quite suitable, without intricate regulation of the motor alternator.

The signals are initiated from a desk in the substation control room, with two seven-position switches. The manual selector is moved to the required position and the push button depressed momentarily; the signal is then transmitted automatically, all the control equipment being shut down on the completion of the signal. Indicating lamps on the desk inform the operator of the positions of the various relays on the network.

The receiving relays operate at widely varying signal voltages, from 0·4 to 5. Two types of filter discriminate between signals; the spring-controlled galvanometer relay, which is employed in the "Rythmatic" switch, is mechanical while the electrical resonant circuit constitutes the electrical filter. An electrical filter alone cannot provide complete immunity against operation from parasitic voltages and shock operation due to surges. The secondary mechanical filter is employed to guard against interference and to give signal discrimination.

The signal frequency is accepted by the resonant circuit, which rejects the 230 V, 50 cycle potential; the current is then rectified and applied to the galvanometer relay, which swings under the control of a spring at a fixed periodicity. Only when the relay has received a number of pulses in harmony with its "rhythm" can the swing of the armature build up in amplitude sufficiently to make contact. This causes a circuit to be extended to a mechanically locking switch, which performs the operation required.

The installation is designed to fulfil other purposes than control of street lighting, such as load shift, peak control and other signals. Since its installation the equipment has operated at an efficiency of 99·967 per cent which represents less than four failures due to all causes in 10,000 relay operations.

COMMERCE and INDUSTRY

Municipalities and Nationalization. B.I. Callender's Factory.

AT its annual conference in London last week the Association of Municipal Corporations considered and approved reports by sub-committees on the nationalization of electricity, gas and transport. As regards electricity the view was that generation and transmission should be the responsibility of a central body. For the co-ordination of distribution the country should be divided into suitable areas within which the supply of electricity should be under the control of local authorities, singly or in combination. It was also thought that in any scheme of reorganization of the gas industry efficient local-authority undertakings should be retained and that municipal authorities might act as Government agents. For the transport services it was considered that there should be a national co-ordinating body but that the actual services should be operated by area authorities.

Fuses for New Zealand

It is reported by the *Board of Trade Journal* that the New Zealand Government now requires that applications for licences for the importation of indoor or switchboard type fuses shall bear an indication of the voltage for which they are to be used and whether or not they are of the high-rupturing-capacity type.

American Trade-Mark Law

A useful summary of the provisions of the new United States Trade-marks Act (the "Lanham Act") is given by Peter Meinhardt in the October *Anglo-American News* (the journal of the American Chamber of Commerce in London, Aldwych House, Aldwych, W.C.2). The new Act adheres to the previous concept of United States law that a trade-mark can be registered only if it is being actually used in commerce. British practice is to register a mark also if it is proposed to be used. If application has been made for the registration of a mark in Great Britain and the United States, application is made under the International Convention. Use in the United States need not be proved. The article gives details of registration procedure and of the kinds of marks which are not accepted.

American trade-marks have an unlimited life (as in Great Britain) but renewal fees are payable at 20-year intervals (seven years in this country). Under the International Convention trade names and commercial names of British firms will be protected without registration.

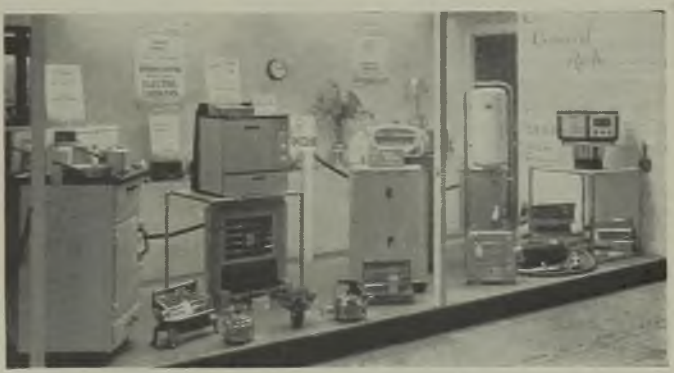
Refresher Course for Designers

A refresher course organized by the Council of Industrial Design is to be held at High Leigh, Hoddesdon, Herts., from November 4th to 8th and a limited number of places are available. Tickets cost two guineas inclusive of meals and accommodation. Students will visit the "Britain Can Make It" Exhibition and talk to its designers.

Islington Housing Exhibition

The notable part played in housing by the Islington Borough Council Electricity Department (borough electrical engineer: Mr. F. S. Naylor) is emphasized by a striking display arranged at a Housing and Local Government Exhibition now being held at the Town Hall. Not only is the electrical exhibit the central feature of the exhibition but the Electricity Department is giving regular film shows as well as demonstrations of electric cooking and radio apparatus. It was also responsible for the public address system.

An attractive display of some of the latest domestic appliances is accompanied by an E.D.A. model all-electric kitchen and a replica of actual flats being built on the Balls Pond and other Council estates. The kitchen in this flat is equipped with an electric cooker and an under-draining-board water heater (adopted as standard in all Council houses) and is wired ready for a refrigerator. On the outside of the stand is a dial bringing home to the visitor the cheapness of electricity: it points out that under the recently introduced two-part domestic



Part of the Islington Electricity Department's stand at a local housing exhibition

tariff it is possible, for instance, to have practically an all-electric home at no more than the cost of seventy cigarettes a week. A novel feature of this tariff is that the standing charge of 1s. per week for premises up to 800 sq ft (plus 1d. for every additional 100 sq ft) is reduced to 9d. for premises up to 500 sq ft (plus 1d. for every additional 100 sq ft) if electricity is used for cooking: the " unit " charge is ¾d.

There have been packed houses for both the cooking demonstrations (twice daily) and the film shows (thrice daily) and considerable interest has been shown in the " Civic Concord " radio sets which, in common with some other London supply undertakings, the Electricity Department is now marketing.

Gravesend Electrical Exhibition

Gravesend Electricity Supply Department recently held an exhibition in the Town Hall. It was officially opened by the Mayor and was visited by Mr. Garry Allighan, the local M.P. Directors of local firms were also present and during the week over 8,000 visited the Exhibition. Not only were there exhibits by well-known manufacturers, but both morning and afternoon there were cooking demonstrations, film and television shows. The cooking demonstrations lasted about an hour and were attended by about 100 people in each session.

Tube Works Closed

It is reported that the Tube Investments group has closed down the steel tube works of its subsidiary, the Perfecta Tube Co., Birmingham. The staff have been transferred to other works and the premises are being used as a service depot and store. Mr. I. A. R. Stedeford, chairman and managing director of Tube Investments, stated last week that the group's tube production capacity had for some time considerably exceeded the dwindling steel supply and the step had been taken as the best means of maintaining maximum production with maximum efficiency. It was, however, most disappointing to have to shut down production capacity at a time when the home and overseas demand for tubes was at its highest. Their reconversion plans were so far advanced that they could fulfil all tube orders at reasonable notice if they could get the steel.

Building Licence Exceeded

At Woking on October 18th a fine of £1,250, with the alternative of three months' imprisonment, was imposed on Bernard Brunton, Chobham, Surrey, for carrying out work on his bomb-damaged house costing £2,000 when his building licence sanctioned work to the extent of only £300. William Mist, Fulham, who had carried out decorations costing about £1,304, was fined £100 or three months' imprisonment. Frank W. Clifford, Ltd., who supplied labour for plastering work, were fined £25 but the magistrates agreed to state a case for further consideration. The Strand Electric & Engineering Co., Ltd., which was said to have carried out electrical work valued at £390, was fined £75. The company stated that it had received an assurance that the work was within the scope of the licence. An architect and a clerk of works were fined £100 and £50, respectively, with the alternative of three months' imprisonment.

New B.I. Callender's Factory

Plans for a large new factory involving the expenditure of £600,000 for further extending the manufacture of electric cables and other electrical equipment were announced this week by Sir Alexander Roger, chairman of British Insulated Callender's Cables, Ltd. Arrangements are now proceeding for the purchase of a 23-acre site on the Kirby Trading Estate of the Liverpool Corporation. The new factory will have a floor area initially of approximately 250,000 sq ft and will provide considerable employment for the Liverpool area in addition to the 10,000 persons already employed in the B.I. Callender's factories at Prescot and Helsby.

Submarine Telephone Repeater

Since the end of the war a submarine cable 200 nautical miles in length has been laid direct from this country to Germany. It is the longest of its kind but, as laid, it provided only one telephone circuit and six telegraph circuits over the single coaxial pair. A submerged repeater (similar to that developed by the G.P.O. and laid experimentally on the sea bed between Holyhead and the Isle of Man in June, 1943) has now been included in the cable to Europe and the number of circuits has been increased thereby to five telephone channels, any one of which may be used to provide eighteen telegraph circuits. The Continental cable is similar to the Anglo-Irish coaxial cable, except that the insulation is polythene instead of air.

E.A.W. Glasgow Branch

The Glasgow Branch of the Electrical Association for Women celebrated its twenty-first birthday on October 10th and 11th with a two-day programme. At a large gathering at the Grosvenor Restaurant the Dowager Lady Swaythling, president of the E.A.W., wished the branch twenty-one more years of progress. Mr. Edgar, Central Electricity Board, in seconding that wish, explained how repairs at the great power stations were constantly taxing ingenuity and new machinery was a clamant need; these conditions, coupled with the inferior coal received, made the production of electricity very difficult, especially when the daily demand was growing. Mrs. MacColl accepted the good wishes for the branch. Miss Caroline Haslett, director of the Association, recalled her journey

to form this first branch outside of London. On some future date she hoped to see a conference of the E.A.W. in Europe. Other events included visits to the Hoover factory at Cambuslang and to the Cosmo Cinema to see a film of the life of Lord Kelvin.

Cotton Mill Lighting

A new lighting installation has recently been completed at the cotton mill of Dart Mill, Ltd., at Bolton. The accompanying picture shows the carding room illuminated at night by 316 Revo patent "Trufolite" reflectors and 80-W 5 ft tubular fluorescent lamps. All the necessary operating gear is incorporated in the ends of the reflectors, concealed but readily accessible. These units also have facilities for re-lamping and instant removal of the complete reflectors for replacement

Carding room of Dart Mill, Ltd., illuminated by fluorescent lamps in reflectors

or cleaning. The reflectors are mounted to give a height of 12 ft 8 in at light centre and are spaced at intervals of 13 ft and 10 ft 6 in. To assist in this distribution of light, and improve the working conditions the ceiling of the room is enamelled white and the walls in cream. A similar lighting scheme is used to illuminate the cotton spinning room of the mill. The reflectors were manufactured and supplied by Revo Electric Co., Ltd., and the whole installation was planned and executed in conjunction with Dart Mill, Ltd., by the Electrical Equipment Co. (Leicester), Ltd.

Radio Communication Conference

Discussions in Moscow between representatives of Russia, Great Britain, the United States, France and China resulted this week in a decision to call a world conference on radio communications in May next year with a further conference on telegraphs and telephones in 1948. The principal object of the conference will be to straighten out the use of frequencies which during and since the war has got out of control. A new draft convention has been drawn up for submission to a plenary conference of the United Nations organization in July next. The leader of the British delegation to Moscow, Sir Stanley Angwin, engineer-in-chief of the G.P.O., expressed his appreciation of the evident desire of the Soviet Government to secure improvement in international communications.

Fatalities

ACCIDENT AT COLLIERY.—An inquest was held recently at Clipstone by the Worksop coroner, on Richard Samuel Harrison (24) an underground colliery electrician. Another electrician at the colliery said he had withdrawn the switch shortly before the accident. The switchgear had, however, been moved forward the previous Sunday and the switch should have been in a circuit to make the line dead when the switch was withdrawn. Apparently there had been an oversight in the coupling up, there being many cables and switches in a confined space. It was a pure accident and all adequate precautions had been taken.

CHILD'S DEATH.—A public inquiry was held at Edinburgh recently into the death of a three-year-old girl who was found dead at the back of her father's house beside an electric cable. Thomas Buist, of the Corporation Electricity Department, said that in spite of a communication sent from the Engineer's Department, in June, 1945, the electric wires had been allowed to remain alive and on the ground. Several children had complained of slight shocks when they touched the wall of a concrete air-raid shelter in wet weather.

Palestinian Imports and Exports

According to the *Board of Trade Journal*, imports of electrical goods and apparatus into Palestine in the first four months of this year were valued at £P.166,184. In the same period exports of this class were valued at £P.9,125.

Reports on German Industry

The latest list of reports by investigating teams on various branches of German industry include the following:—C.I.O.S. XXXIII-36. "Design for Turbo-Generators built for German Navy" (9s.); B.I.O.S. 674. "The German Electrically Welded Steel Tube Industry" (4s.).

Industrial Lighting

The Industrial Lighting Exhibition recently held in the Manchester Corporation electricity showrooms, featured modern fluorescent and incandescent installations in contrast with old-fashioned methods of factory lighting. This was the first special post-war event in the

showroom demonstration theatre, the last one having been an industrial heating exhibition in 1939. Visitors to the exhibition were mainly executives of textile and clothing factories. Lamps and fittings of various kinds, photographs, diagrams and publicity matter were also displayed. Mr. C. F. Hurd (B.T.H. Co.) addressed two audiences on "Factory Lighting: Legal Requirements," and Mr. H. Hewett discussed fluorescent lighting in industry with an audience of industrialists.

Potters' Mills

In the above article in our October 11th issue it was stated (p. 563) that "the (Hardinge) mill discharges continuously through a coarse trommel attached to the discharge spout of the mill to permit stray oversize or broken pebbles to pass to the classifier." Actually, as Mr. J. C. Farrant, of the International Combustion, Ltd., points out, the object of the trommel is to take out oversize or broken pebbles from the circuit and so prevent them going into the classifier, as this would upset the performance of the machine. In point of fact, the percentage so discharged is extremely small. It can either be discarded or returned to the feed end of the mill from time to time. The pulp which passes through the trommel goes to the classifier, but not the material which is rejected by the trommel.

Changes of Name

The following companies have changed their names:—

Searchlight Batteries (Lancs), Ltd., to Searchlight Electric (Lancs), Ltd.; Permavox, Ltd., to Permaheat, Ltd.; Electrical Manufacturers Finance Co., Ltd., to Associated Electrical Industries Finance Co., Ltd.; Grant, Kent & Shield, Ltd., to Grant & Kent, Ltd.; Dicks & Hammond, Ltd., to J. H. Dicks & Sons, Ltd.; Anson Accumulators, Ltd., to Anson Lee, Ltd.; S.I. Holdings, Ltd., to Midland Holdings, Ltd.; and Arcolectric (Twickenham), Ltd., to Arcolectric (Switches), Ltd.

Trade Publications

Sun Electrical Co., Ltd., 118, Charing Cross Road, London, W.C.2.—Illustrated and priced catalogue (No. 720) of installation accessories, conduit and fittings, cables and wires, tools and materials, with subject and numerical reference indexes; also schedule of price advances.

Service Electric Co., Ltd., Abbey Estate, Mount Pleasant, Alperton, Middlesex.—Illustrated and priced data sheet (No. 103/33) on gas torch attachment to "Secomak" blower for brazing and tempering.

W. J. Furse & Co., Ltd., Traffic Street, Nottingham.—Illustrated and priced catalogue (W. 51a) of control equipment for stage lighting; also illustrated folder (W. 53D) dealing with regulators for "Delicolor" illumination in from one to 54 colours in any order and speed of change.

E. C. Hopkins, Ltd., Grosvenor Street West, Birmingham, 16.—Illustrated folder on flexible shaft and small bench type grinders and buffers.

William Geipel, Ltd., 156, Bermondsey Street, London, S.E.1.—Illustrated folder on motor starters, contactors and resistances.

Visco Engineering Co., Ltd., Stafford Road, Croydon, Surrey.—Illustrated brochure (No. 465) describing air filters of the oil bath and oil spray self-cleaning types; also Leaflet No. 466 illustrating and describing the company's ozone generators.

Five-day Week

Hailwood & Ackroyd, Ltd., announce that having adopted the five-day week, there will be no staff at either the works or offices on Saturday mornings.

Sangamo Weston, Ltd., have also adopted a five-day working week.

A.E.U. Change of Address

The trade union administration side of the Amalgamated Engineering Union has returned to 110, Peckham Road, London, S.E.15 (telephone, Rodney 4231/4). The Union's National Health Insurance department is still at Northampton.

Trade Announcements

J. Fisher, Ltd., have moved to 44, Gamage Buildings, Holborn, London, E.C.1 (telephone: Holborn 5461).

The Earthing Clip Co. has moved to 2-4, Derby Road, Bootle, Liverpool, 20.

TRADE MARKS

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from October 16th:—

ANTOMIC. No. 642,128, Class 7. Electrically operated machines for sharpening safety razor blades.—The Antomic Engineering Co., Ltd., 2, Promenade Chambers, Edgware.

H.E.S. Co. (design). No. B640,309, Class 9. Electrical apparatus and instruments included in Class 9, and radio receiving instruments and apparatus.—Holt Electric Supplies Co., Ltd., 29, New Brown Street, Manchester.

REDIGRAM. No. B641,934, Class 9. Records of sound, light or electric signals, and instruments, apparatus and parts thereof (not included in other classes) for reproduction from such records.—Central Rediffusion Services, Ltd., Carlton House, Regent Street, London, S.W.1.

HAMOLAC. No. 642,746, Class 9. Insulated electric cables and wires. De la Rue Insulation, Ltd., Imperial House, 84-86, Regent Street, London, W.1.

ELECTRICITY SUPPLY

Rural Electrification Costs. Poplar Scheme Delayed.

Bedford.—TARIFF INCREASE.—The existing 10 per cent advance in electricity charges is to be increased to 15 per cent on non-industrial tariffs.

Bermondsey. — FLUORESCENT LIGHTING TARIFF.—To meet the requirements of consumers using motor generators for converting d.c. to a.c. for fluorescent lighting, the Borough Council Electricity Committee has introduced the following tariff: £12 10s. per kW per annum of installed capacity of fluorescent lighting and £6 (plus 15 per cent) per kW per annum for the additional maximum demand by the motor generator over installed fluorescent lighting capacity, plus ⅛d. per kWh.

Billingham - on - Tees. — FITTING SHORTAGE STOPS HOUSE ELECTRIFICATION.—On inquiring from the contractor about the delay in starting work on the electrification of certain houses, the Urban District Council was informed that the position was hopeless and worse than three months ago. The contractor stated that electrical fittings could only be obtained for new houses. Having regard to the circumstances, the Council has decided to cancel the contract.

Blackburn.—LOAD REDUCTION SCHEME.—A warning system controlled from the Whitebirk generating station is to be put into effect to indicate to large industrial concerns the necessity for load reduction by from 10 to 15 per cent. In an emergency a red lamp marked " Warning " will be illuminated in the works, and if no improvement takes place in the general position a second lamp marked " Reduce Load " will be lighted. The warnings will operate a few minutes before 8 a.m. and 2 p.m., the start of the peak periods.

Bury—BROKEN LAMPS.—The Town Council has decided to order the removal of lantern heads from street lamps which are repeatedly broken and to fix a notice to the standards, stating the reason for the removal.

Cannock.—HIGHER CHARGES.—As from October 1st electricity charges have been increased, in most cases by 3 per cent, with a 10 per cent advance in the power flat rate.

Chesterfield.—FRINGE ORDERS REFUSED.—The Electricity Commissioners have refused to grant Fringe Orders to enable the Corporation to provide a supply to Brimington and Calow, having regard to the supplies at present afforded by the Derbyshire & Nottinghamshire Electric Power Co. in those areas.

ESTATE DEVELOPMENT.—A scheme costing £22,828 and involving the erection of four new substations, for the provision of supply to housing estates, has been approved by the Electricity Committee.

Colchester.—ELECTRICITY IN RURAL AREAS.—When representatives of " oil lamp villages " attended a conference at Colchester to discuss the electrification of rural areas, Capt. C. Smith, M.P., who convened the conference, said he would do everything he could to see that the Minister of Fuel and Power recognized the special difficulties of such areas. A revision of the financial arrangements for the supply of electricity to isolated consumers was necessary, and he would bring that to the fore in any discussion which took place on the subject.

Mr. G. P. Dixon, borough electrical engineer, said the Colchester Corporation had done a vast amount of work in the electrification of the rural area. The Corporation's powers were still limited by priority restrictions imposed by the Government in June, 1945.

Crayford.—WATER WORKS SUPPLY. — The Metropolitan Water Board has made arrangements for the West Kent Electric Co., Ltd., to supply Crayford waterworks, and is contributing £500 towards the cost.

Edinburgh.—ILLUMINATED STREET NAMES.—Illuminated panels indicating the names of streets may be placed on lighting standards throughout Edinburgh, states the annual report of the Corporation Lighting Department. Designs for these panels are being prepared.

Gateshead.—STREET LIGHTING.—The Town Council has approved in principle a five-year scheme costing £94,935 for electric street lighting using concrete poles. The lighting on roads from Carr Hill Road to the trading estate is to be converted to the sodium vapour system at a cost of £2,800.

HOUSING SUPPLIES.—The chief architect has prepared an estimate at £26,610 for supplying electricity by direct labour to 413 houses at Beacon Lough and £1,620 for similar work at 54 flats in Sunderland Road. The expenditure has been sanctioned subject to Ministry of Health approval.

Great Yarmouth. — DOMESTIC APPARATUS ORDERS.—The Electricity Department has been authorized to place orders valued at £100,000 for the supply of domestic appliances during the year ending March 31st, 1948.

SHRUBLANDS ESTATE.—Sanction has been given to a loan of £10,500 for mains, services, substation plant and equipment to supply the Shrublands temporary housing estate.

Guildford.—SILVER JUBILEE.—To mark the completion of twenty-five years' ownership of the electricity undertaking by the Corporation, a dinner was held at which the chief guest was Viscount Bennett, a former Prime Minister of Canada. On the previous day the final

instalment of the loan of £60,000 raised to purchase the undertaking from the Guildford Electricity Supply Co. was paid. The Mayor, Councillor A. W. Graham Brown, commented that in the past five years £84,000 had been returned to consumers in rebates.

Mr. W. E. Affleck has held the position of chief engineer of the undertaking throughout its municipal ownership, and there have been only two chairmen of the Electricity Committee, the late Alderman J. B. Rapkins and the present chairman, Alderman W. Harvey.

Kirkcudbrightshire.—FARM ELECTRIFICATION —Mr. A. N. Bott, county electrical engineer in his report on the undertaking, says that last year 33 more farms were supplied with electricity, bringing the number of farms served to 405.

Leicester. — STREET LIGHTING. — The City Council is considering lighting all streets within a half-mile radius of the Clock Tower by electricity.

Mansfield.—NEW SERVICE UNIT.—At a meeting of the Electricity Committee the electrical engineer (Mr. A. Latham) reported that he had prepared an improved type of service unit designed to be built into the cavity walls of new houses. The Housing Committee had agreed to adopt it for future estates as also had the Mansfield Woodhouse U.D.C.

CONSUMPTION IN TEMPORARY HOUSES.—Reporting on the electricity revenue from temporary houses on the Goodacre estate, the electrical engineer stated that at the end of the June quarter meters were read in 42 houses which had been occupied for periods ranging from 24 to 116 days. The average weekly consumption per house was 47·4 kWh, on which basis the average weekly charge was 2s. 9¼d.

Middlesbrough.—DISPOSAL OF ELECTRICITY PROFITS.—A special committee has been appointed by the Town Council to consider the question of disposing of the profits of the electricity undertaking between now and the date at which the electricity supply industry is nationalized.

North Wales.—POLE SHORTAGE.—Reporting on the lack of materials, at a meeting of North Wales and South Cheshire Joint Electricity Authority held at Llandudno, Lt.-Col. J. Rankin, director and general manager, North Wales Power Co., said that only 10 per cent of the company's normal requirements of poles were being received. For the schemes in hand 6,000 poles were required. Electric cable could not be delivered by manufacturers within sixty weeks of the order being placed. The company's immediate £450,000 programme of electrical development was being held up and the only work it had been able to do amounted to £130,000.

Paisley.—HIRE RESUMPTION.—The Town Council has approved the proposals submitted by the engineer and manager (Mr. Daniel Ross) for resuming the hire and hire-purchase cookers, wash-boilers, immersion heaters and water heaters. The hire charges will be on strictly economic lines and application is being made to the Electricity Commissioners for consent to borrow £30,000 to cover the initial stages of the scheme.

Poplar.—POWER STATION SCHEME DELAYED.—A report by the Electricity Committee expressing concern at the delay in commencing the construction of the new electricity generating station at Brunswick Wharf came before the Borough Council last week. The Committee stated that the consent of the Electricity Commissioners had not yet been received and it was felt that having regard to the urgent need for increasing the electricity supply further postponement was likely to be detrimental to the public interest. The Council agreed that representations should be made to the Government for authority to be given to the Council to proceed with the scheme immediately.

Wantage.—OVERHEAD LINES INQUIRY. — A public inquiry was held last week into the Rural District Council's objection to a proposal by the Wessex Electricity Co. to erect an overhead line to the Council's housing estate, East Challow. The Council maintained that if the lines were overhead the beauty of the village would be impaired. The cost of the overhead scheme was stated by the company to be approximately £11,010, whereas if underground it would cost £17,071. The company said that it was always prepared to try to avoid spoiling the countryside, but at the same time it wished to extend its service in a way which would not entail an increase of the cost of electricity.

Warmley.—FLAT RATE REDUCED.—The Rural District Council is to reduce the flat rate for electricity by 1d. per kWh as from the end of the Christmas quarter. This represents a concession of £635 to consumers.

Wick.—TRANSFER DATE FIXED.—The provisional date for the taking over of the electricity undertaking by North of Scotland Hydro-Electric Board has been fixed as May, 1947. At a meeting of Town Council, Mr. W. D. D. Fenton, commercial engineer, North of Scotland Board, answering questions relating to the draft agreement, stated that Wick would save from £3,000 to £4,000 annually, and that the reduction in street lighting alone would be £400 a year.

Overseas

Austria.—ELECTRICITY FAILURE IN VIENNA.—A complete breakdown of the electricity supply held up all electric transport services in Vienna and deprived the city of light on October 17th. The reasons for the breakdown are low level of the rivers owing to the small rainfall, lack of fuel, the export of electric power from Western Austria to Germany, and a general breakdown of old machinery and cables.—*Reuter* (Vienna).

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Atlas Electric & General Trust, Ltd.—The revenue for the year to March 31st last was £331,964 (against £308,365 for 1944-45) and the net revenue, after taxation, £143,395 (£132,244). A sum of £5,359 is placed to general reserve and £216,656 (£188,870) is carried forward. No ordinary dividend has been paid since that for 1931-32. There was a balance of revenue over operating costs of the Uruguayan subsidiary amounting to $278,701 ($211,109), Uruguayan currency, reducing the debit balance brought in to $481,663. No provision for this is made in the Atlas Trust's accounts. General investments appear in the balance sheet at £5,804,840 (£5,756,223), or 26 per cent (17½ per cent) below their market value at March 31st. The valuation of interest in the subsidiary cannot yet be ascertained. Reserves, etc., amount to £2,413,662 (£2,419,827).

Murex, Ltd.—The accounts for the year to June 30th show a profit of £142,392, a reduction of £90,143 compared with 1944-45. After adding other income and £125,000 (£55,000) E.P.T. refund the net profit is £201,490 (£213,032). With £34,246 from profit on sale of shares in associated company, £35,754 from recovery of amount written off investment in former enemy-occupied territory and £126,680 brought in there is £398,170 (£338,430) available. General reserve receives £110,000 (£90,000) and obsolescence reserve £50,000 (nil); there is no allocation to pension contingencies account (last year £20,000). The ordinary dividend and bonus for the year are maintained at 20 per cent and £126,332 is carried forward.

The Broadcast Relay Service, Ltd., is making an issue of 750,000 new 4 per cent preference shares of £1 each to existing shareholders. The company has obtained permission from the Capital Issues Committee to increase its capital by the creation of £1,000,000 in 4 per cent preference shares of £1 each, and as soon as the increase of capital is approved by shareholders the offer will be made. The issue is for the repayment of bank loans and to provide capital for further expansion of business.

Thos. W. Ward, Ltd., are again paying a final ordinary dividend of 6¼ per cent, and in addition this year are also paying a victory bonus of 2½ per cent, making 12½ per cent for the year (against 10 per cent).

Herbert Morris, Ltd., report a net trading profit for the year ended July 31st, after taxation, of £157,987, as compared with £129,856 for the preceding year. The final ordinary dividend is 15 per cent, plus a bonus of 2 per cent, making 22 per cent tax free for the year. The dividend is the same as for the previous year, but no bonus was paid in 1944-45. General reserve receives £25,000 and £79,189 is carried forward (against £79,039 brought in).

J. & F. Stone Lighting & Radio, Ltd.—The trading profit and sundry receipts for the year to June 30th amounted to £186,949 (against £113,850), to which is added gross dividend from a subsidiary company £90,000 (£30,000). The net profit was £139,289 (£44,692) after providing £126,380 (£88,000) for taxation. A sum of £40,000 (nil) is set aside for future repairs and renewals and, as already announced, the ordinary dividend is raised from 15 to 40 per cent, a balance of £12,853 (£13,797) being carried forward. A resolution is to be submitted at the meeting on October 30th for the conversion of the 6 per cent £1 preference shares and 5s. ordinary shares into stock.

The Cables Investment Trust, Ltd., reports a net revenue for the year ended June 30th of £226,673, as compared with £220,579 for the preceding year. The final ordinary dividend is 3 per cent, maintaining the distribution for the year at 5 per cent, and £325,402 is carried forward (against £288,729 brought in).

The General Gas & Electricity Co., Ltd., reports a revenue for the year to March 31st of £19,990 (£18,674) and a net profit of £3,811 (£3,868). After providing £1,815 (£1,650) for preference dividends £6,133 (£4,137) is carried forward.

Strand Electric Holdings, Ltd., is again paying a dividend for the year of 10 per cent, together with a bonus of 2½ per cent.

The Cawnpore Electric Supply Corporation, Ltd., is raising its interim dividend from 3 to 4 per cent.

Babcock & Wilcox, Ltd., have announced an interim ordinary dividend of 5 per cent (against 4 per cent).

Cable & Wireless, Ltd., is paying an interim dividend of 2 per cent (against 1½ per cent).

Hopkinsons, Ltd., have declared an interim dividend of 5 per cent (unchanged).

New Companies

T. D. Young & Sons, Ltd.—Registered October 10th. Capital, £3,000. Manufacturers of, and dealers in, wireless and television apparatus, electrical fittings, apparatus and accessories, etc. T. D. Young is the first director. Regd. office: Progressive Works, Babington Lane, Derby.

Lund Bros. & Co., Ltd.—Registered October 4th. Capital, £10,000. To acquire the business of electrical, radio, mechanical and general engineers, contractors and manufacturers, etc.,

carried on by the administrators of the estate of the late C. A. N. Roberts at 55, Bendon Valley, Earlsfield, S.W.18, as "Lund Bros. & Co." and to adopt an agreement with Charlotte Roberts and J. A. Roberts. Directors: J. A. Roberts, C. Carter, J. S. Jordan and A. C. Wright. Secretary: C. Carter. Regd. office: 55, Bendon Valley, Earlsfield, S.W.18.

"Q" Electrics, Ltd.—Registered October 2nd. Capital, £1,000. Manufacturers of, and dealers in, domestic, household and general electrical equipment and appliances, including washing and cleaning machines, etc. Directors: H. H. Tordoff and M. B. Tordoff. Regd. office: 2, Park Row, Leeds, 1.

E. L. Etherington (Refrigerators), Ltd.—Registered, September 18th. Capital, £3,000. Manufacturers of, dealers in, and contractors for, the installation and servicing of refrigerators and refrigerating plant and equipment, electrical goods, radio fittings, etc. Directors: L. S. Jowney and E. L. Etherington. Regd. office: 19, John William Street, Huddersfield.

Rota Electric, Ltd.—Registered October 11th. Capital, £10,000. To acquire the business of an electrical and radio wholesaler carried on by E. W. Robey at Northampton, Peterborough and Swansea. E. W. Robey is permanent director. Regd. office: 6, Newland, Northampton.

Domestic Refrigeration Services, Ltd.—Registered October 7th. Capital, £500. Electrical and mechanical engineers, suppliers and maintainers of all kinds of plant (including refrigeration and domestic appliances), etc. Directors: C. L. Andrews and E. J. Whitters. Regd. office: 2s, Mill Street, Sutton Coldfield.

F. Webster (Monmouth), Ltd.—Registered September 3rd. Capital, £5,000. Manufacturers of, and dealers in, refrigerators and cold storage machinery, etc. Directors: F. E. Webster, H. C. Swain, J. C. Morton and C. H. Best. Regd. office: Gwent Works, New Road, Nantyglo, Mon.

C. Linnell & Sons, Ltd.—Registered September 7th. Capital, £1,500. Electricians, radio and mechanical engineers, etc. Directors: C. Linnell, Elsie Linnell and J. N. Linnell. Regd. office: 249, Dale Hall, Burslem.

Batteries & Electricals, Ltd.—Registered September 25th. Capital, £1,000. To carry on business as indicated by the title. Directors: T. Michelson and C. D. Turnbull. Regd. office: 21, Copthall Avenue, London Wall, E.C.2.

Modern Domestic Electrics, Ltd.—Registered September 24th. Capital £300. To carry on business as indicated by the title. Directors: R. T. Scampton and R. B. V. Kemp. Regd. office: 29, Turnpike Lane, N.8.

Merco (Great Britain), Ltd.—Registered October 1st. Capital, £1,000. Importers, exporters and manufacturers of, and dealers in, natural and synthetic plastics and plastic substances, manufacturers of, and dealers in, apparatus required for electronic commodities and accessories, etc. Directors: H. J. Fink, A. H. Alexander and J. Merrens. Regd. office: 4, Gower Street, W.C.1.

Bankruptcies

J. Eisner, J. Sunshine, B. Rome and **T. Otaki**, trading together in partnership as the Lloyd Electric Lamp Co. (a firm), 8, Rangoon Street, London, E.C.3 (lately 4, Lloyd's Avenue, London, E.C.) wholesale electrical accessories dealers (separate application of J. Eisner). —On October 15th at the London Bankruptcy Court the Registrar granted an immediate discharge, the debtor agreeing to pay over to the Official Receiver £105, which he had received as an Army gratuity, and consenting to a judgment in the sum of £50.

A. J. Barlow (trading as Barlow Bros.), 9, Brunswick Place, City Road, London, E.C., electrical and general engineer.—This debtor's application for discharge was heard at the London Bankruptcy Court on October 17th. The Official Receiver reported that the debtor failed in April, 1923, with liabilities of £1,705; the assets produced £1,395, and a dividend of 6s. 3¼d. in the £ was paid. The Registrar granted an immediate discharge.

A. E. Starr, lately carrying on business at 125, Commercial Street, Batley, and formerly at 2, Brewery Lane, Thornhill Lees, Dewsbury, as an electrical and radio engineer under the style of Electronic Enterprises.—Receiving order made October 10th on debtor's own petition.

First meeting October 25th at the Official Receiver's office, Hallfield Chambers, 71, Manningham Lane, Bradford. Public examination November 25th at the County Court, Eightlands, Dewsbury.

H. H. Moore (Junior), electrical engineer, "The Lindens," West Cliff Gardens, Bournemouth.—Order made May 20th, 1940, granting discharge subject to bankrupt's consenting to judgment for £50 being entered against him by the Official Receiver. £50 paid to the Official Receiver in lieu of entering up judgment.

A. R. Carter, electrical contractor, 2, Priory Avenue, Mile End, Bridgend, Glam.—Second and final dividend of 2s. 10½d. in the £, payable at the Official Receiver's office, Government Buildings, 10, St. Mary's Square, Swansea.

G. C. Spong and **J. H. Trussell**, trading under the name of the C.C.S. Trading Co., 30, Western Mail Chambers, Cardiff, electricians.—Last day for receiving proofs for dividend, October 30th. Trustee, Mr. R. Betts, 34, Park Place, Cardiff, Official Receiver.

Liquidations

Waterloo Electric Supplies, Ltd.—Particulars of claims by November 8th to the liquidator, Mr. W. Pickles, 48, Mosley Street, Manchester, 2.

STOCKS AND SHARES

THE outstanding financial feature of the present month is the Government's intention to redeem £429,000,000 of Local Loans 3 per cent stock at 100 on January 5th next. Simultaneously, the Chancellor of the Exchequer announced a new issue of 2½ per cent Treasury stock at 100, redeemable at any time after April, 1975. The immediate effect was to cause a substantial rise in the price of 2½ per cent Consols, and to strengthen the markets for all gilt-edged securities. Home Railway prior-charge issues participated and industrial shares derived benefit from the Chancellor's determination that the cheap money policy pursued by the Government is, as Mr. Dalton said, to be "resolutely pressed home."

Rally Follows Depression

Upon this, the depression which had occurred earlier in the month, and which had already given indication of wearing off, became further diminished, and recoveries ensued in most of the prices previously weakened by Mr. Shinwell's statement regarding the gravity of the coal situation. On balance, a considerable number of falls are shown as compared with the prices of a month ago, but, as just mentioned, the rally served to mitigate the effects of the anxiety which is felt in many directions in connection with the coal position.

Investment Opportunities

Investment has now a choice of shares in commercial companies at prices lower than have been seen for some weeks. Since the third week in September, De la Rue, for example, have lost 12s. 6d.; Reyrolle 6s.; Johnson & Phillips 4s. 6d.; Westinghouse Brake 2s. 6d.; and Falk Stadelmann and Lancashire Dynamo 5s. each. International Combustion are down 15s. and Electric Construction 4s. This is but a representative handful of the losses incurred by shares of industrial companies connected more or less with the electrical branches.

In a number of directions several good dividends and reports have appeared. Babcock & Wilcox fell 4s. 6d. to 58s. 6d., but declaration of an increased interim dividend sufficed to raise the price to 61s. 3d. Brush Electrical at 7s. 9d. are 3d. higher, after the fall of 3s. upon the passing of the final dividend for the year recently ended. Enfield Cables, however, are 7s. down on the month, the cut in the interim from 6¼ to 3¾ per cent having caused surprise and disappointment.

Cable & Wireless

Cable & Wireless stocks provide a bright contrast. The ordinary has risen 3½ points to 112 since a month ago, on the announcement by the Cable & Wireless operating company of an interim dividend of 2 per cent, as compared with 1½ per cent a year ago. Cable & Wireless (Holding) ordinary stock received last May the usual 4 per cent., plus a special £5 bonus. Interest is intrigued by the increase in the operating company's interim dividend. To attempt a forecast as to what the dividend for the year on the holding company's ordinary stock will be, is a matter of sheer speculation, but it seems to be practically certain that the dividend will be well in advance of 4 per cent, even though the full bonus of 5 per cent may not be repeated.

Home Electricity

In a month that has witnessed falls in the prices of literally hundreds of stocks and shares, it is both significant and surprising that the list of Home electricity supply ordinary share the honours with gilt-edged securities in showing noteworthy strength. During the past four weeks nearly a score of prices have shown rises ranging from 6d. to 2s., in spite of all the talk of coal crisis, increased costs, transition troubles and appeals for voluntary restriction of consumption. This steadiness is due in no small measure to the energetic campaign against nationalization of an industry which can point to a material reduction in cost to the public since the outbreak of the last war. The evidence produced to prove this striking exception to general conditions has held, and is holding, the market in Home electricity ordinary shares immune from the depression that overtook most of the other industrial sections.

Midland Counties Electric Ordinary shares are now ex the rights to the new issue, and 1s. 6d. per share was deducted from the price of the old shares as the value of the new. The latter are quoted at 9s. premium over the issue price of 35s., and an active market has developed.

Railway Stocks Advance

Something of a feature has been renewed activity in stocks of the Home railway companies. Prices rose sharply on the issue of a recent statement from the companies illustrating the services they have rendered, and the developments they contemplate. The London & North Eastern has advanced a proposal that the Government shall take over the tracks and appurtenances, for an agreed figure to be paid for in Government stock, following which the State should re-lease the tracks to each of the present companies for an annual rental. This, in effect, if the North Eastern Company's proposal were implemented, would mean a subsidy to the companies.

More Buyers than Sellers

The likelihood of the Government's agreeing to such a plan is not considered to be particularly promising, but the mere hope of the railway companies being placed upon a foundation more stable than that at present existing, attracted buyers to the stocks and raised prices by several points. At 75, the 5 per cent preferred stock of the Southern Railway is 4 up, and the company's 5 per cent preference at 113½ is

(*Continued on page* 671)

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price Oct. 18	Month's Rise or Fall	Yield £ s. d.
Home Electricity Ordinary					
Bournemouth and Poole	12½	12½	64/6	+1/-	3 17 8
British Power and Light	7	8	33/6	+1/-	4 15 7
City of London	6	7	31/6	+6d.	4 9 0
Clyde Valley	8	8	43/-	+1/-	3 14 5
County of London	8	10	46/-	+2/-	4 7 0
Edmundsons	6	6	29/-	+1/-	4 2 9
Elec. Dis. Yorkshire	9	9	46/-	+1/6	3 18 3
Elec. Fin. and Securities	13½	15	63/-	+1/-	4 15 3
Elec. Supply Corporation	10	10	44/6	+6d.	4 10 0
Lancs. Light and Power	7½	7½	32/6	+1/-	4 12 3
Llanelly Elec.	6	6	27/6	+1/6	4 7 3
Lond. Assoc. Electric	4	6	27/-	+1/6	4 9 0
London Electric	6	6	26/-	..	4 12 4
Metropolitan E.S.	8	9	42/6	+6d.	4 4 9
Midland Counties	8	8	44/6xr	..	3 12 0
Mid. Elec. Power	9	9	45/6	+1/6	3 19 0
Newcastle Elec.	7	7	31/-	..	4 10 4
North Eastern Elec.	7	7	32/-	+1/6	4 11 10
Northampton	10	10	48/-	..	4 3 4
Northmet Power	7	9	43/6	+1/6	4 2 10
Scottish Power	8	9	40/-	..	4 10 0
Southern Areas	5	5½	22/3	+3d.	4 18 10
South London	7	7	31/-	..	4 10 4
Yorkshire Elec.	9	9	47/-	+1/6	3 16 6
Public Boards					
Central Electricity:					
1963–93	3½	3½	111½	+2½	3 2 9
1974–94	3¼	3¼	109	+1	2 19 8
London Elec. Trans.	2½	2½	100	..	2 10 0
Lond. Pass. Trans. Bd.					
A	4½	4½	128½	+2	3 10 1
B	5	5	122½	+2	4 1 8
C	3	3	58⅛	−1½	5 2 7
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	8/3	−1/9	—
Calcutta Elec.	6*	6*	55/-	..	2 3 8
Cawnpore Elec.	13	13	58/6	+ ⅛	4 8 10
East African Power	7	7	45/-	−1/-	3 2 3
Jerusalem Elec.	5	5	23/-	−6d.	4 7 1
Madras Elec.	4	6	38/-	+6d.	3 3 2
Montreal Power	1½	1½	23¼	−¼	—
Nigerian Elec.	10	12½	42/-	..	5 19 0
Palestine Elec. "A"	5*	6*	35/6	..	3 7 5
Perak Hydro-elec.	6	7	14/6	−1/6	—
Tokyo Elec. 6%	6	6	35½	−1	—
Victoria Falls Power	15	19	5½	+⅜	3 9 1
Whitehall Inv. Pref.	—	6	26/6	..	4 10 7
Equipment and Manufacturing					
Aron Elec. Ord.	15	10	54/6	−3/-	3 13 6
Assoc. Brit. Eng.	8	12	40/-	−¼	6 0 0
Assoc. Elec. :					
Ord.	10	10	66/-	−3/6	3 0 6
Pref.	8	8	42/6	−1/9	3 15 3
Automatic Tel. & El.	12½	12½	71/6	−3/-	3 7 2
Babcock & Wilcox	12	12½	61/3	−1/9	4 1 8

Company	Dividend Previous	Dividend Last	Middle Price Oct. 18	Month's Rise or Fall	Yield £ s. d.
Equipment and Manufacturing (*Continued*)					
Baldwin, H.J. (2/-)	10	20	13/-	+6d.	3 3 0
British Aluminium	10	8	40/-	−½	4 0 0
British Insulated & Callender's	..	..	44/6	−⅛	—
British Rola (2/-)	15	15	6/-	−9d.	5 0 0
British Thermostat (5/-)	18½	18½	22/6	−1/-	4 2 3
British Vac. Cleaner (5/-)	30	20	25/-	−5/16	4 0 0
Brush Ord. (5/-)	10	4	7/9	+3d.	2 11 7
Burco (5/-)	15	20	27/6	−1/-	3 12 10
Chloride El. Storage	15	15	95/-	−3/9	3 3 0
Christy Bros.	12½	17½	82/6	−¼	4 4 0
Cole, E. K. (5/-)	20	20	31/3	−⅛	3 4 0
Cossor, A. C. (5/-)	10*	12½*	31/-	−3/-	2 0 4
Crabtree (10/-)	17½	17½	46/3	−3/3	3 15 9
Crompton Parkinson Ord. (5/-)	22½	22½	31/6	−1/6	3 11 5
De La Rue	40	45	12½	−⅛	3 12 0
Decca (1/-)	100	112	53/9	−⅛	2 1 6
E.M.I. (10/-)	8	8	28/9	−3/-	2 15 8
Elec. Construction	10	12½	63/6	−4/-	3 18 7
Enfield Cable Ord.	12½	12½	51/6	−7/-	—
English Electric	10	10	60/6	−1/-	3 6 0
Ericsson Tel. (5/-)	22*	20*	52/-	−3/-	1 18 6
Ever Ready (5/-)	40	40	45/-	−1/-	4 9 0
Falk Stadelmann	7½	10	42/6	−¼	4 14 2
Ferranti Pref.	7	7	34/-	−6d.	4 2 4
G.E.C. :					
Pref.	6½	6½	37/-	−6d.	3 10 4
Ord.	17½	17½	95/9	−3/-	3 13 3
General Cable (5/-)	15	15	23/-	..	3 5 2
Greenwood & Batley	15	15	52/-	−2/-	5 15 5
H.T.A. (10/-)	12½	10	21/6	..	4 13 0
Heatrae (3/-)	12½	12½	7/6	−6d.	5 0 0
Henley's (5/-)	20	20	26/6	−1/6	3 15 6
Hopkinsons 4½% Pref.	4½	4½	25/-	..	3 12 0
Hopkinsons	17½	20	95/-	−5/16	4 4 0
Intl. Combustion	30	32½	81½	−¾	3 19 0
Johnson & Phillips	15	15	73/-	−4/6	3 17 0
Lancashire Dynamo	22½	22½	5½	−¼	4 1 10
Laurence, Scott (5/-)	12½	12½	13/6	−6d.	4 12 7
London Elec. Wire	7½	7½	40/9	−3/-	3 13 6
Mather & Platt	10	10	52/6	−5/16	3 16 4
Metal Industries (B)	9	10	56/3	−¼	3 11 2
Mid. Elec. Mfg.	25	25	8¾	−⅛	2 17 1
Murex	20	20	92/6	+5/16	4 6 7
Newman Ind. (2/-)	22½	22½	9/-	−9d.	5 0 0
Plessey (5/-)	20	20	33/9	−5/16	—
Power Securities	6	6	31/6	−6d.	3 16 2
Pye Deferred (5/-)	25	25	31/3	−4/9	4 0 0
Radio & Tel. (2/-)	25	10	9/6	..	—
Revo (10/-)	17½	20	51/-	−¼	3 18 8
Reyrolle	12½	12½	74/-	−6/-	3 7 6
Scophony (5/-)	—	—	7/-	−2/-	—
Siemens Ord.	7½	7½	36/6	−1/6	4 2 2
Strand Elec. (5/-)	10	12½	11/9	−9d.	5 6 5
Switchgear & Cowans (5/-)	20	20	26/-	−1/-	3 17 0
T.C.C. (10/-)	10	12½	31/9	..	3 18 8

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Month's Price Oct. 18	Rise or Fall	Yield p.c.
Equipment and Manufacturing (*Continued*)					£ s. d.
T.C. & M.	10	10	54/6	−1/−	3 13 3
TelephoneMfg.(5/−)	9	9	13/−	−9d.	3 9 3
Thorn Elec. (5/−)	20	20	32/6	−⅛	3 1 6
Tube Investments	20	22½	6	..	3 15 0
Vactric (5/−)	Nil	Nil	13/9	−½	—
Veritys (5/−)	7½	7½	7/9	−3d.	4 16 10
WalsallConduits(4/−)	55	55	55/−	..	4 0 0
Ward & Goldstone (5/−)	25	35	47/−	−2/6	3 14 6
Watford (2/−)	15	15	7/3	−6d.	4 2 9
WestinghouseBrake	14	14	72/6	−2/6	3 17 3
West, Allen (5/−)	7½	7½	8/−	..	4 13 9
Traction and Transport					
Brit.Elec.Traction:					
Def. Ord.	45	45	1110	..	4 1 1
Pref. Ord.	8	8	183	+5	4 7 5
Calcutta Trams.	6½	7½	58/9	−⅛	2 11 0
Cape Elec. Trams	5	6	32/−	..	3 15 0
Southern Rly.:					
5% Prefd.	5	5	75	+4	6 13 4
5% Pref.	5	5	113½	+4	4 8 3
T. Tilling	10	10	53/−	+6d.	3 13 6
West Riding	10	15	50/−	..	5 13 2
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	138½	−2	4 6 6
Def.	1½	1½	33	+½	4 11 9
Anglo-Portuguese	8	8	30/−	−1/−	5 6 8
Cable & Wireless:					
5½Pref.	5½	5½	116½	..	4 14 5
Ord.	4	4	112	+3½	3 11 5
CanadianMarconi	$1 Nil	4 cts.	15/9	+2/−	—
Globe Tel. & Tel:					
Ord.	8½*	5*	43/−	+1/6	2 7 5
Pref.	6	6	33/−	+6d.	3 12 10
GreatNorthernTel. (£10)	20	18	32½	+⅛	5 10 9
Inter. Tel. & Tel.	Nil	Nil	21½	+½	—
Marconi-Marine	7½	7½	33/6	−1/6	4 9 7
Oriental Tel. Ord.	4	4	55/6	−6d.	—
Telephone Props.	Nil	6	22/6	..	5 6 7
Tele. Rentals (5/−)	10	10	14/−	−6d.	3 11 5

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from p. 669*)

similarly higher, as compared with a month ago. Thomas Tilling shares fell to 50s. before regaining 53s. British Electric Traction lost and recovered 50 points: the 5 per cent preferred is 5 up on the month.

London Transport

London Passenger Transport Board senior stocks moved up along with other gilt-edged securities, but the speculative "C" remained at 58½. The L.P.T.B., it may be of interest to recall, came into being in April, 1933, the object being to take over and merge the Metropolitan, the London Electric, City and South London and Central London Railways, and, in addition, the tramways, buses and coaches operating regular services in the London area. The Metropolitan is the oldest of these companies, the original line, which for a few months was under the auspices of the Great Western Railway, having been opened as long ago as January 10th, 1863.

Embankment Trust

When British Insulated Cables merged with Callender's Cable & Construction Co. last year, another company, Callender's Trust, Ltd., was not included in the amalgamation. The new company issued to Callender's Trust, Ltd., 205,000 ordinary shares as consideration for trade investments to be acquired. The share capital of Callender's Trust, Ltd., consisting of 525,000 shares of £1 fully paid, was distributed to ordinary stock holders of Callender's Cable & Construction Co., in addition to shares of the new concern. These Callender's Trust, now re-named Embankment Trust, shares are negotiable in the Stock Exchange under special conditions. The price of the shares was standing at about 52s. 6d. when the last dividend, 5 per cent, was declared. It fell abruptly to 40s., but recovered almost as promptly to 54s., which is about the present quotation.

Government and Trade Organization

A REPORT of the Trade Organization Committee of the Federation of British Industries has been sent to the President of the Board of Trade and other Ministers concerned. Its subject is "Trade Organization: Relationship with Government" and it arises out of proposals made by "working parties" appointed for various industries that there should be continuance of machinery, similar to the working parties themselves, as a permanent addition to Governmental and industrial organization.

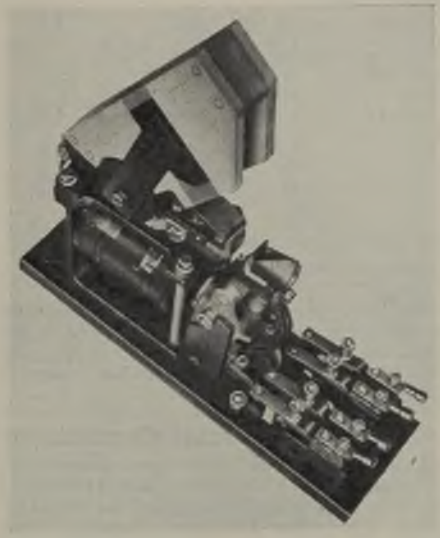
While the Committee recognizes that the working parties are performing a useful function in the circumstances arising in connection with the reconversion of industries, it is thought that such bodies are not necessarily required as permanencies. The opinion is expressed that more is likely to be achieved by consultation between the Government and the existing trade associations and methods of co-operation are suggested, i.e., direct contact, advisory councils and statutory industry boards. The councils would be representative of the Departments and industries concerned, the industries' representation covering employers and employed. Statutory boards should be set up only if the other two methods were found to be inadequate and should never be forced on an industry. Executive powers would probably be necessary but these should be restricted to the minimum necessary to solve the particular industry's problems.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Contactor for Trolley-buses

THE unit-type electro-magnet clapper contactor developed by the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, 17, for trolley-bus service is rated



Trolley-bus contactor with interlocks

at 150 A (continuous) at 600 V. It is mounted on an insulating panel to occupy the minimum of space consistent with adequate creepage distance. The number of working parts has been kept low and phosphor bronze is employed in both the pivot and the knuckling bearings to guard against any neglect of lubrication and the bearing pins are of substantial proportions.

The main frame itself is of welded steel construction, to withstand continual vibration, and a strong knuckling spring exerts a constant pressure between the contacts, irrespective of large variations in voltage. Hinged about the blow-out coil is the arc chute box which can be raised easily for inspection.

The interlock assembly is also built on the unit principle, the fingers being mounted on a moulded bakelite block which generally carries up to two interlocks of normally-closed or normally-open type; a larger number can be provided when required. Pure silver contacts are fitted to dispense with the need for cleaning and the fingers are of the self-aligning type. A notable feature is that all connections and adjustments are made from the front of the panel, to permit removal intact or in parts without the necessity for openings in the bulkheads of cab-mounted trolley-bus equipment. The dimensions of each contactor are $9\frac{3}{4}$ in. high, $3\frac{5}{16}$ in. wide and $8\frac{5}{16}$ in. deep with a centre distance of $3\frac{3}{4}$ in. between neighbouring contactors. Excluding the mounting panel, the weight per contactor is 16 lb.

"Ferranti" Radio Receiver

A second new broadcast receiving set is announced by FERRANTI, LTD., Hollinwood, Lancs. This, the "No. 146" model has a performance basically similar to the "No. 145" set but a number of improvements have been made in reliability and appearance by the fitting of permeability tuned i.f. transformers, the use of nylon covered glass drive-cord, an improved tuning scale and a horizontal cabinet of more modern design. It has three wave ranges and 4 watts undistorted output. Its dimensions are $11\frac{3}{4}$ by $20\frac{1}{4}$ by 9 in. and it weighs 29 lb.

Heating Elements for Plastic Moulding

To meet the growing demand for electric heating for the extrusion and moulding of plastic materials GENRISTO, LTD., Osmaston Street. Nottingham, has developed a range of band elements covering about one hundred types. These are made in diameters from $1\frac{1}{2}$ to 11 in. with a maximum width of 6 in. The elements are of nickel chrome wire wound on mica. The necessary automatic control apparatus is also supplied by the company. For units taking up to 2 A two-pin connectors are supplied but for the higher loadings flexible ends are fitted. Normally the sheaths are of tinned steel but in special cases stainless steel is employed.

Finishing off "Genristo" band elements for plastic moulding work

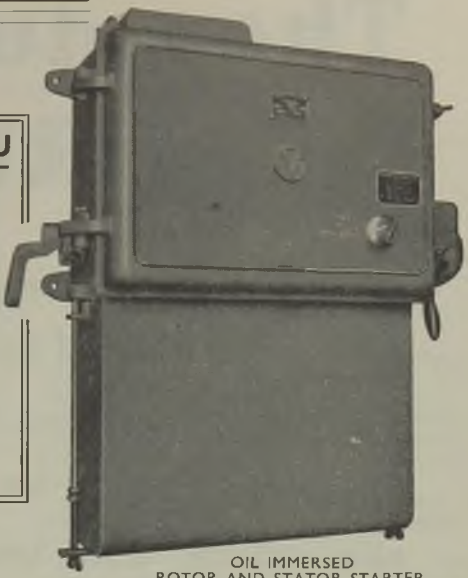
CONTROL

OF IMPORTANCE TO YOU

In order that we may give you the best service under the present difficult conditions we appeal to you to utilise standard equipment ; avoid " frills " whenever possible.

Your co-operation in this respect will enable us to concentrate on standard production with consequent reduction in despatch time.

USE "STANDARD"



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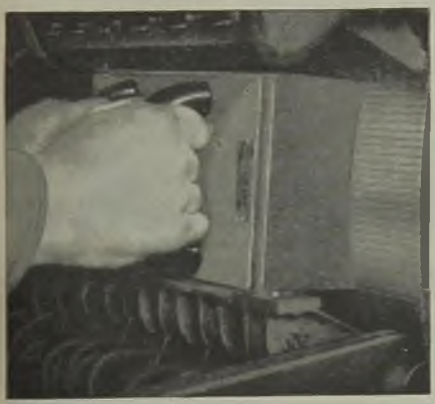
Works : **ASTON, BIRMINGHAM 6**



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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.

AKT.-GES. Brown, Boveri & Cie.—" Gas blast multi-break electric circuit-breakers." 18699/44. September 4th, 1943. (581236.) " Method of manufacturing centrifugal impellers particularly for compressors and pumps, and impellers produced according to this method." 15539/44. July 20th, 1943. (581260.)

Automatic Telephone & Electric Co., Ltd. and C. R. P. Stoner.—" Methods of indicating electrical quantities." 17439. September 13th, 1944. (581233.)

C. M. R. Balbi.—" Telephone receivers." 6123. April 1st, 1944. (581189.)

W. Blackman and E. B. King.—" Electrical switching arrangements and switches therefor." 5125. April 17th, 1942. (581131.)

A. D. Blumlein.—" Electrical apparatus for indicating or measuring distances." Cognate applications 547/40, 4478/40, 10483/40 and 10485/40. January 10th, 1940. (581161.)

A. D. Blumlein.—" Electrical bridge arrangements." 1629/41. January 10th, 1940. (Divided out of 581161.) (581164.)

British Insulated Cables, Ltd., and C. H. M. Thorpe.—" Scale graduating device." 18205. September 23rd, 1944. (581106.)

British Thomson-Houston Co., Ltd.—" Electric arc welding apparatus." 17013/44. September 10th, 1943. (581102.)

British Thomson-Houston Co., Ltd., and A. L. Whiteley.—" Electric control systems." 8479. June 19th, 1942. (581135.)

Bush Radio, Ltd., and W. H. Harrison.—" Radio wave systems for indicating the presence, range or location of an object." 9573. July 28th, 1941. (581168.)

Callender-Suchy Developments, Ltd., and C. T. Suchy.—" Electrically heated clothing, blankets and the like." 9566. May 18th, 1944. (581212.)

Cantie Switches, Ltd., and B. Heller.—" Electric circuit-breakers and switches of the explosion pot type." Cognate applications 11041/44 and 19438/44. June 9th, 1944. (581215.)

Chloride Electrical Storage Co., Ltd., and H. C. Jones.—" Electric accumulators." 9272. April 13th, 1945. (581118.)

Commercial Secretaries, Ltd., and H. A. Tunstall.—" Electric cables." 996. January 23rd, 1942. (581128.)

W. H. Connell.—" Electrical height indicating apparatus." 18217. December 30th, 1940. (581163.)

D. Cooke.—" Variable frequency electric oscillators." 14317. October 13th, 1942. (581138.)

E. C. Corke and A. D. Blumlein.—" High frequency electric circuit arrangements." 5807. May 5th, 1941. (581167.)

A. G. Crossland.—" Electric lamp holders." Cognate applications 15054/44 and 1304/45. August 8th, 1944. (581097.)

G. L. C. Earle.—" Refrigerator." 1916/41. November 9th, 1940. (581121.)

J. Forman & Pye, Ltd.—" Radio relative velocity meter." 4987. April 17th, 1941. (581166.)

General Electric Co., Ltd., C. E. Ransley and J. W. Ryde.—" Crystal contacts of which one element is silicon." 5004. April 15th, 1942. (581130.)

G. Haim and H. P. Zade.—" Welding of plastics by high-frequency electric fields." 2238. February 7th, 1944. (581181.)

Hazeltine Corporation.—" System for locating a radiated-signal reflector." 16207/42. November 28th, 1941. (581241.)

W. T. Henley's Telegraph Works Co., Ltd., and J. I. King.—" Method of manufacturing electric cartridge fuses." Cognate applications 17236/44 and 13141/45. September 9th, 1944. (581269.)

W. T. Henley's Telegraph Works Co., Ltd., and H. S. Wheeler.—" Joints for electric cables." 15631. August 16th, 1944. (581263.)

H. E. Holman.—" Grids particularly for electron discharge devices." 7012. April 15th, 1944. (581192.)

Holophane, Ltd. (Holophane Co., Inc.).—" Down-lighting apparatus." 15553. August 15th, 1944. (581261.)

Hoover, Ltd.—" Suction cleaners." 15617/44. August 18th, 1943. (581228.)

Marconi's Wireless Telegraph Co., Ltd.—" Frequency discriminating circuits." 6978/44. April 15th, 1943. (581085.) " Electric insulating materials and dielectrics." 5297/44. January 29th, 1943. (581184.)

Marconi's Wireless Telegraph Co., Ltd., and H. J. Round.—" Magneto-strictive devices." 12532. September 26th, 1941. (581123.)

Marconi's Wireless Telegraph Co., Ltd., J. M. Furnival, N. M. Ruse and G. E. Partington.—" Method of and apparatus for the detection of electro-magnetic radiation of the presence and location of objects in space." Cognate applications 4375/41 and 11151/41. April 1st, 1941. (581165.)

Marshall, Sons & Co., Ltd., and S. H. Richards —" Magnetic slip coupling for a winding or like machine." 18984. October 4th, 1944. (581107.)

P. H. Morrison, S. W. Taylor and Plessey

Co., Ltd.—" Rheostats or potentiometers." 10530. June 1st, 1944. (581195.)

Naamlooze Vennootschap Fabriek van Electrische Apparaten Voorheen L. Hazelmeijer & Co., and H. de Rook. " Multi-position electric switches." 11604. September 10th, 1941. (581122.)

Nash & Thompson, Ltd., A. G. Frazer-Nash and A. Whitaker.—" Electrical range finders." 29663. November 8th, 1939. (581160.)

E. P. Newton (L. Lesavoy).—" Telephone recorder-repeater system." 16633. October 11th, 1943. (581149.)

C. H. Nicholson.—" Improvements in electric time switches suitable to control radio sets and alarms." 19167. October 6th, 1944. (581109.)

Partridge Wilson & Co., Ltd., and A. R. Hardwick.—" Connecting tags for electrical components." 13593. July 17th, 1944. (581225.)

Philips Lamps, Ltd., and S. W. West.—" Illuminating and viewing apparatus for objects such as photographic transparencies and prints." 11318. June 13th, 1944. (581088.)

Revo Electric Co., Ltd., A. E. Felton and G. G. Mason.—" Electrical multiple plug-pin couplings." 6708. April 12th, 1944. (581191.)

V. A. Sheridan.—" Measurement of electric impedances." 10914. June 7th, 1944. (581246.)

Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington.—" Starting arrangements for electric discharge lamps." 15380. August 11th, 1944. (581199.) " Holders for bi-pin caps of electric lamps." 15461. August 14th, 1944. (581227.)

Siemens Electric Lamps & Supplies, Ltd., and R. W. Stevens.—" Fittings for light sources." 9994. April 20th, 1945. (581119.)

Soc. Française Radio-Electrique.—" Phase compensator for groups of microphones or transmitters, particularly for submarine transmission." 11873/40. July 18th, 1939. (581081.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—" Measurement of distances of obstacles by radio electric waves." 16698. December 26th, 1941. (581169.)

Standard Telephones & Cables, Ltd., and C. W. Earp.—" Visual course indicators for radio directive systems." 16695. December 26th, 1941. (581126.) " Radio distance meter." 4868. March 15th, 1940. (581162.) " Arrangements for frequency measurement, of particular application to obstacle detection." 5368. April 21st, 1942. (581201.) " Arrangements for frequency measurement." 20558. December 8th, 1943. (Addition to 581201.) (581202.)

Standard Telephones & Cables, Ltd., and E. O. Willoughby.—" Band pass filters for ultra-high frequencies." 12109. August 27th, 1942. (581173.)

Standard Telephones & Cables, Ltd., B. B. Jacobsen and B. Secker.—" Electrical methods of and apparatus for locating moving objects." Cognate applications 32052/39 and 4289/40. December 12th, 1939. (581120.)

A. H. Stevens (Electronic Laboratories Inc.).—" Voltage modifying systems." 16715. October 12th, 1943. (581179.)

Wellcome Foundation, Ltd., and R. H. Thorp.—" Voltmeters incorporating thermionic valves." 17293. September 11th, 1944. (581270.)

Western Electric Co., Inc.—" Electrical communication systems." 12547/44. July 1st, 1943. (581218.)

Westinghouse Electric International Co.—" Winding of electrical apparatus, for example, electric transformers." 25193/44. December 15th, 1943. (581112.) " Electric circuit-breakers adapted for rapid reclosure." 7269/44. May 30th, 1942. (581194.) " Metal-casting moulds." 5152/44. March 13th, 1943. (581244.)

J. A. Wright and Metropolitan-Vickers Electrical Co., Ltd.—" Intermittent seam spot welding machines." 12900. July 6th, 1944. (581221.)

Amended Specifications Published

533314. British Thomson-Houston Co., Ltd., and anr.—" Ignition devices for internal combustion engines."

570859. W. Wilson.—" Cable layers."

576003. British Thomson-Houston Co., Ltd.—" Electron microscopes."

Power Transformers

THE construction of power transformers was dealt with in Mr. R. V. DARTON'S address as the new chairman of the London Students' Section of the Institution of Electrical Engineers.

The formation of the magnetic circuit, windings and their insulation, cooling systems and external fittings were explained. For tap-changing substation transformers of up to 1,000 kVA at 11 kV the use of mercury switches was economical, but mechanical gear was preferred for larger sizes. For fully insulated windings above 66 kV special gear (Metropolitan-Vickers) had been devised to prevent the apparatus becoming too bulky.

The highest transmission voltage in use to-day was 287 kV, but an experimental line was to be erected in America to operate at up to 500 kV. At this year's International High-Voltage Conference in Paris designs were exhibited (Paper No. 108) for a bank of single-phase transformers rated at 240,000 kVA at 400 kV.

Electrical Engineering Progress

A SYNOPTIC review of electrical engineering progress during the last quarter century was presented by MR. J. D. FERGUSON in his inaugural address as chairman of the Irish Branch of the I.E.E. in Trinity College, Dublin, on October 10th, preceded by a social function.

Mr. Ferguson dealt with automatic telephony, coaxial cables, radar and television. A section of the address was devoted to electronics, high-frequency industrial electric heating and the design of electron tubes; the Betatron and Cyclotron were explained.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

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

Australia.—VICTORIA.—State Electricity Commission. January 22nd. Two 50,000-kW steam turbo-generators, with condensing, feed-water heating and evaporating plant, Spec. 45-47/11.

Belfast.—November 1st. Electricity Department. 33-kV and 6·6-kV armoured switchgear and cabling for Harbour. power station. (October 18th.)

Bristol.—November 1st. Education Committee. Electric lighting installations at a group of three primary schools, Southmead. (See this issue.)

Bootle.—November 8th. Works Committee. Sodium lighting equipment. (See this issue.)

Cardiff.—December 10th.—Electricity Department. 11-kV switchgear, 500-kVA transformers and 11-kV and l.v. underground cables. (October 18th.)

Dorset.—November 1st. Hospital Visiting Committee. Modification of existing electrical installation, change over from d.c. to a.c. and lighting and power at Dorset Mental Hospital, Herrison, Dorchester. (October 18th.)

Edinburgh.—November 25th. North of Scotland Hydro-Electric Board. H.v. and l.v. lines, Gairloch distribution scheme. (See this issue.)

Farnworth.—November 13th. Electricity Department. 1,000-kVA transformer and e.h.v. switchgear. (October 18th.)

Glasgow.—Corporation Health Committee. Electric vehicles for the transport of food from kitchens to wards in hospitals.

Heanor.—November 4th. Urban District Council. Two two-stage horizontal electrically-operated centrifugal pumps (or alternatively vertical spindle pumps).—E. Archer, engineer, Council Offices.

Hepton.—November 19th. Rural District Council. Two electrically-driven pumping sets, each of 200 g.p.m. capacity.—A. Brooksbank, Council's engineer, 14, The Exchange, Bradford.

Manchester. — November 15th. Electricity Committee. One motor-driven air compressor and receiver. (See this issue.)

Middlesex.—November 4th. County Council. Applications are invited from contractors for the inclusion of their names in the Council's approved list for the following works:—Electric lighting and power installations; X-ray apparatus; refrigerators; electric lifts; laundry equipment, etc. Forms from C. W. Radcliffe, clerk of the County Council (Reference C/GP/G), Guildhall, Westminster, S.W.1; a stamped addressed envelope must be enclosed.

New Zealand.—November 29th. Trolley-bus chassis, and/or bodies; town clerk, Dunedin.

Plymouth.—November 2nd. Electricity Department. Meters, time switches, underground joint boxes, underground disconnecting boxes and two 6-kV outdoor transformers. (October 11th.)

November 9th. Electricity Supply Department. Twelve pit type 150-kVA three-phase auto-transformers. (See this issue.)

Portsmouth.—November 9th. Electricity Undertaking. One three-phase 33-kV oil-immersed, natural-cooled outdoor type reactor, complete with cable boxes and fittings. (See this issue.)

Salford.—November 11th. Electricity Department. 6,600/415/240-V three-phase power transformer. (October 18th.)

Selkirk.—October 31st. Town Council. Electrical work in connection with 120 houses at Philiphaugh site. Rowland Anderson and Paul & Partners, architects, 16, Rutland Square, Edinburgh, 1.

Southend-on-Sea.—November 11th. Electricity Department. 11-kV metalclad switchgear, and e.h.v. and l.v. cable. (October 11th.)

Southport. — November 7th. Electricity Department. Eighty cast-iron street lighting standards. (See this issue.)

Spalding.—November 12th. Rural District Council. Two centrifugal pumps, complete with electric motors and automatic switchgear. —Silcock & Simpson, consulting engineers, 10, Park Row, Leeds, 1.

Weymouth and Melcombe Regis.—Electricity Department. 11-kV and l.v. overhead lines to supply villages of Bincombe, West Knighton and West Stafford. (See this issue.)

Woking.—November 1st. Urban District Council. Installations in 22 houses to be erected on Well Lane site, Horsell (deposit: £2 2s.).—Surveyor, Council Offices.

Orders Placed

Newcastle-on-Tyne.—City Council. Accepted. Electric lighting in 88 flats at Wesley Street (£2,699).—Devereux Moodie & Co.

Paisley.—Corporation Housing Advisory Committee. Recommended. Electrical work at housing scheme.—J. Bell & Sons.

Seaham (Durham).—U.D.C. Accepted. Underground electric cable and boxes (£2,451). —Henley's.

Swindon.—Housing Committee. Accepted. Electrical installations in 100 houses on the Beach estate (£2,909).—Teesdale & Jones.

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.

Banbury.—Additions and alterations to Horton General Hospital; F. E. Openshaw, architect, 149, Woodstock Road, Oxford.

Barnes.—Two blocks of dwellings, Lonsdale Road; borough engineer and surveyor.

Bethnal Green.—Blocks 1, 2 and 4 of dwellings at Collingwood estate (Darling Row area) for L.C.C.; William F. Blay, Ltd., 27, Albemarle Street, W.1, contractors.

Blandford.—Houses (13 pairs), Salisbury Road; L. M. Austin, architect, 51, Towngate Street, Poole.

Bolton.—Rebuilding after fire, Hill Fold Mill, Astley Bridge, for W. A. Openshaw, Ltd.; John Dickinson (Bolton), Ltd., builders.

Bootle.—Permanent dwellings (62), Orrell Mount site; W. A. Harrison, borough engineer.

Camberwell.—Seven blocks of dwellings, Sultan Terrace area, for L.C.C.; W. H. Gaze & Sons, Ltd., 23, High Street, Kingston-on-Thames, contractors.

Cardigan.—Houses (38), Greenfield Road; H. Williams & Partners, architects, "Graystones," Priory Street.

Carlisle.—Houses (200), Harraby and Belah estates (£248,000); J. Laing & Son, Ltd.

Chester.—Nurses' home, St. Martin's Fields; Royal Infirmary governors.

Denbigh.—Houses (80), Gwaenynog Road (£99,582); H. A. Peake, builder, Prestatyn.

Derby.—Conversion of hangars, London Road, for bus depots (£54,250); borough engineer.

Disley.—Houses (38), Bentside, for R.D.C.; F. J. Gibson (Builder), Ltd., Wilmslow.

Dunfermline.—Houses (376); burgh surveyor.

Edinburgh.—Temporary school, Colinton Mains; city architect, City Chambers.

Eston (Yorks).—Houses (106); surveyor, Urban Council Offices, Grangetown-on-Tees.

Friern Barnet.—Flats (60), Alexandra Road (£71,137) for U.D.C.; McManus & Co., Ltd., builders, High Road, Whetstone, N.20.

Gateshead.—Extensions to factory of the Bush Board Co.; L. G. Couves & Partners, Carliol House, Newcastle.

Office block at the factory of De La Rue Gas Development, Ltd.; Cackett, Burns Dick & McKellar, 21, Ellison Place, Newcastle.

Conversion of the Belle Vue Methodist Church into a Y.M.C.A. centre (£10,000); J. R. Rutherford & Sons, Jesmond, Newcastle-on-Tyne.

Houses, Coach Road (274) and Lobley Hill (439); H. J. Cooke, chief architect, Municipal Buildings.

Greenock.—Conversion of building into art centre for Greenock Arts Guild; secretary.

Islington.—Blocks 1 to 6 of dwellings, Boleyn estate, for L.C.C.; William F. Blay, Ltd., 27, Albemarle Street, W.1, contractors.

Jarrow.—Factory for the Neufchatel Asphalt Co., Newcastle; R. Burke, Singleton House, Northumberland Road, Newcastle-on-Tyne.

Keith.—Houses (14); burgh surveyor.

Ledbury.—Factory for Alex Robb & Co., Ltd., biscuit manufacturers.

Llanrwst.—Houses (52) for U.D.C.; F. Tydesley & Co., builders, Colwyn Bay.

Louth.—Houses (40), Eastfield Road scheme; J. C. Barber, borough surveyor, Town Hall.

Motherwell.—Alterations and additions to works for Rivet, Bolt & Nut Co., 74, York Street, Glasgow (£8,000); manager.

Musselburgh.—Reconstruction work for Bruntons (Musselburgh), Ltd., factory (£23,000); manager.

Newcastle-on-Tyne.—New science block at King's College (£150,000); J. R. Rutherford & Sons, builders, Jesmond, Newcastle-on-Tyne.

Newport (I.o.W.).—Houses (86), Melbourne Park estate; E. L. Smith & Son, architects.

X-ray clinic, Parkhurst Road; S. Gregson, county architect.

Paisley.—Dye house, laboratory, etc., for D. Macfarlane & Sons, Ltd., dyers, Underwood Road; manager.

Patricroft.—Foundry, Albion Works; J. Cocker, Ltd., builders, Walkden.

Potters Bar.—Houses (38), Dugdale Hill Lane and Mutton Lane (£44,267), for U.D.C.; Newland Bros., Ltd., builders, 96, Strafford Gate.

Sherburn.—Factory for Fowler & Armstrong, motor engineers, New Elvet, Durham; E. M. Lawson, Barras Buildings, Barras Bridge, Newcastle-on-Tyne.

Stafford.—Houses (36), Silkmore estate; Morgans (Stafford), Ltd., builders.

Tamworth.—Permanent "Airey" houses (38), Wood End, Hurley (£58,641), for R.D.C.; H. J. Bray, builder, Watling Street, Wilnecote.

Wallasey.—Permanent houses (159), Moreton (£182,155); William Thornton & Sons, builders, 38, Wellington Road, Liverpool.

Warrington.—Houses (30), Dallam Farm estate; Clough & Gaskell, Ltd., builders, Wigan.

Watford.—Reconstruction work at Technical College (£28,523) for Herts Education Committee; Truett & Steel, Ltd., builders, High Street, Thornton Heath.

West Hartlepool.—Offices for Christopher Brown, Ltd., timber importers; Turnbull & Rowe, architects, Scarborough Street.

Worsbro' (Yorks).—Factory on the Elm House estate for Johnson & Barnes, Ltd., Leicester.

CLASSIFIED ADVERTISEMENTS

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

THE CHARGE for advertisements in this section is 2/– per line (approx. 7 words) per insertion; ***ONLY OFFICIAL AND GOVERNMENT ANNOUNCEMENTS CAN NOW BE DISPLAYED:***—30/– per inch. Where the advertisement includes a Box Number this counts as six words and there is an additional charge of 6d. for postage of replies.

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

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 AND COUNTY OF BRISTOL EDUCATION COMMITTEE

To Electrical Engineers

Group of Three Primary Schools, Southmead, Bristol

TENDERS are invited for the execution complete of electric lighting installation, together with electric power and heating services at the above. Contractors desirous of tendering should forward their names and addresses to the undersigned on or before the 1st November, 1946. The drawings and specification, together with forms of tender, will be forwarded shortly after to the contractors who have made application by this date.

Applications must be accompanied by a deposit of two guineas, cheques to be made payable to the Corporation of Bristol, the deposit being returnable on receipt of a bona fide tender and return of all documents.

Drawings, draft conditions of main contract, etc., can be inspected at the office of the City Architect.

The Corporation do not bind themselves to accept the lowest or any tender, and the contractor whose tender is accepted will be a nominated sub-contractor and required to enter into a contract with the main contractor upon terms and conditions consistent with those to be observed by him.

J. NELSON MEREDITH, F.R.I.B.A.,
City Architect.

Eagle House,
Colston Avenue,
Bristol, 1. 3118

CITY OF MANCHESTER

THE Electricity Committee invites tenders for the Supply, Delivery and Erection of
ONE MOTOR-DRIVEN AIR COMPRESSOR AND RECEIVER (Specification No. 880).

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

Tenders, addressed to the Chairman of the Electricity Committee to be delivered not later than 10 o'clock a.m. on Friday, 15th November, 1946. The Committee does not bind itself to accept the lowest or any tender.

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester, 2.
15th October, 1946. 3105

BOROUGH OF WEYMOUTH AND MELCOMBE REGIS ELECTRICITY DEPARTMENT

TENDERS are invited for the supply, erection and connecting-up of 11,000 volts and Low Tension Overhead Lines to supply the villages of Bincombe, West Knighton and West Stafford; which will be placed as one contract.

Copies of specifications, plans and bills of quantities may be obtained on application to the Borough Electrical Engineer. The lowest or any tender will not necessarily be accepted.

T. WHITEHOUSE, A.M.I.E.E.,
Borough Electrical Engineer.

Electric House,
Westham Road, Weymouth.
October, 1946. 3127

COUNTY BOROUGH OF BOOTLE

Proposed Sodium Lighting—Regent Road and Hawthorne Road, Bootle

THE Works Committee of the Bootle Corporation invite tenders for the supply and delivery of Sodium Lighting Equipment, comprising Sodium Lamps, Lanterns, Control Boxes, Time Switches, Poles, Brackets, Conductors, etc.

Form of tender, specification and conditions of contract may be obtained on application to the Borough Engineer and Surveyor, Town Hall, Bootle, Liverpool, 20.

Tenders must be forwarded in a plain envelope, sealed and endorsed "Sodium Lighting," and delivered to the Town Clerk, Town Hall, Bootle, Liverpool, 20, so as to reach him not later than 10 a.m. on Friday, the 8th November, 1946. The envelope must not bear any name or mark indicating the sender.

The Corporation do not bind themselves to accept any tender, and reserve the right to purchase the equipment from two or more contractors.

By Order,
HAROLD PARTINGTON,
Town Clerk.

Town Hall, Bootle.
25th October, 1946. 3188

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Gairloch Distribution Scheme

High and Low Tension Overhead Lines (Wood Poles)

In the Area of Gairloch, Ross-shire

THE Board invite Tenders for the Supply, Delivery and Erection of High Tension and Low Tension Distribution Lines.

Prospective tenderers may obtain copies of the tender documents from the Engineers, Messrs. Strain & Robertson, 154, West George Street, Glasgow, C.2, on sending to them cheque for deposit of £1 1s., which will be refunded on receipt of a bona fide tender.

Completed tenders, endorsed "Gairloch Distribution—Contract No. 1," must reach the subscriber not later than noon on 25th November, 1946. The Board do not bind themselves to accept the lowest or any tender.

T. LAWRIE,
Secretary.

16, Rothesay Terrace,
Edinburgh, 3.
19th October, 1946. 3182

CITY OF PORTSMOUTH ELECTRICITY UNDERTAKING

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

One 3-phase, 33,000 volt, oil immersed, natural-cooled, outdoor-type Reactor, rated at 10 per cent. on 35 M.V.A., complete with cable boxes and fittings as specified.

Specification, conditions and form of tender may be obtained from the Engineer and Manager, Electricity Undertaking, 111, High Street, Portsmouth, on receipt of £1 1s., which will be refunded on receipt of a bona fide tender. Tender forms must be returned to the undersigned in a plain sealed envelope marked "Tender for Transformer," without bearing any name or mark indicating the sender, on or before the 9th November, 1946.

V. BLANCHARD,
Town Clerk.

Portsmouth.
16th October, 1946. 3187

CITY OF PLYMOUTH ELECTRICITY SUPPLY DEPARTMENT

THE Plymouth Corporation invite Tenders for the supply and delivery of 12 Pit-type, 150 kVA, three-phase Auto Transformers. Specifications and forms of tender may be obtained from the City Electrical Engineer, Armada Street, Plymouth. Completed tenders must reach the undersigned not later than noon on the 9th November, 1946.

COLIN CAMPBELL,
Town Clerk.

October, 1946. 3154

COUNTY BOROUGH OF SOUTHPORT ELECTRICITY DEPARTMENT

Electric Street Lighting Standards

THE Corporation invite Tenders for the supply and delivery of 80 Cast Iron Short Street Lighting Standards.

Specifications and forms of tender may be obtained from the Borough Electrical Engineer, 188, Lord Street, and should be returned to the undersigned, in a sealed envelope endorsed "Street Lighting Standards," not later than the first post on Thursday, 7th November, 1946.

R. EDGAR PERRINS,
Town Clerk.

Town Hall,
Southport. 3149

SITUATIONS VACANT

BOROUGH OF HESTON AND ISLEWORTH ELECTRICITY DEPARTMENT

Meter Mechanics

APPLICATIONS are invited for the positions of Meter Mechanicians in the Corporation's Class "A" polyphase testing station.

Applicants must be conversant with the carrying out of actual repairs and calibration of both A.C. and D.C. single-phase and polyphase meters, prepayment and maximum demand equipment. Experience in the manufacture and repairing of clocks, watches or electrical and mechanical recording instruments will be an advantage.

Wages and conditions of employment will be in accordance with the District Joint Industrial Council (No. 10) Area Schedule, present rate of wage, including war bonus, 47-hour week, is £5 18s. 8d. (If required to work alternate weekly shifts, 8 a.m. to 4 p.m. and 1 p.m. to 9 p.m., 48 hours per week, £6 13s. 2d.)

The appointments are subject to the Local Government Superannuation Act, 1937, and the successful candidate will be required to undergo a medical examination.

Applications, stating age, qualifications, previous experience and present wages, together with copies of two recent testimonials, must reach the undersigned, enclosed in an envelope endorsed "Meter Mechanicians," not later than 16th November, 1946.

HAROLD SWANN,
Town Clerk.

Council House,
Hounslow. 3074

CITY OF PLYMOUTH ELECTRICITY SUPPLY DEPARTMENT

Appointment of Two Junior Shift Charge Engineers

APPLICATIONS are invited for two positions as Junior Charge Engineers to carry out the normal duties of assisting the Shift Charge Engineer in the generating station.

Applicants must be between the ages of 25 and 40, and should have experience in a modern power station. Preference will be given to those who have passed the Graduateship examination of the Institution of Electrical Engineers or an approved equivalent. The salary will be in accordance with Grade 8b, Class H, of the National Joint Board Scheme, at present £429 per annum.

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

Applications must be made on special forms to be obtained from the undersigned, to whom they must be returned not later than noon on the 6th November, 1946.

H. MIDGLEY,
City Electrical Engineer.

Armada Street,
Plymouth.
October, 1946. 3153

BOROUGH OF LUTON ELECTRICITY UNDERTAKING

APPLICATIONS are invited for the following positions:

(1) INSTALLATION INSPECTOR (four vacancies). Candidates must be fully qualified electricians, conversant with I.E.E. Wiring Regulations and able to inspect and report upon domestic and industrial installations. Conditions of service and rates of pay in accordance with the D.J.I.C. Schedule for No. 9 area, at present £5 11s. 6d. per week of 47 hours. The selected candidates may participate in a merit bonus scheme, which provides a maximum payment up to 3d. per hour in addition to the above rate.

(2) METER MECHANICIAN (two vacancies). Candidates must be capable of carrying out repairs to electrical precision instruments, the reconditioning of meter dials and pivots. Preference will be given to candidates who are also capable of carrying out repairs to time switches and clocks.

Conditions of service and rates of pay will be in accordance with the D.J.I.C. Schedule for No. 9 area, at present 2s. 4d. per hour. The selected candidates may participate in a merit bonus scheme, which provides a maximum payment up to 3d. per hour in addition to the above rate.

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

Applications, giving details of training and experience, and present position, and accompanied by copies of two recent testimonials, should be delivered not later than Saturday, 9th November, 1946, to C. T. Melling, M.Sc.Tech., M.I.E.E., M.I.Mech.E., Borough Electrical Engineer, Electricity Offices, St. Mary's Road, Luton. Canvassing, directly or indirectly, will be a disqualification.

W. H. ROBINSON,
Town Clerk.

Town Hall, Luton.
18th October, 1946. 3170

COUNTY BOROUGH OF IPSWICH ELECTRIC SUPPLY AND TRANSPORT DEPARTMENTS

Appointment of Electrical Fitters (Two)

APPLICATIONS are invited for the above positions of Electrical Fitters. The rate of pay to be in accordance with the Schedule of the No. 8 District Council (East Coast) Area Electricity Supply Industry, at present 28.74d. per hour inclusive.

Applicants should have had experience in the erection and maintenance of E.H.T. and L.T. Switchgear and Transformers, and must provide proof of their training in this class of work. Experience in an Electricity Supply Undertaking will be considered an advantage.

The successful applicants will be required to pass a medical examination by the Council's Medical Officer and the appointments will be subject to the provisions of the Local Government Superannuation Act, 1937.

Applications, in the candidates' own handwriting, stating age, experience and when able to take up duties, accompanied by copies of recent testimonials, to be sent to the undersigned not later than the first post on Tuesday, November 12th, 1946, and endorsed "Electrical Fitter." Canvassing in any form will be a disqualification.

G. A. VOWLES, M.I.E.E., M.I.Mech.E.,
Chief Engineer and Manager.

Electric Supply and Transport Depts.,
Russell House, Russell Road, Ipswich. 3150

COUNTY BOROUGH OF BLACKPOOL ELECTRICITY DEPARTMENT

APPLICATIONS are invited for the position of Draughtsman in the above undertaking, at a salary in accordance with the National Joint Board Schedule, Class G, Grade 9a (£343-£358 per annum). Applicants must be over the age of 21 and possess a good knowledge of modern drawing office practice, and have had experience in the preparation of mains network plans and the maintenance of mains records. Experience in surveying and the design and layout of substation buildings will be considered an advantage. The appointment will be subject to a medical examination and to the Local Government Superannuation Act.

Applications, endorsed "Draughtsman" and accompanied by copies of any recent testimonials, are to be received by the Borough Electrical Engineer, Shannon Street, Blackpool, not later than 11th November, 1946.

TREVOR T. JONES,
Town Clerk.

3176

BOROUGH OF FINCHLEY ELECTRICITY DEPT.

Appointment of a Deputy Distribution Engineer and a Consumers' Engineer.

APPLICATIONS are invited for the positions of:—

(a) Deputy Distribution Engineer in the Electricity Department at a salary in accordance with the National Joint Board Scale, Class G, Grade 5/1, at present £601 13s. per annum.

(b) Consumers' Engineer in the Electricity Department at a salary in accordance with the National Joint Board Scale, Class G, Grade 7, at present £518 14s. per annum.

The qualifications which must be possessed by the applicants are as follows:—

(a) Candidates must be Corporate Members of the Institution of Electrical Engineers and have had experience in (i) 6.6 kV transmission, 3-phase and D.C. distribution; (ii) the operation and maintenance of static and rotary substations (experience in mercury arc rectifying substations would be an advantage); (iii) estimating for switchgear and cable extensions.

The person appointed will be responsible for the distribution department in the absence of the Distribution Engineer.

(b) Preference will be given to Corporate Members of the Institution of Electrical Engineers who possess the following qualifications: (i) Sound engineering training; (ii) experience in the commercial development of electricity undertakings; (iii) experience in hire and hire purchase schemes; (iv) control of sales and maintenance staff.

The successful candidates will be required to pass a medical examination by the Council's Medical Officer of Health and to contribute to the Superannuation Scheme.

Forms of application will not be issued and applications to the undersigned, containing full details of the candidate's experience and qualifications, should be received by not later than 12th November, 1946, endorsed "Deputy Distribution Engineer" or "Consumers' Engineer." Canvassing any member or any officer of the Town Council, either directly or indirectly, will be deemed a disqualification.

C. R. WESTLAKE, M.I.E.E.,
General Manager and Engineer.

Electricity Department,
Squires Lane, N.3. 3125

FIRST GARDEN CITY LIMITED

THE following vacancies are open:—

(a) HOME SERVICE ADVISER. Lady (single) conversant with all domestic uses of electricity and able to advise upon the selection of appliances, to hold lecture demonstrations, to visit consumers' houses, and to assist in sales development. Qualifications must include a recognised domestic science certificate and/or E.A.W. diploma. Salary £236 per annum, plus car allowance.

(b) CLERICAL ASSISTANT (MALE). To assist with stock records, invoices, time sheets. Rate of pay £5 per week of 40½ hours.

(c) STORES ASSISTANT (MALE). Used to handling electrical material and routine records. Rate of pay £5 per week of 47 hours.

(d) METER TESTER. Used to the testing and adjustment of D.C. and A.C. meters, with some technical knowledge; if necessary, suitable young man would be trained. Rate of pay £5 9s. 8d. per week of 47 hours.

All the above payments are adjusted to current cost-of-living allowances, and the conditions, where applicable, are in accordance with national agreements, including paid holidays, generous sick pay scheme, staff benefit retirement fund, canteen facilities. There is an acute housing shortage in the area. Full particulars in writing to the undersigned.

W. A. BROWN,
Works Road, Letchworth, Electrical Engineer.
Hertfordshire. 3096

MOUNT VERNON HOSPITAL AND THE RADIUM INSTITUTE, NORTHWOOD, MIDDLESEX

ASSISTANT Engineer or Technician required by the X-ray Department, preferably with experience of X-ray and vacuum technique and of electrical wiring, to assist in the maintenance of several 200 kilovolt X-ray installations. Salary scale £275-£350 by increments of £15 p.a., commencing rate according to experience.

Applications, stating age and experience, accompanied by testimonials, to be forwarded to the Secretary, from whom further particulars may be obtained. 3100

BOROUGH OF NELSON ELECTRICITY DEPT.

Appointment of Mains Superintendent

APPLICATIONS are invited from Chartered Electrical Engineers, under the age of 45 years, who have held a responsible position in the distribution department of an electricity supply undertaking.

Applicants should possess a wide experience in the direction of a distribution department and in the control of staff. They should have had experience in an extensive urban distribution system supplied by means of 6.6 kV, 3-phase alternating current with substations and the necessary low tension networks connected therewith. They should also preferably have had experience of 33 kV transmission, and the supply to rural areas, together with the maintenance of bulk supplies to other authorised undertakings.

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

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

Forms of application are not being issued and applications containing full details of age, qualifications, past and present appointments and experience, should be submitted to the undersigned not later than the 9th November, 1946, endorsed "Mains Superintendent." Canvassing any member or any officer of the Town Council, either directly or indirectly, will be deemed a disqualification.

F. W. ROBERTS.
Town Hall, Nelson. Town Clerk.
14th October, 1946. 3083

CITY OF MANCHESTER

City Architect's Department

Appointment of Electrical Engineering Assistant

APPLICATIONS are invited for the appointment of an Electrical Engineering Assistant in the City Architect's Department, basic salary £400 by £25 to £425 per annum, plus cost of living bonus, at present £60. The salary may be reviewed in the event of the Corporation adopting the National Salary Scales.

Candidates should be Corporate Members of the Institute of Electrical Engineers, possessing adequate technical knowledge and practical experience in the design of installations, including preparation of plans and specifications and the supervision of contracts in connection with electric lighting, heating and power plants in municipal buildings, including schools and institutions.

The successful candidate will be required to pass a medical examination before the appointment is confirmed, to contribute to the Corporation's Superannuation Fund and to execute the Corporation's Deed of Service.

Applications must be made on the official form, which can be obtained at my office, and must be returned (together with copies of not more than three recent testimonials) to me—and not to any member of the Council—by Saturday, 2nd November, 1946, endorsed "Electrical Engineering Assistant." Canvassing in any form, oral or written, direct or indirect, is prohibited and will be regarded as a disqualification.

PHILIP B. DINGLE,
Town Hall, Manchester. Town Clerk.
October, 1946. 3123

CITY OF MANCHESTER ELECTRICITY DEPT.

APPLICATIONS are invited for the position of Senior Assistant Chemist, at a salary in accordance with Class K, Grade 8b, which is equivalent to £487, rising, by two biennial increments to £510 per annum, and conditions of the National Joint Board.

Candidates must have had experience in power station chemistry, and hold the Higher National Certificate or equivalent diploma.

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

Applications, giving full particulars of age, technical training and experience, together with copies of recent testimonials, must be endorsed "Senior Assistant Chemist" and addressed to the Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2, not later than 10 a.m. on Friday, 1st November, 1946. Canvassing, directly or indirectly, will disqualify.

PHILIP B. DINGLE,
Town Hall, Manchester, 2. Town Clerk.
16th October, 1946. 3122

METROPOLITAN BOROUGH OF ISLINGTON ELECTRICITY DEPARTMENT

Appointment of Assistant Engineer

APPLICATIONS are invited for the appointment of an Assistant Engineer on advisory and inspection work in the Consumers' Service Section. Applicants must be between the age of 25 and 35 years, have had a sound secondary and technical education, and must possess technical qualifications to not less than ordinary National Certificate standard and be experienced in the testing and inspecting of electrical installations for heating, lighting and industrial application. A sound knowledge of current regulations of the I.E.E., Home Office and Electricity Commissioners is essential. Salary and conditions of employment will be in accordance with the National Joint Board Schedule, Class G, Grade 9.

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.

Forms, on which application must be made, can be obtained from the Engineer and General Manager, 341/3, Holloway Road, N.7, and must be returned to the Town Clerk, Town Hall, Upper Street, N.1, by not later than the 9th November, 1946.

Candidates are required to disclose in writing whether, to their knowledge, they are related to any member or holder of any senior office under the Council.

The Council are unable to make any arrangements whatsoever for the provision of housing accommodation for the successful candidate. Canvassing, either directly or indirectly, will be a disqualification.

W. ERIC ADAMS.
Town Clerk.

Town Hall,
Upper Street, N.1.
3136

COUNTY BOROUGH OF EAST HAM ELECTRICITY DEPARTMENT

Appointment of Installation Engineer

APPLICATIONS are invited for the above appointment from persons with sound technical training and who have had considerable experience in the installation and maintenance of all classes of electrical lighting, heating and power installations. Applicants must be able to initiate schemes and prepare complete estimates and specifications for all classes of installation work for new public buildings, schools, canteens and housing programmes, and to supervise the carrying out of the work and control staff. Preference will be given to corporate members of the I.E.E.

The salary will be in accordance with Class F, Grade 7, of the National Joint Board Schedule, at present £502 19s. per annum.

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

Applications, stating age, whether married or single, present appointment and salary, experience and qualifications, with copies of not more than three recent testimonials, to be sent to reach the undersigned, and endorsed "Installation Engineer," not later than 1st November, 1946. Canvassing in any form will be a disqualification.

H. A. EDWARDS,
Town Clerk.

Town Hall,
East Ham, E.6.
8th October, 1946.
2974

THE BOURNEMOUTH & POOLE ELECTRICITY SUPPLY CO. LTD.

Lady Demonstrator

APPLICATIONS are invited for the position of Senior Lady Demonstrator.

Candidates should be between 25 and 35 years of age and must have had a good general education, hold the E.A.W. Diploma or Certificate, or other approved qualifications, and have a thorough knowledge of domestic electric appliances; they must be competent to conduct lectures and cookery demonstrations and advise on the selection and use of electrical apparatus. Commencing salary £335 per annum inclusive of cost-of-living bonus.

Applications, giving full particulars of training and experience, and accompanied by copies of recent testimonials, to be sent to the undersigned in a sealed envelope endorsed "Demonstrator."

N. F. GADSDON,
Regional Manager.

Electric House, Yelverton Road,
Bournemouth, Hants.
3090

BOROUGH OF ASHTON-UNDER-LYNE ELECTRICITY DEPARTMENT

Appointment of Substation Control Engineer

APPLICATIONS are invited for the position of Substation Control Engineer for shift duties in the Council's Wellington Road Station, at a salary in accordance with the N.J.B. Schedule, Class F, Grade 9, commencing at the present rate of £358 per annum and rising to £373 per annum.

Applicants should have had a sound technical training and experience in the control of high and low pressure switchboards, operation of rotary conversion plant and grid switching.

Applications, stating age, education and technical training, and accompanied by not more than three testimonials, should be sent to Mr. N. Jones, Chief Engineer, Electricity Department, Wellington Road, Ashton-under-Lyne, not later than Monday, November 18th, 1946, endorsed "Substation Control Engineer." Possession of qualifications up to Graduate standard of the I.E.E. will be an advantage. Applicants should state whether related to any member or senior officer of the Council, and should not be more than 45 years of age.

As the appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, the selected candidate will be required to pass a medical examination and contribute to the superannuation scheme.

The Council regrets that it is unable to offer housing facilities to the successful applicant.

D. W. BROMLEY,
Town Clerk.

Town Hall,
Ashton-under-Lyne.
17th October, 1946.
3145

BOROUGH OF EALING

Appointment of Junior Mains Assistant

APPLICATIONS are invited for the above position from candidates with a sound technical education and practical experience in the mains department of an electricity undertaking. Preference will be given to candidates with technical qualifications, e.g., Higher National Certificate.

The salary will be in accordance with N.J.B. Schedule, Class F, Grade 9A.

The appointment will be on twelve months' probationary service, and will be subject to the Local Government and Other Officers' Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

A house belonging to the department will be available for renting by the successful applicant.

Applications, endorsed "Junior Mains Assistant," giving age, details of education, training, positions held, present position and salary, together with copies of three recent testimonials, should be addressed to the undersigned and be delivered at this office not later than first post Monday, November 4th, 1946. Canvassing will be a disqualification, and applicants should disclose whether, to their knowledge, they are related to any members or chief officers of the Local Authority.

RONALD BIRT,
Borough Electrical Engineer and Manager.

Electricity House,
Ealing, London, W.5.
17th October, 1946.
3147

COUNTY BOROUGH OF EAST HAM ELECTRICITY DEPARTMENT

Rotary Substation Attendant

APPLICATIONS for the above position are invited from Engineers having a sound experience in the operation of La Cour Converters, and should have had experience in the operation of high tension control switchgear controlling a high distribution system.

Salary in accordance with the National Joint Board Schedule Grade 8(b), Class E (plus 5% London Area), at present £378 per annum.

The appointment is 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, whether married or single, and stating qualifications, with copy of recent testimonials and date of release to the undersigned.

G. W. ABLITT, A.M.I.E.E.,
Engineer and Manager.

Electricity Offices, Nelson St.,
East Ham, E.6.
October 12th, 1946.
3036

METROPOLITAN BOROUGH OF WOOLWICH ELECTRICITY DEPARTMENT

Appointment of Lady Cookery Demonstrator

APPLICATIONS are invited for the appointment of Lady Cookery Demonstrator at the Electricity Showrooms, Electric House, Powis Street, Woolwich, at a salary in accordance with the Clerical Division of the National Scales, commencing at £252 per annum, rising by annual increments of £12 to £288 per annum, with London Weighting £16 and cost-of-living bonus (at present £48 2s. per annum) in addition.

Candidates, who should hold the E.A.W. Certificate or Diploma, should not be less than 21 years of age and have had experience in demonstrating cookery by electricity.

The appointment will be subject to the Council's Conditions of Service in force from time to time, to the provisions of the Local Government Superannuation Act, 1937, and will be terminable by one month's notice on either side. The selected candidate will be required to pass a medical examination.

Applications, giving full details of age, qualifications and experience, together with copies of not more than three recent testimonials, should be received by the Borough Electrical Engineer, Electric House, Powis Street, Woolwich, not later than 9th November, 1946. Candidates must disclose in writing if they are related to any member or senior officer of the Council. Canvassing, either directly or indirectly, will disqualify.

DAVID JENKINS,
Town Clerk.

Town Hall, Woolwich.
October, 1946. 3072

BOROUGH OF BRENTFORD AND CHISWICK ELECTRICITY DEPARTMENT

Assistant Meter Engineer

APPLICATIONS are invited for the position of Assistant Meter Engineer at a salary in accordance with Grade 8b, Class E, of the N.J.B. Schedule (at present £378, rising to £395 17s. per annum).

Candidates must have sound technical training and be capable of supervising (under the general direction of the Meter Superintendent) meter repairing, meter and instrument testing and care of sub-standard instruments for a Class "A" D.C. and A.C. polyphase testing station. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, endorsed "Assistant Meter Engineer," must be delivered to the undersigned not later than Monday, 4th November, 1946. Not more than two testimonials and the names of not more than 2 referees may be submitted if desired. Canvassing, directly or indirectly, will be deemed a disqualification, and candidates must declare any relationship with members or senior officers of the Borough Council of which they are aware.

A. E. JEANS, M.I.E.E.,
Borough Electrical Engineer.

Electricity Showrooms and Offices,
197/199, Chiswick High Road,
London, W.4. 3095

METROPOLITAN BOROUGH OF ISLINGTON ELECTRICITY DEPARTMENT

APPLICATIONS are invited for the positions of Meter Testers and Repairers. Applicants must have had experience in testing and repairing A.C. credit and prepayment meters.

Conditions of employment will be in accordance with the No. 10 Area, District Joint Industrial Council, the present rate of pay for 47-hour week being £5 18s. 8d.

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

The Council are unable to make any arrangements whatsoever for the provision of housing accommodation for the successful candidate.

Applications, in writing, giving details of experience and accompanied by copies of testimonials, should be addressed to the Engineer and General Manager, 341/3, Holloway Road, N.7, and received not later than the 2nd November, 1946. Canvassing, either directly or indirectly, will be a disqualification.

W. ERIC ADAMS,
Town Clerk.

Town Hall,
Upper Street, N.1. 3086

BOROUGH OF HESTON AND ISLEWORTH ELECTRICITY DEPARTMENT

Mains Assistant

APPLICATIONS are invited for the position of Mains Assistant. Applicants must have passed the Graduateship examination of the I.E.E. or hold equivalent qualifications and had practical experience in mains systems and substations, including fault finding and emergency work. A knowledge of protective systems and testing will be an advantage.

The salary and conditions of employment will be in accordance with the National Joint Board Schedule, Class G, Grade 8b, at present £428 8s. per annum.

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

Applications for the position must be made on a form to be obtained from the Borough Electrical Engineer and Manager, 11, Staines Road, Hounslow, and addressed to the undersigned, endorsed "Mains Assistant," accompanied by not more than three recent testimonials, to be received not later than 16th November, 1946.

HAROLD SWANN,
Town Clerk.

Council House,
Hounslow. 3073

COUNTY BOROUGH OF NEWPORT ELECTRICITY DEPARTMENT

Mains Recorder and Draughtsman

THE Newport Corporation invite applications for the position of Mains Recorder and Draughtsman.

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

The conditions of employment will be in accordance with the N.J.B. Schedule and the commencing nett salary £365 per annum (Class H, Grade 9a).

Applications, stating the applicant's age, whether married or single, and giving full details of experience, previous appointments and qualifications, together with copies of not more than three recent testimonials, should be addressed to the undersigned, endorsed "Mains Recorder and Draughtsman," and delivered not later than Monday, November 11th, 1946.

T. H. WOOD,
Borough Electrical Engineer and Manager.

Electric House, Dock Street,
Newport, Mon.
14th October, 1946. 3107

URBAN DISTRICT COUNCIL OF FAREHAM ELECTRICITY DEPARTMENT

APPLICATIONS are invited for the position of Junior Technical Assistant Engineer at a salary in accordance with Class C, Grade 9, of the N.J.B. Schedule (at present £300 per annum).

Applicants should have had a sound technical and practical training in electrical engineering. Experience in keeping mains records would be an advantage. Technical qualifications should be up to I.E.E. Graduate standard.

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, qualifications and experience, together with copies of not more than three recent testimonials, are to be delivered to the Electrical Engineer, Fareham Urban District Council, Westbury Manor, Fareham, Hants, not later than twelve o'clock noon on the 28th October, 1946.

HERBERT A. WATTS,
Clerk to the Council.

"Merton," 5 Grove Road,
Fareham.
9th October, 1946. 3005

ALTRINCHAM ELECTRIC SUPPLY LTD.

Plumber-Jointers

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

Applications, stating age and experience, should be addressed to The Engineer and Manager, Altrincham Electric Supply Ltd., 60, Stamford New Road, Altrincham, Cheshire. 2996

CITY OF YORK ELECTRICITY DEPARTMENT

Appointment of Power Station Superintendent

APPLICATIONS are invited for the appointment of Power Station Superintendent, at a salary in accordance with the N.J.B. Schedule, Class G, Grade 3, commencing at £681 per annum.

Candidates must have had a good technical education and experience in the operation and maintenance of a steam power station, and Corporate Membership of an engineering institution will be considered an advantage.

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

Applications, stating age and qualifications, and giving particulars of education, training, experience and present appointment, accompanied by not more than three recent testimonials, must reach the undersigned not later than 10 a.m. on Wednesday, 6th November, and be endorsed "Power Station Superintendent."

W. A. CROCKER, A.M.I.E.E.,
City Electrical Engineer.

Electricity Offices,
Clifford Street, York. 3131

STRETFORD AND DISTRICT ELECTRICITY BOARD

Appointment of Technical Assistant

APPLICATIONS are invited from engineers with sound technical and practical generation, transmission and distribution experience for the position of Technical Assistant at a salary in accordance with Grade 4, Class H, of the N.J.B. Schedule (starting salary £666 per annum). Applications, endorsed "Technical Assistant," stating age and giving full particulars of experience, and accompanied by copies of testimonials, should be received by the undersigned not later than 31st October, 1946.

The engineer appointed will be required to pass a medical examination and to join the Board's Superannuation Scheme. The appointment will be terminable by one month's notice on either side. Canvassing, directly or indirectly, will be deemed a disqualification.

H. G. BELL,
Chief Engineer and Manager.

Trafford Power Station,
Trafford Park, Manchester, 17. 3019

BOROUGH OF ACCRINGTON ELECTRICITY DEPT.

Mains Assistant

APPLICATIONS are invited for the position of Mains Assistant in the Electricity Department at a salary in accordance with the National Joint Board Scale, Class F, Grade 8b/1, at present £386 per annum.

Candidates must possess the Higher National Electrical Engineering Certificate and have had experience in the laying of 33 kV high tension mains, three-phase distribution and maintenance and operation of static substations.

The appointment is subject to the provisions of the Local Government Service Act, 1937. The successful candidate will require to pass a medical examination by the Council's Medical Officer of Health.

Applications and copies of three recent testimonials to be forwarded to the undersigned not later than Thursday, the 31st October, 1946, endorsed "Mains Assistant."

P. D. WADSWORTH,
Town Clerk.

Town Hall,
Accrington. 2975

METROPOLITAN BOROUGH OF BETHNAL GREEN ELECTRICITY DEPARTMENT

Appointment of Plumber-Jointer

THE Council invites applications for the appointment of a Plumber-Jointer. Applicants must have had experience in high tension and low tension cables.

The rate of pay will be that prescribed by the Electricity Supply Industry (District Council No. 10) Greater London Area, at present 2s. 8d. per hour.

The appointment will be subject to the Council's Superannuation Act and By-laws, and the successful candidate must pass a medical examination.

Applications, in writing, must reach me at the Town Hall, Bethnal Green, E.2., by 10 a.m. on Saturday, November 2nd, 1946, and should be endorsed "Plumber Jointer." Canvassing will disqualify.

S. P. FERDINANDO,
Town Clerk.
3186

EAST GRINSTEAD URBAN DISTRICT COUNCIL ELECTRICITY DEPARTMENT

Appointment of Mains Superintendent

APPLICATIONS are invited for the above permanent appointment. Conditions of employment will be in accordance with the N.J.B. Schedule of Conditions and Salaries under Class B, Grade 3 (at present £507 per annum).

Applicants must have had a sound technical and practical training in the operation and construction of E.H.T. and L.T. distribution systems. Knowledge and experience in the maintenance, routine testing and erection of substation equipment, fault localisation, change-over schemes from D.C. to A.C., and mercury arc rectifiers (glass bulb type) are essential.

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, whether married or single, training and present position, together with copies of three recent testimonials, should be sent to the undersigned not later than noon on Monday, the 28th day of October, 1946. Envelopes should be endorsed "Mains Superintendent." Canvassing, directly or indirectly, will disqualify.

L. R. BENNETT,
Clerk to the Council.

Council Offices,
East Grinstead, Sussex. 3087

COUNTY BOROUGH OF WALSALL ELECTRICITY SUPPLY DEPARTMENT

Deputy Engineer and Manager

APPLICATIONS are invited for the position of Deputy Engineer and Manager of the Electricity Supply Undertaking at a salary in accordance with Class G, Grade 1, of the National Joint Board Schedule of Salaries (at present £832-852-870). Applicants must be Corporate Members of the Institution of Electrical Engineers, or of equivalent standard, and have had sound technical education and technical, administrative and commercial experience of a progressive electricity undertaking. The appointment will be subject to the provisions of the Local Government Superannuation Acts and the successful candidate will be required to pass a medical examination. Applicants must disclose whether they are related to any member or employee of the Walsall Town Council and canvassing, directly or indirectly, will disqualify. Applications must be submitted on the appropriate form, which may be obtained from the undersigned, and should be returned, together with copies of testimonials, not later than Tuesday, 19th November.

D. HOLT,
Engineer and Manager.

Electricity Supply Department,
Upper Bridge Street, Walsall.
15th October, 1946. 3104

ROYAL BERKSHIRE HOSPITAL, READING

RESIDENT Electrician required. Salary at the rate of £300 per annum. House provided in hospital grounds.

Applicants must have served full apprenticeship in electrical engineering and possess extensive knowledge of A.C. services, including alternators, lifts, motors, etc. Previous experience in hospital maintenance work an advantage.

Applications, stating age, qualifications and previous experience, and accompanied by copies of three recent testimonials, to be sent to the House Governor immediately. 3133

WARWICKSHIRE COUNTY COUNCIL

Rugby College of Technology and Arts

A full-time Lecturer is required for Physics to Final B.Sc. standard. Salary according to Burnham Technical Scale. Application form and further particulars may be obtained by sending a stamped addressed envelope to the undersigned, by whom applications should be received as soon as possible.

P. I. KITCHEN,
Organiser of Further Education in Rugby.

College of Technology and Arts,
Eastlands, Rugby. 2952

CORPORATION OF GRAVESEND ELECTRICITY DEPARTMENT

Draughtsmen

VACANCIES exist in this department for two Draughtsmen, at a salary of £413 per annum, Grade 8a, Class F, rising to £429 and thereafter to £442 or £459 according to ability. Considerable extensions are in progress on the distribution system and new offices and workshops are being designed. Power station reconstruction is also in hand. Applicants will be considered from both manufacturing firms and supply undertakings.

One draughtsman will be specifically required to deal with building construction work, while the other will be concerned with mains records, wiring, diagrams, etc.

The conditions of employment are those of the N.J.B. Agreement and successful candidates will be superannuated after passing a medical examination. Applications should be sent to the undersigned before 16th November.

G. V. HARRAP, A.M.I.E.E., M.I.I.A.,
General Manager and Engineer.
3164

A First-class Representative required for Yorks. by cable manufacturers. Cable sales experience preferred, but not essential. Good salary and expenses £400-£500 per annum with commission and bonus according to qualifications. Write, giving full details of past experience.—Box 9790, c/o The Electrical Review.

A Midlands house of repute will shortly require the services of two Salesmen, whose qualifications should incorporate a sound knowledge of the electrical and radio trades, coupled with first-class selling ability and retail trade connections. Remuneration will be by salary, commission and expenses. Applicants should state, in confidence, full details of their previous experience.—Box 3075, c/o The Electrical Review.

ARMATURE Winder or good Improver required, used to all types of motors. Knowledge of dismantling and assembly of motors a good advantage. Apply to—Messrs. Charles H. Harwood & Co. Ltd., 32, Meyrick Road, Willesden, N.W.10. 114

ARMATURE Winder Foreman for repair shop, also armature winder & improvers.—W. H. Sugden & Co. Ltd., Glenny Rd., Barking. 2934

ARMATURE Winder required (W.R. Yorks), used to A.C. and D.C. Must have full knowledge and capable of taking charge of new dept.—Box 9764, c/o The Electrical Review.

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

ARMATURE Winders and Improvers wanted for General Repair Works. A.C. and D.C. top rates.—Phillips & Sons Electrical Ltd., 40, Waterford Road, S.W.6. 3066

ARMATURE Winders and Improvers required, A.C. and D.C., top rates, good working conditions.—Electrical Power Repairs (Gillingham) Ltd., Strover Street, Gillingham, Kent. 9664

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

ASSISTANT Plant or Maintenance Engineer required to do certain amount of drawing work in addition to dealing with shop queries. Location of work is at Rugby. Full details of training and experience should be given. Basic salary up to £7 per week, according to experience and ability, plus 32/6 married, 29/6 single, staff war bonus.—English Electric Co. Ltd., Queens House, Kingsway, W.C.2. 3008

AUTOMOBILE Dynamo and Starter Armature Winder, able to undertake fr. h.p. motor rewinds. Fully experienced and able to take charge of any established department. Permanency and good prospects. West London district. Write, stating age, experience and salary required, to—Box 2959, c/o The Electrical Review.

BIRMINGHAM area. Energetic young man wanted, preferably with connection with electrical wholesalers and contractors to act as Sub-Agent for remunerative repeating line—commission basis.—Box 3173, c/o The Electrical Review.

CINEMATOGRAPH Engineer required to take charge of installation and service for important distributors of sound film apparatus, Middle East. Attractive salary on three year contract can be offered to really first-class man with good technical knowledge and thorough experience of sound film equipment. Write full details experience, qualifications, age and present salary to—Box 3113, c/o The Electrical Review.

DRAUGHTSMAN, having first-class experience on direct current motors up to 50 b.h.p. Give details of experience, salary expected and when available to Personnel Manager (Birmingham area).—Box 3132, c/o The Electrical Review.

CIVIL Service Commission. The Civil Service Commissioners announce that a special competition will be held for appointments as Assistant Examiner in the Patent Office under the Board of Trade. Approximately 200 vacancies will be filled by competitive interviews spread over a period of two or three years. Vacancies will be available for mathematicians, physicists, chemists, electrical engineers, mechanical engineers and persons with general scientific qualifications. Candidates must have passed an examination qualifying for a University degree or its equivalent or hold other qualifications specified in the regulations. Candidates must have been born on or after the 2nd August, 1910, and have attained the age of 20 on the 1st January of the year in which they compete. Allowance will be made for service in H.M. Forces prior to 3rd September, 1939, and for service as established civil servant commencing before age 25, the latter allowance being subject to a maximum of two years. The salary scale is £250 a year, rising to £400 a year (men), £350 a year (women), plus consolidation additions varying from £78 a year (men) and £63 a year (women) at the minimum of the scale to £90 a year and £72 a year for men and women respectively at the maximum. Commencing salary will vary according to age. Subject to efficiency there is advancement after 5 years' service to Examiner, £450 to £750 (men) and £375 to £650 (women). There are prospects of promotion to higher grades. Candidates who have served or are serving in H.M. Forces must send in their application forms in time to reach the Civil Service Commission not later than 1 February, 1947. All other candidates must send them in by 1 December, 1946. Copies of the regulations and forms of application may be obtained from the Secretary, Civil Service Commission, Burlington Gardens, London, W.1, or from the Chief Officer, Civil Service Commission, at the following addresses, quoting No. 1664: (India) 10, Underhill Lane, Delhi; (Egypt) 8, Sharia Tolumbat, Garden City, Cairo; (Italy) c/o G.H.Q., C.M.F.; (Germany) c/o 2nd Echelon, G.H.Q., B.A.O.R. 3117

DESIGNER Draughtsman experienced. Industrial and commercial type electric lighting fittings. Sound knowledge of mechanical optical and electrical aspects. Permanent position, pension scheme, salary according to age and experience. Apply to—Staff Manager, The General Electric Co. Ltd., Magnet House, Kingsway, W.C.2. 3185

DESIGNER-Draughtsman required; experienced in development of light electro-mechanical apparatus and preferably with a knowledge of telecommunications laboratory gear; accustomed to workshop practice and production problems; capable of working on own initiative. Apply, stating age, experience, salary, etc., to—Muirhead & Co. Ltd., Elmers End, Beckenham, Kent. 3137

DRAUGHTSMAN capable of developing designs of electro-mechanisms from rough conceptions and supervising model-making. Unusual scope for ingenuity, initiative and advancement. Model Maker also required for same class of product. Guildford district. State age, experience and salary required.—Box 9785, c/o The Electrical Review.

DRAUGHTSMAN, fully experienced in design of transformer on-load tap change gear and/or switchgear. 40½ hours per week, pension scheme and production bonus. Minimum technical qualification, Higher National Certificate (Mechanical). Apply, stating salary required, to—Chief Draughtsman, Hackbridge Electric Construction Co. Ltd., Walton-on-Thames, Surrey. 3078

DRAUGHTSMEN for design of Radio Communication Equipment. Experience in this class of work desirable but not essential, although drawing office experience in electrical and mechanical apparatus is essential Location of work is at Chelmsford. Basic salary up to £7 per week plus 25% staff war bonus.—English Electric Co. Ltd., Queens House, Kingsway, W.C.2. 3009

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

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

DRAUGHTSMEN, Senior and Juniors, over 22, required for power transformers, by a large Birmingham firm. Electrical experience desirable but not essential.—Box 2893, c/o The Electrcial Review.

DRAUGHTSMEN (25/35) required for the Manchester district, with experience in A.C. and/or D.C. machinery. Applicants must be capable of preparing own calculations, etc. State age, full experience and salary required.—Box 3128, c/o The Electrical Review.

DRAUGHTSMEN (Senior) required for layout of electrical services, substations and lighting for new wide strip mill. Must be familiar with electrical controls of tandem mills and reversing mills. Office situated Newport, Monmouthshire, later may move to Banbury. Apply—Northern Aluminium Company Ltd., General Engineering Department, Banbury. 3110

ELECTRIC Lamps (miniature) Foreman Charge-hand, South London factory. Qualifications, stem making, head lamps in particular, sealing, etc. Some knowledge of filaments an asset.—Box 3152, c/o The Electrical Review.

ELECTRICAL company shortly opening London premises intends to commence contracting side to business. Fully experienced electrician required take charge. Excellent opportunity for man prepared to move forward with developing business. Full details age, experience, salary.—Box 9741, c/o The Electrical Review.

ELECTRICAL Engineer for the Manchester district, experienced in dealing with contracts, also technical and commercial correspondence relating to all classes of A.C. and D.C. machinery and appropriate ancillary equipment. State experience, age and salary required.—Box 3130, c/o The Electrical Review.

ELECTRICAL Engineer required to assist in technical and administrative work in a Test Room engaged in the production and finishing of instruments of precision. Applicants must have had previous experience in testing all types of accurate moving coil instruments. Degree man preferred. Factory situated in Home Counties. Progressive post for the right man. State age, experience and salary required.—Box 3048, c/o The Electrical Review.

ELECTRICAL engineering firm in Essex have a vacancy for a Jig and Tool Draughtsman between 25 and 30 years of age. Experience in machine tool design an advantage but not essential. Apply, stating experience and salary required, to—Box 3024, c/o The Electrical Review.

ELECTRICAL/Mechanical Designer - Draughtsmen, senior and junior, with good all-round experience, required for work on switchgear, special purpose machinery, machine design, etc., by firm of consultants in London area. Interesting variety of work and good prospects of advancement to proficient applicants. Box 3098, c/o The Electrical Review.

ELECTRICAL Repairers. Capable men required for work on industrial electrical equipment. Good rates of pay to men of ability. Write—Cox & Danks Ltd., Faggs Road, Feltham, Middx. 3076

ELECTRICIAN, must be used to power and automatic control gear.—Boys, 187, Goswell Road, E.C.1. 3151

ELECTRICIAN required for electrical installation work; must be adaptable and capable of taking charge of large and small jobs. Permanency with paid holidays for right man. South London district.—Box 9765, c/o The Electrical Review.

ELECTRICIAN wanted by small London contractor, for general installation work.—Box 9773, c/o The Electrical Review.

ELECTRICIAN with energy and initiative for London area, experienced factory installations, breakdowns and maintenance.—Box 9751, c/o The Electrical Review.

ELECTRICIAN with experience of shopfitting for work in London and small proportion in provinces. T.U. —Box 2976, c/o The Electrical Review.

ENGINEER required to take immediate control of erection and running of Short Circuit Testing Station for Switchgear. Must have had previous experience in this type of work, and ability to control staff. Reply, stating age, experience and salary required, to—Box 3120, c/o The Electrical Review.

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

ESTABLISHED contracting firm has vacancy for qualified Engineer. Partnership with investment would be considered to one fully experienced in contracting work.—Box 9770, c/o The Electrical Review.

EXPERIENCED Draughtsmen are required by large electrical firm in Midlands. Must be familiar with mechanical design and construction of medium and large A.C. and D.C. machines. Reply, with full particulars, to—Box No. 315, 8, Serle Street, London, W.C.2. 2967

EXPERIENCED Designer to take charge of electric motor designs. Applicants should have held similar position elsewhere. Generous salary will be paid to applicants having the necessary qualifications.—Box 2906, c/o The Electrical Review.

EXPERIENCED Designer-Draughtsman. Decorative electric lighting fittings. Period and modern styles. Sound knowledge of mechanical and electrical aspects essential. Permanent position, pension scheme, salary according to age and experience. Apply to—Staff Manager, The General Electric Co. Ltd., Magnet House, Kingsway, W.C.2. 3184

FERGUSON, Pailin Ltd., Higher Openshaw, Manchester 11, require an inside Sales Engineer to handle switchgear enquiries and orders. Previous switchgear experience essential, preferably in similar capacity. 3183

FIRM of Consultants, London area, have vacancies for Draughtsmen with experience in circuit diagram and detail diagram work. Good prospects for suitable applicants. Write, stating full particulars, to—Box 3099, c/o The Electrical Review.

FIRST-class Draughtsmen urgently required for radio and electrical engineers in London area. Experience in radio apparatus and/or machine design essential. Write, stating age, experience and salary required, to—Box 3148, c/o The Electrical Review.

FIRST-class Practical Engineer wanted, thoroughly accustomed to the complete overhaul of high-speed petrol and Diesel engines.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 3161

FOREMAN wanted by leading firm of cable manufacturers for copper wire mill, including pickling plant and annealing ovens. Applicants should be between 30 and 40 years of age and must be conversant with all modern methods and fully capable of taking complete charge of plant, including die room for the re-finishing of synthetic and diamond dies. The position, which is a staff appointment, is progressive and superannuation benefits are available.—Box 3023, c/o The Electrical Review.

HARRODS Ltd. require Manager for their Engineering Department; must be a first-class engineer, with good technical qualifications and experienced in organising the planning, installation and maintenance of general engineering service and factory equipment, including steam and oil engines, electricity generation, heating, ventilation, extensive electric lighting and general electrical installations. Applicants should be between 35 and 42 and have held a position of senior responsibility. Commencing salary of £1,000 to £1,250, according to qualifications. The position is pensionable. Applications, giving full details of education, training and experience in writing, to—Personnel Director, Harrods Ltd., London, S.W.1. 3106

HIGHLY-qualified Mechanical and Electrical Engineer as Assistant Manager in full charge of maintenance and design of plant at large producing mine in Australia. Salary, £2,500 (Aust.) p.a. with free furnished house, light and water. Apply in writing with full particulars of training and experience to—Box 1123, Walter Skinner Ltd., 20, Copthall Avenue, London, E.C.2. 3169

IMPERIAL Chemical Industries Ltd. Applications are invited for the position of Shift Electrical Engineer to take charge of a large converter substation at the Company's Cassel Works at Billingham. Applicants should preferably be between 30 and 45 years of age and should have a sound technical training and experience in high and low pressure switching and in the operating and maintenance of converting and transforming plant. Salary will depend on qualifications and experience. Applications, giving date of birth, and details of qualifications and experience, should be addressed to—Staff Manager, Imperial Chemical Industries Ltd., General Chemicals Division, Cunard Building, Liverpool, 3. 3176

INSULATION Testing. Large London factory manufacturing insulating varnishes, components, etc., has vacancy for Assistant in their Insulating Laboratory. Applicants should be conversant with physical and electrical testing to standard specifications and the use of up-to-date testing equipment. The position will be permanent and pensionable. Reply, stating age, qualifications and salary required, to—Box 2872, c/o The Electrical Review.

JUNIOR Draughtsman for the Manchester district, experienced in A.C. or D.C. machinery. Good prospects for keen young man. State age, experience and salary required.—Box 3129, c/o The Electrical Review.

JUNIOR Engineer required, preferably with some estimating experience, particularly on overhead line extension costs. Applications giving full details of experience and stating salary required, to—West Cambrian Power Co. Ltd., Electric House, Norton, Tenby. 9723

JUNIOR Sales Engineer required, must have knowledge of industrial electrical equipment and be good technical correspondent. Preference to holder of Nat. Cert. (Electrical) or equivalent.—Box 3177, c/o The Electrical Review.

JUNIOR Engineers required, preferably with degree or diploma in electrical engineering, for technical and research department of a large electrical manufacturer.—Box 3166, c/o The Electrical Review.

JUNIOR Switchgear Estimating and Sales Engineer required for London office. State experience, age, salary required, etc., to—J. G. Statter & Co. Ltd., 82, Victoria Street, London, S.W.1. 3097

LADY or gentleman required as assistant to export manager by city firm. No Saturdays. Write—Box "C.P.M.," c/o 95, Bishopsgate, E.C.2. 2999

LEADING firm of electrical manufacturers requires Assistant Manager for a sales department. Age about 35, with technical training and preferably with commercial experience of lamps and lighting supplies business. Applications, giving age and particulars of education and experience, to—Box 2980, c/o The Electrical Review.

LIFT Draughtsman required immediately. Must have first-class experience and be able to work on own initiative. Good prospects for right type of man.—Box 3119, c/o The Electrical Review.

MANAGER for Electrical Showrooms. Must be first-class man with modern experience. Good salary and excellent prospects.—E. W. Jones (Electrical) Ltd., The Square, Wellington, Salop. 9739

MANAGER or Manageress of good appearance and personality required for high-class electrical and radio retail and art goods business, 30 miles from London. Must be thoroughly capable and able to take full control. Write with particulars, stating age, experience and salary required.—Box 115, c/o The Electrical Review.

METHODS Engineer and Ratefixer for light electrical assemblies and machine shop. Applicants must be widely experienced in electro-mechanical engineering and able to work on own initiative. Knowledge of electrical measuring instruments essential. Commencing salary £450-£500, according to qualifications.—Box 3111, c/o The Electrical Review.

MICA Products Ltd., 1, Downs Park Road, London, E.8, require Two Representatives for London and the Home Counties with connection amongst leading engineering, electrical and radio firms, to sell mica, micanite, laminated tubes and sheets, all types of machined plastics, injection and compression mouldings. Letters only, marked S.M., giving experience and salary required. 2836

MUFULIRA Copper Mines Ltd., Northern Rhodesia, invite applications for the position of Electrical Engineer. Applicants should be between 35 and 40 years of age and should hold a University degree in electrical engineering, or an equivalent qualification, and should preferably be experienced in all of the following: A.C. power generation and distribution; installation and maintenance of switchgear and motors; Ward-Leonard and A.C. hoisting equipment; D.C. traction. The appointment involves the organization and direction of the activities of the electrical section of the engineering department, both on surface and underground. Power distribution approximately 20,000 kW. Commencing salary from £1,000 per annum, according to qualifications and experience. Write in first instance for application form to—Mufulira Copper Mines Ltd., Selection Trust Building, Mason's Avenue, Coleman Street, London, E.C.2. 3082

OPERATORS wanted, cable trade, North Midlands, for all branches wire drawing, tinning, extruding, diamond polishing, etc. Good steady job and housing arranged for right type. Write in confidence, giving details of experience, etc., to—Box 3121, c/o The Electrical Review.

OPPORTUNITY for young man with flair for publicity and sales promotion and to act as assistant to sales manager in transport engineering concern. Write, stating experience, age, salary, etc., to—Box 3081, c/o The Electrical Review.

ORDER Clerks (Male or Female). Neat hand-writing essential. Used to dealing with telephone calls. Write to—Staff Manager, The Sun Electrical Co. Ltd., 118/120, Charing Cross Road, W.C.2. 3115

OVERHEAD Linesmen and Steel Erectors required for electricity transmission lines to be erected throughout the country. Must be mobile and fully skilled. Write to—Labour Officer, British Insulated Callender's Cables Ltd., 60, Hillmarton Road, N.7. 3144

PACKER and Storekeeper wanted. Experienced and responsible. Good position. Write fully—M. F. & Co. Ltd., 37, Aylmer Parade, N.2. 3168

PLUMBER-Jointers, E.H.T. and Low Tension required at Oxford and in Berkshire. Conditions of service and rates of pay as per No. 9 D.J.I.C. Present rate 2s. 4d. per hour. Apply—Wessex Electricity Coy., Oxford Road, Newbury. 3155

PRODUCTION Manager required to take charge of electronic instruments department. Salary £750. Apply in writing giving full details of training and experience to—L. M. K. Manufacturing Co. Ltd., Harlequin Avenue, Great West Road, Brentford. 3163

REQUIRED, for extensive development programme, Electrical Draughtsmen with experience in steelworks H.T. and L.T. distribution schemes, substation design and layout, A.C. and D.C. heavy industrial control gear. Draughtsmen with similar experience in other industries would be considered. Apply by letter, stating age, experience and salary required, to—Chief Draughtsman, Dorman Long & Co. Ltd., Central Engineering Dept., Britannia Works, Middlesbrough. 41

REQUIRED, Plant Layout or Builders' Draughtsman conversant with the usual engineering workshop service equipment, such as compressors, boilers and the various service mains, preferably also conversant with building construction and plant installation in order to cover layout drawings and ordering of equipment. Will be required to progress this type of work and provide any technical liaison required. Location of work is at Rugby. Basic salary up to £7 per week, according to experience and ability, plus 32/6 married, 29/6 single, staff war bonus.—English Electric Co. Ltd., Queens House, Kingsway, W.C.2. 3007

RESEARCH Assistant required for London area. Candidates should have experience of research allied to industry, and preferably some knowledge of magnetic materials and their use in electrical instruments. Applicants should give details of experience, age and salary required.—Box 3091, c/o The Electrical Review.

SENIOR Chemist required for electrical engineering works laboratory in London area, B.Sc. standard, preferably with experience in power cables. Salary £500-£600 per annum. Replies will be treated in confidence.—Write Box 2954, c/o White's Ltd. 72 Fleet Street, E.C.4. 3047

SENIOR Design Draughtsman required with experience of automobile or aero electrical equipment. Salary according to qualifications.—Box 3172, c/o The Electrical Review.

SENIOR Designer-Draughtsman required for electrical control gear. Knowledge of contractor design essential, five-day week and excellent prospects. Age over 35. Write details of experience, salary required.—Box No. 316, 8, Serle Street, London, W.C.2. 2966

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SERVICE and Plumber-Jointers. 47-hour week, J.I.C. rates paid. Apply—Chief Electrical Engineer and Manager, Corporation Electricity Dept., Woodbridge Road, Guildford, Surrey. 3108

SUPERVISING and Estimating Engineer. Applications are invited for Supervising and Estimating Engineer to well-known firm of London electrical contractors. Write in first instance, stating salary and experience, to—Box 3109, c/o The Electrical Review.

SALES Representative with knowledge of E.L.M.A. Lamps, Lighting Equipment, Cables, etc., required for London area by well-known electrical manufacturers. Write, stating age, experience and salary required, to—Box No. 108, c/o Dorland, 18, Regent Street, London, S.W.1. 3146

TELECOMMUNICATION Draughtsmen required for preparation of wiring diagrams, running sheets and the routing of schematics. Should have had experience in cable-forming, rack wiring and installation work. Apply—Reference 634, Siemens Brothers & Co. Ltd., Woolwich, London, S.E.18. 2981

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WANTED for transformer sales department, Technical Correspondents for the preparation of tenders and the handling of orders. Applicants should be of good education and have sound technical electrical training, preferably with workshop experience. A detailed knowledge of transformers, voltage regulating equipment and reactors is preferred. Good salary and prospects are offered to applicants with the right experience. Apply in writing to—Personnel Manager, Metropolitan-Vickers Elect. Co. Ltd., Trafford Park, Manchester, and mark envelope "Technical Correspondent." 2990

WANTED by N. London firm of repute, working Electrical Engineer. Experience manufacture, operation and repair of electric motors and associated equipment, ¼ to 100 h.p. Duties would comprise inspection of machines for repair, diagnosis of test faults, attendance on outside breakdown jobs. Only first-class men should apply for this vacancy, which is a permanency and has good prospects for advancement. State wages required.—Box 3064, c/o The Electrical Review.

TECHNICAL Assistant required for technical department of an electrical manufacturer, N.E. England. Minimum qualification, Higher National Certificate.—Box 3165, c/o The Electrical Review.

WELL known Midland works require Senior Chemist, preferably with good works experience in technical control of electro-plating and metal finishing processes. Graduate in Chemistry. Not over 35. Also Assistant Chemist of Inter-science standard, up to 25 years. Experience in general analytical work.—Box 3101, c/o The Electrical Review.

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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.

CENTRAL Electricity Board (South-East and East England Districts)—First Assistant Control Engineer. All applicants are thanked.

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AUSTRALIA. British Engineer, at present in Forces (E.M.E.) abroad, proceeding Australia on release in few months, seeks position there representing manufacturer. Has many years' experience abroad in handling all aspects of imports and sales of engineering equipment. Electrical engineer by training. Age 39. Reasonable salary and commission with good prospects required.—Box 9759, c/o The Electrical Review.

B.Sc. (Lon.) Engineering, 4 years' experience with large electrical firm, sound knowledge of welding processes, development, fabrication, etc., seeks appointment London area, research preferred.—Box 9763, c/o The Electrical Review.

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CHARTERED Electrical Engineer (34) desires appointment with managerial responsibility for department. 10 years' experience electrical/mechanical plant inspection, maintenance, repair and installation work. 4 years electrical officer R.A.F. Experienced in maintenance organisation and planning and in plant purchase and repair costing. Has been concerned with many large industrial plants. Would like to join firm expanding on new lines. Particularly interested in agricultural electrification and agricultural plant maintenance. Prepared for small investment or consider partnership.—Box 9789, c/o The Electrical Review.

CHIEF Storekeeper requires situation with live electrical firm, 14 years' experience, age 30. Thorough knowledge of all electrical accessories, and clerical work, future opportunity becoming a buyer.—Box 9724, c/o The Electrical Review.

COMPETENT Electrical and Mechanical Engineer age 34, foreman or representative desires responsible position. Extensive experience of industrial installations and maintenance of A.C./D.C. power plants, installing motors, control gear, lighting, illuminations, heating, ventilation, lay-outs, records and estimating.—Box 9784, c/o The Electrical Review.

ELECTRIC Lamps. Production Specialist with knowledge of all types requires executive or managerial post.—Box 9699, c/o The Electrical Review.

ELECTRICAL Engineer (26), D.F.H. (hons.), Grad. I.E.E., major in R.E.M.E., desires administrative position with responsibility and scope. Technical sales experience, excellent organisation ability and used to handling personnel. Highest references available.—Box 9691, c/o The Electrical Review.

ELECTRICAL Engineer (46) seeks progressive appointment leading to advancement, supervisory or managerial. Design, lay-out, estimating of large private and industrial lighting, power and heating installations. Conversant with office management, control of skilled and unskilled labour.—Box 9786, c/o The Electrical Review.

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ELECTRICAL Contractors' Supervising Engineer, long experience, electrical and mechanical, capable, practical, energetic.—Box 9757, c/o The Electrical Review.

ELECTRICAL Wholesalers' Manager, 27 years' experience, extensive knowledge in all branches, supplies and correspondence, desires change with well-known firm. Not afraid of responsibility. Good connection with the retail trade. Replies to—Box 9792, c/o The Electrical Review.

ELECTRICIAN (charge or otherwise), installations or maintenance, disengaged 17th inst. Progressive job considered anywhere.—Pike, 59, New Road, Croxley Green, Herts. 9754

ENGINEER, A.M.I.E.E. (36), 20 yrs.' exper. manufacturing and development. Chief draughtsman all types dynamo electric machinery. Requires progressive position as Assistant Production Manager or Assistant Chief Engineer. London or Home Counties. Minimum salary £650.—Box 9772, c/o The Electrical Review.

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EX-technical officer (29), 4½ years' commissioned service, industrial electrical experience, academic qualifications, seeks technical sales post or as technical assistant. Any progressive position considered. Own car.—Box 3094, c/o The Electrical Review.

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IF you want a Chief or Assistant Engineer (age 39, B.Sc., A.M.I.E.E., etc.) for a telephone operating company abroad please write—Box 9745, c/o The Electrical Review.

SERVICE Engineer and Electrician, 25 years' electrical and mechanical experience, competent and well trained.—Box 9753, c/o The Electrical Review.

TECHNICAL Assistant (33), requires position in agricultural dept. of supply company, interviewing, estimating and supervising, good practical and technical experience.—Box 9716, c/o The Electrical Review.

TELECOMMUNICATIONS Engineer (36), B.Sc., A.C.G.I., A.M.I.E.E. having wide experience of telephony including carrier telephony desires post giving opportunity of developing and applying his knowledge of radio engineering.—Box 9788, c/o The Electrical Review.

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FOR SALE

1 1,000-kW Rotary Converter;
1 300-kW Rotary Converter;
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1 6-panel, heavy current, D.C. Switchboard;
1 9-panel, 33-kV, metalclad Switchboard;
2 3-panel, 6.6-kV, metalclad Switchboards;
1 2,800 ampere-hour Battery;
12 3,000/460/230 volt, single-phase, oil-immersed Transformers;
2 6,600/3,000 volt, single-phase, oil-immersed Transformers.

Miscellaneous loose Switchgear and current Transformers.

Full details and tender form may be obtained from the City Electrical Engineer, Electricity Department, Frederick Road, Salford, 6, Lancs., to whom they should be returned by noon on Wednesday, 13th November, 1946.

H. H. TOMSON, Town Clerk.

3174

A number of unused portable petrol driven Welding Sets, suitable for use with electrodes sizes 6 to 12.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 3157

A. Cooksley & Co. Ltd. offer large selection of used Electric Motors, A.C. and D.C. Write—21/25, Tabernacle Street, London, E.C.2 (Monarch 3357/58). 46

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

A Diesel Generating Set by Davey Paxman. 25 h.p., single cylinder, vertical, cold start, with belt-driven alternator, 15 kVA, 400/3/50, 1,000 revs. Cheap for quick clearance.—Box 3141, c/o The Electrical Review.

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BARCRO Drawing Storage Eliminator. One complete Barcro Drawing recording and reproduction equipment in full working order, comprising: photo copying and projection unit, with frame to take drawings up to 40" × 30", washing and developing tanks, print and film dryer, material storage cabinet, safelights, electric heater, electric timer, and other accessories. Immediate delivery on completion of sale. The complete equipment is in first-class condition and can be inspected as a working unit on application to—Box 3071, c/o The Electrical Review.

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

BREAKFAST Cookers. 110 reconditioned, 2 kW, complete with pans, as new, by English Electric and Siemens, 70/- each or offer. Minimum lots of six, carriage paid, customers to provide packing.—Bacup Corporation Electricity Department, St. James' Square, Bacup, Lancs. 3084

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MOTOR, 3-ph., 50 c., 380/415 v., 37 amps, 18.5 kW, 25 h.p., 1,435 r.p.m., Star Delta Totally Enc., new, £60.—Smith & Hammond Ltd., 5, Buckingham St., W.C.2. Tem. 5063. 3175

MOTOR, 11 h.p., 400/50/3/1,420, Crompton Parkinson, slip-ring, no starter, as new, best offer before November 1st secures.—B. & S. Electrical Contractors Ltd., 1, Bridge Street, Guildford, Surrey. 3171

MOTOR Generator Sets and Convertors, all sizes and voltages from ½ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, City Road, London, N.1. Telephone, Clerkenwell 5512, 5513 & 5514. 28

MULTI-Range (Eleven) A.E.G. Millivoltammeter, plush lined carrying case, condition as new, £27.—Allsop, Westfields, Bakewell, Derbyshire. 9730

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

NEW or Secondhand A.C./D.C. Motors can be supplied from stock or at short notice. Specialists in rewinds and repairs. Send your requirements to—John Phillips & Co. (Electrics), 31, Fortune Green Rd. N.W.6 Park 4772). 3015

OSMOR Radio Heart equals complete first-class 5-valve Superhet, positively only small condensers and resistances to find. Super-efficient components. Building instructions, £5 16s. Cabinets. Trade invited.—Morgan Osborne Ltd., Southview Rd., Upper Warlingham 2560, Surrey. 101

ONE ton of Polished Bakelite Cuttings, mostly in pieces 6 ft. to 8 ft. long × 9" wide × ⅛" thick.—John J. Dewhurst, The Mill, Duddington, Nr. Stamford. 3135

ONE 50-kVA L. D. & M. Alternator, 400/440 volts, 3-phase, 50 cycles, 1,500 r.p.m., complete with exciter and switchboard. One 2½-kW Alternator, 110 volts, 1,500 r.p.m., 1-phase, 50 cycles, self-exciting. One 145-kVA, B.T.H., 400/440-volts, 3-phase, 50-cycles, 1,000-r.p.m., auto-synchronous Motor, directly coupled to 120-kW, 230-v., 522-amp. compound generator, complete with all accessories, including exciter and switchboard; and one Complete Distribution Board, suitable for operating on 365/400 volts, 3-phase, 50 cycles, comprising 14 black slate panels, 2 ft. × 3 ft., complete with knife switches, fuses, amp. and volt meters, kilowatt meters, all mounted on steel framework.—D. C. Coward, 140-144, Newfoundland Road, Bristol, 2. 3079

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

PHONE 98 Staines. 90-kW Ruston Diesel Set, 110 vo. D.C.; 25-kW Mirrlees ditto, 110 vo.; 7/9-kW Ruston ditto, 110 vo.; 5-kVA Ruston ditto, 400/1/50; Weir Feed Pump, 8½" × 6" × 13".—Harry H. Gardam & Co. Ltd., Staines. 60

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

QUANTITY 30-amp. D.P. Insulated Sw/fuses for sale.—Box 9756, c/o The Electrical Review.

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

RECONDITIONED Sectional Nissen Huts and other ex-Government buildings for sale. Several available ex stock, Nissens, 36' × 16', £65-£73, delivered. No licence required. Write for further details or call to view prototype erected at—J. Thorn & Sons Ltd., Box 80, Brampton Road, Bexleyheath, Kent. 47

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

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

SACKS and Bags in excellent condition for all commodities, as low as 4d. each. Write—John Braydon Ltd., 230, Tottenham Court Road, W.1. Tel. No. Museum 6972. 79

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

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

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

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

SURPLUS Disposal—50% discount. R.1 Lead Alloy Sheathed Cable: 2 drums 300 yds. 37/083, 1 drum 100 yds. 61/093. 3 drums 500 yds. 91/093, 7 drums 1,200 yds. 127/093. T.R.S. Single Core 660 volt Cable: 12 coils 3,000 yds. 7/064, 3 drums 5,000 yds. 19/052, 5 drums 1,400 yds. 19/064. All original makers' packings. Must be cleared. All or any offers considered.—Electrical Agencies (Belfast) Ltd., College Street, Belfast. Phone 24813. 2983

SWITCHGEAR: Westinghouse oil-immersed, draw out Switches. Ten for sale, various sizes.—Norman E. Potts (Birmingham) Ltd., 105, Alcester Road South, Birmingham. 14

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

TYPEWRITERS, three surplus. Brief £27 10s., Standard £26 10s., Portable £17 10s.—Horton, 15, Palmerston Rd., Sutton, Surrey. 9776

UNUSED D.C. Motors. Fifteen 21 h.p., 220 volt; six 21 h.p., 105 volt and many others.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 3158

USED Double Flanged Bobbins, good condition, 2,000 gross approx. Measurements 3¾" overall, 3½" traverse, 3" diameter flange. Will sell all or part.—Joseph Harari, 42, Whitworth Street, Manchester. 99

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

WEE Meggers, Evershed, 500 v., 20 meg., in carrying case, £12 5s. 6d., ex stock (new).—Robins Electric, 222, West End Lane, N.W.6. 82

2-cub. ft. Refrigerator Cabinet, requires comp., etc.—Batchelor, 64, Purley Oaks Rd., Sanderstead, Sy. 9779

5-kW and 2½-kW, 230/250-volt D.C. Generating Sets, complete with 4-cylinder, 10-h.p. Austin Engines, with petrol tanks, radiators, fans and switchboards. Large number available.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 103

8 Ellison 500-volt, oil-immersed, triple-pole Circuit Breaker Panels, with isolation switch and ammeter up to 15 amp. On stand, complete.—Scottish Electromill Ltd., 51, Lanark Street, Glasgow. 9767

12-h.p., 110-volt, 1,450-r.p.m. D.C. Motors, continuously rated, compound wound, totally enclosed, fan-cooled, unused, complete with E.A.C. faceplate starters. Six available. Write—Box 871, Mason-Peacock Ltd., 184, Strand, W.C.2. 3126

50-kW Alternator by E.C.C., 3-phase, 50 cycle, 415 volts, 750 r.p.m., direct-coupled exciter, v-rope drive, complete with control panel.—Box 9727, c/o The Electrical Review.

100-h.p. Ingleby Motor, prot. type, A.C., 400 volts, 600 r.p.m., 50 cycles, 2-phase, slip-ring, complete with Ellison Rotor and Stator Starter with 2 O.L. and N.V. Can be seen running. Apply—Leeds Consumers' Ice & Cold Storage Co., Marsh Lane, Leeds. 3114

170 House Service Meters, D.C., 250 volts, 1½, 2½, 5 and 10 amps. Secondhand. All in working order. Surplus to requirements.—Consett Iron Company Limited, Consett, County Durham. 3124

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

440-volts, 3-phase, 50-cycles Motors, standard r.p.m., slip-ring. Two 90-h.p. Metro-Vickers; two 50 h.p.; one 40 h.p.; one 20 h.p.—Norman E. Potts (Birmingham) Ltd., 105, Alcester Road South, Birmingham, 14. 3749

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

5,000 good strong Crates, inside measurements 29" × 9½" × 9½", ½" thick, battened all round, at 1s. 9d. each, ex works.—K. Goldser & Sons, 14a, Rectory Square, London, E.1 (Tel. Stepney Green 2550). 75

ARTICLES WANTED

A quantity of Brass Rod, 5/16" diameter, screwing quality, also motorised D.E. polishing spindles.—[illegible], 192, Victoria Street, Grimsby.

A.C. Motors, all sizes, burnt out machines acceptable providing mechanically sound.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 3160

A.C. Motors, 1/50/230 volts, 1,425 r.p.m. Up to fifty of each, ¼", ⅜", ½".—Baxter, Brown Ltd., St. James's Street, Derby. 3093

A.C. Motors urgently wanted, any condition, 400/3/50 type, sizes from 1 to 20 h.p., speeds 1,500 and 1,000. State price.—Bowie Electrical Service, Roscoe Street, Scarborough (Tel. 1264). 2881

A.C. Motors, 3/50/400-440 volts, 1,440 r.p.m. One 5 h.p., two 3 h.p. One 2 h.p. complete with Slide Rails and Starter Gear if possible.—Baxter, Brown Limited, St. James's Street, Derby. 3092

A.C./D.C. Motors wanted urgently, all sizes and voltages. Best prices offered.—John Phillips & Co. (Electrics), 31, Fortune Green Road, N.W.6 (Park 4772). 3016

ACETATE and other thermoplastic scrap; polythene and P.V.C. in any form; also scrap cable and insulated wire; urgently wanted.—Elton Levy & Co. Ltd., 18, St. Thomas Street, S.E.1. 30

CELLULOSE Acetate Offcuts urgently wanted. Send samples and prices to—Box 107, c/o The Electrical Review.

EITHER new or secondhand, 200 yards .06 sq. in. 3-core Cable, paper insulated, lead covered, steel wire armoured, 11 kV grade to B.S.480/1942 for earthed system.—Dendix Brushes Ltd., Chepstow, Mon. Tel. 877. 3134

ELECTRIC Insulating for Norway. Leading Norwegian import firm, buying for own account, wants supplies of electrical insulating material in bakelite, micanite, varnished cambric, steatite. Please apply to—C. Bagge's Asbestkompani A/S, Radhusgt. 6, Oslo. Established 1894. 3103

ENGINEERING Technical Books (new or secondhand) wanted in any quantity. Attractive cash offers. Call—Third floor, 356, Oxford Street, W.1, or "Stoneleigh," St. George's Avenue, Weybridge. 62

FIRE Bar Elements (Flat), 9" × 3", 1 kilo.; also 5 to 15 amp. Switches. Large or small quantities. Offers to—Supreme Electrical Manufacturers, 3, Downs Road, Epsom, Surrey (Phone, Epsom 1358). 9712

FLUORESCENT Lamps, 5 ft., urgently required, any quantity, retail prices paid. Collected London area.—Box 111, c/o The Electrical Review.

FOUR 10-kW Unit Heaters, 440 volts, 3-phase, 50 cycles. Particulars and price to—Lawrenson & Rushton Ltd., 1014, Dumbarton Rd., Glasgow, W.4. 9768

LAMINATIONS, types 75A.4A., required in substantial quantities. Small quantities also considered.—Cornercroft, Fallibroome Road, Macclesfield. 95

MANUFACTURERS urgently require supplies of Iron and Toaster Elements, Fire and Griller Ceramic Elements, 3-core Flexible, all sizes.—Box 3080, c/o The Electrical Review.

MERCURY (Quicksilver) wanted. Write for packing instructions. Gold, Silver and Platinum also purchased.—Collingridge & Co. Ltd., Riverside Works, Riverside Road, Watford (Tel. 5963). 20

NEW, secondhand or reconditioned 3-phase, H.F. Generator Set, output approximately 10 kW, 125 volts, 200 cycles, for 400 volts, 3-phase, 50 cycles supply.—Box 3179, c/o The Electrical Review.

ONE or two 75-kW Steam Generator Sets, 480 volts D.C. Two Lancashire Boilers for the same, to burn wood waste preferred.—Box 9758, c/o The Electrical Review.

REQUIRED: Mica Electric Iron Elements; Toaster Elements; Spirals, nichrome wire; Cotton-covered Flexes; Brass, Copper and Steel Sheets, min. size 9" × 6"; Alu. Strip, ⅜" × ¼"; Machinery, new and used; Timber; Glazing; Rubber Grommets; Asbestos; Switches; Iron Connectors, etc., etc. Offers to—British Diamix Ltd., Metrum Works, Beatty Street, N.W.1. Euston 5951. 44

URGENTLY wanted for Power Station extension, one 25,000/30,000 lbs. capacity Babcock & Wilcox Water Tube Boiler, 200 lbs. working pressure, temp. 580° F., complete with superheater, chain grate stokers, etc.—Box 2932, c/o The Electrical Review.

WANTED by factor, in large quantities, Xmas Decoration Sets. For cash.—Box 9771, c/o The Electrical Review.

WANTED, D.C. and A.C. ball-bearing Motors. Full details to—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 29

WANTED for works change-over the following A.C. 400/3/50-cycle Motors and Starters: one 25-h.p., 960-r.p.m. slip-ring; two duplicate 25-h.p., 960-r.p.m. squirrel-cage; two 12-h.p., 960-r.p.m. squirrel-cage.—Box 3063, c/o The Electrical Review.

WANTED, Rotary Converters, any size. Universal, 221, City Road, London, E.C.1. 22

WANTED. Well known Wholesalers in N.W. Lancs are prepared to make spot cash purchases of switchgear, domestic appliances and regular or clearance lines of all requirements for the electrical contracting trade. Offers in confidence to—Box 3031, c/o The Electrical Review.

WANTED ½ to 1-h.p., 220- and 110-volt, Motors or equivalent dynamos.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 3159

WE are immediate buyers for electrical machinery and heavy power plant of all descriptions. Good prices offered for A1 plant.—G.P.U. Ltd., Wembley, Middx. 3140

1-h.p., 230-v. A.C. or D.C. Motor.—Universal Electrical, 221, City Road, London, E.C.1. 25

2-H.P., 110-volt, D.C. vertical Motor.—Fyfe, Wilson, & Co. Ltd. Bishop's Stortford. 3162

7½ H.P. slip ring ball bearing protected type Motors, 400/440 volts, 3-phase, 50 cycles, 1,440 r.p.m.—Box 3180, c/o The Electrical Review.

24 15-amp. Interlocking Double Pole Switch Plugs in iron boxes, galvanised, but not essential; 36 one-gang square sunk Dolly Switches in iron boxes; 24 two-gang ditto; 24 three-gang ditto; 1" Galvanised Tubing. Licence available.—Bowie Electrical Service, Roscoe Street, Scarborough (Tel. 1264). 2880

300-H.P., 400-volt, 3-phase, 50-cycle, slip ring, 3-bearing Motor with control gear.—Britannia Manufacturing Co., Ltd., 22/26, Britannia Walk, London N.1. 3172a

AGENCIES

ADDITIONAL lines of electrical components and appliances required for distribution throughout the North-West. Please send samples and terms to—Leonard Heys, Faraday House, Henry Street, Blackpool. 3032

AGENCIES required for London, South of England, for the following: (1) Domestic electrical appliances; (2) Brass electrical accessories, switch plugs, etc.; (3) Conduit. Advertisers have clientele with every wholesaler in the territory mentioned. Immediate turnover can be guaranteed. Either commission or buying basis. Post-war arrangements considered.—Box 64, c/o The Electrical Review.

AGENCIES required, South of England, including the London area: (a) Cables; (b) Small Switchgear; (c) Transformers; or any lines suitable for distribution for wholesalers' business.—Box 40, c/o The Electrical Review.

AGENT with first-class Scottish connection, wholesale, trade, corporations, etc., wishes representation.—Box 9694, c/o The Electrical Review.

APPLICATIONS invited from interested parties wishing to be appointed as Agents for the Harbilt Electric Truck. Reply to—Harborough Construction Co. Ltd., Harbilt Works, Market Harborough, Leics. 2739

ELECTRICAL Wholesalers desire to contact manufacturers of high-class Electrical Equipment-Accessories and Domestic Appliances to arrange for sole distribution to retail trade for North England, also export.—Star Domestic Appliances Ltd., 28 Deansgate, Manchester 3. 8641

MANUFACTURERS' Agents, covering the whole of Great Britain and Colonies, are desirous of contacting manufacturers with a view to sole selling rights (either commission or buying), post-war arrangements considered.—Box 23, c/o The Electrical Review.

MANUFACTURERS' Agents, with offices London and South Coast, wish to hear of additional lines, including Cables and Domestic Appliances, for sale to corporations, wholesalers and retailers.—Box 9676, c/o The Electrical Review.

QUALIFIED Electrical Engineer, excellent connections throughout Scotland, corporations, contractors, wholesalers, etc., requires agencies for electrical equipment and accessories.—Box 9761, c/o The Electrical Review.

SOUTH Africa. Representatives, 18 years' experience wholesale electrical accessories and domestic appliances trade, desires contact firm requiring representation in S.A. Excellent ref. Passage booked.—Box 9787, c/o The Electrical Review.

BUSINESS OPPORTUNITIES

CAPITAL and/or equipment provided on equitable basis for development of small electrical contracting business in London, having suitable premises, etc., to accept immediate orders.—Box 9769, c/o The Electrical Review.

SCEMCO Ltd., Fluorescent Lighting Specialists, wish to contact manufacturers of electrical equipment and accessories, including "Novelty" and "Improved" appliances. Domestic fluorescent fittings and components of particular interest. When possible complete output will be taken, and full co-operation given in exchange for sole distribution rights. Replies will be treated with strictest confidence.—Man. Director, Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. 119

BUSINESS PREMISES

FACTORY Extensions, Warehouses, Canteens, etc., erected complete. Plans and licence applications prepared. Consult—The Universal Housing Co. Ltd., Rickmansworth. 109

MISCELLANEOUS

A.S.E.E. EMPLOYMENT BUREAU

THE Association of Supervising Electrical Engineers invite employers, seeking the services of fully-qualified Electrical Engineers for administrative and supervisory positions, to avail themselves of the Association's Employment Bureau.

There are no charges, and only suitably qualified applicants are submitted.

Enquiries to the General Secretary, The Association of Supervising Electrical Engineers, 54, Station Road, New Barnet, Herts. Barnet 6731/2. 3139

SHORTHAND in one week. Test lesson, 3d.—Duttons (E4), 92, Great Russell Street, W.C.1. 24

SHORTHAND Typists, Private Secretaries, Clerks, etc. If you are in urgent need of staff, contact Embassy Secretarial Employment Bureau, Excel House, Whitcomb Street, W.C.2 (Abbey 6745; also Riverside 2330). We specialise in efficient personnel. 90

COMPANY MEETING

BRUSH ELECTRICAL ENGINEERING

Transition Plans

THE adjourned fifty-seventh general meeting of the Brush Electrical Engineering Company Ltd. was held on 22nd October at Falcon Works, Loughborough, Sir Ronald W. Matthews, the chairman, presiding.

The following is an extract from his circulated statement:—

The trading profit of the company for 1945 amounts to £61,217, as compared with £252,875 for 1944. The 1945 figure was adversely affected because of the cessation of hostilities and the consequent cancellation and/or curtailment of practically all your company's Government contracts, with a resultant reduction in turnover of approximately three-quarters of a million pounds. However, a number of cancellation claims on Government Supply Departments have now been agreed, and you will see that a sum of £72,964 has been credited to the profit and loss account.

The net profit of the company amounts to £45,447, against £136,980 in 1944. To this figure of £45,447 must be added to the amount of £11,560, brought forward from last year's account, and a sum of £32,088, being the amount of tax reserve now calculated to be no longer necessary. After making the appropriations, as shown in the appropriation account, there is a balance of £56,744, which your directors recommend should be carried forward. In addition to the fact that a large number of Government contracts were cancelled and/or curtailed during the year under review, there are a number of other factors which contribute to the disappointing drop in profits as compared with recent years, the main one being the disruption caused by the change-over to peace-time production.

Range of New Products

On the cessation of hostilities, production on war-time products ceased more abruptly than it was reasonable to anticipate, and, with the resumption of peace-time activities, your company was faced with the problem of restarting, at the earliest possible date, manufacture of products to pre-war design, or alternatively facing up to the further delays involved in the introduction of extensive modifications and, in a number of outstanding instances, completely new designs. It was decided to adopt the latter course. As a result, your company's production throughout the latter half of 1945, and, in fact, the first half of 1946, was adversely affected by the extensive development, retooling and new shop layouts necessitated by a range of new products which your directors have every reason to believe will ensure the financial well-being of your company for the future.

Your Board is confident that, with the rapidly increasing production of new and improved designs in the entire range of products, the prospects for the future look bright. The reorganization of production facilities has now largely been accomplished and your directors look forward to a steady improvement in the financial well-being of your company.

The report was adopted. 3138

WORK WANTED AND OFFERED

ALL makes and kinds of Electrical and Radio Measuring Instruments repaired by skilled technicians. A.I.D. approved. All work quoted by return without charge. Also for sale, large variety of Voltmeters, Ammeters, Milli-ammeters, 2" and 2½" dials, reconditioned ex-Air Ministry stock. C. Gertler, Dept. A, 20-31, Coweross St., E.C.1 (Tel. Clc. 6783). 9670

ARMATURE, Rotor, Stator Rewinds and Repairs, from fractional to 100 h.p. With the return of our old staff and extended premises we can offer prompt, reliable service. —T. A. Boxall & Co., Horley, Surrey (Phone 654). 2727

ARMATURE Winding: Vacuum Cleaners, etc., single or quantities.—Vac, 80, Cranbrook Road, Ilford. 9612

CAPACITY available for light assembly, December, January. Some machining, London area.—Box 91, c/o The Electrical Review.

CHASSIS, Panels, Brackets, etc., to the trade. Light tool, press, drilling and assembly capacity. New projects entertained.—T.W.N. Products, St. Mary's Works, Southampton. 9781

DRAFTING—tracing, drawing, detailing of all kinds, by experienced draughtsman. Prompt service. Reasonable charge.—W. Day, 98, Hansons Bridge Road, Erdington, Birmingham, 24. 9743

ENGINEERS, Precision, South England, seek manufacture of electrical, mechanical or domestic assemblies or components. Press tools, gauges, small stampings, capstan turning, also Internal and External Grinding. Write—Box 74, c/o The Electrical Review.

LAMPSHADE Wires, any design, from own drawings or samples. Enquiries invited.—Regent Wares, 57a, Queen's Road, Walthamstow, London, E.17. 9711

LIGHTING Fittings, Table Lamps, Bedlights, All Types of Shades; home or export orders undertaken; shades made to customers' requirements. All goods are in the most exquisite and up-to-date designs and finishes. Shades are hand-painted in various designs to suit all customers. Send your inquiries to — Decorshade Ltd., Bromford House, Bromford Lane, Erdington, Birmingham. Tel. No. Erd. 1516. 2744

MACHINING Work, for Centre Lathes up to 6½ in. centres and medium-sized milling (good grade work preferred).—The London Electric Firm, Croydon. Uplands 4871. 56

NORTH London Firm has capacity available for assembling and wiring, paint spraying, plating and sheet metal work.—Box 9760, c/o The Electrical Review.

SHOT Blasting, Metal and Paint Spraying. We are able to undertake the efficient and prompt handling of all goods sent for treatment. Large capacity available. Enquiries to—Commercial Structures Ltd., Staffa Works, Staffa Road, E.10. 112

PARTNERSHIPS

ELECTRICAL Contractors require practical man as partner in genuine business. Small capital.—Box 9755, c/o The Electrical Review.

PARTNERSHIP offered in Refrigeration and Electrical Business. Employing 12 men, present turnover £1,000 per month, showing excellent returns, but in need of extra capital. Amount required possibly about £2,000. —Box 3102, c/o The Electrical Review.

PATENT NOTICES

IT is desired to secure the full commercial development in the United Kingdom of British Patent No. 509895, which relates to Method and Apparatus for Internal Heat Treating of Hollow Objects, either by way of the grant of licences or otherwise on terms acceptable to the Patentee. Interested parties desiring copies of the patent specifications should apply to—Stevens, Langner, Parry & Rollinson, 5 to 9, Quality Court, London, W.C.2. 3116

PATENT Agents.—A. E. Hill, Chartered Patent Agent, 27, Chancery Lane, London, W.C.2. Tele. Chancery 8444. 65

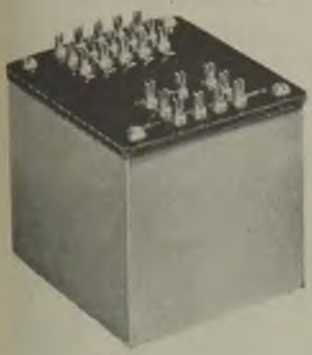
EDUCATIONAL NOTICES

ENGINEERING Careers and Qualifications. Both Government and industry have announced and emphasised that young men with technical knowledge and qualifications must receive every chance of rising to the highest posts within their capacity in post-war engineering and allied industry. Write to-day for "The Engineer's Guide to Success"—200 courses—free—which gives particulars of the first-class training supplied by the T.I.G.B. for the A.M.I.E.E., A.M.Inst.C.E., A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., B.Sc.(Eng.), C. & G., etc., examinations in which T.I.G.B. home-study students have gained 44 first places and over 1,000 passes. The Guide covers careers in all branches, Electrical, Mechanical, Radio, Aeronautical, etc.—The Technological Institute of Great Britain, 35, Temple Bar House, London, E.C.4. 77

LATEST A.M.I.E.E. Results. In the recent examinations held by the Institution of Electrical Engineers 477 candidates sat who had taken B.I.E.T. courses. Of these 457 were successful in passing the examinations. We believe this record of 457 successes out of 477 entrants has never before been approached by any oral or correspondence tutorial organisation, and indicates the very high efficiency of the modern system of technical training which we have laid down. The B.I.E.T. tutorial organisation is waiting to assist you either with a short specialist course or complete training for a recognised examination. We have available a large full-time staff of instructors, while the efficiency of our extensive organisation is a byword among engineers. We guarantee—"No pass—no fee." May we send a copy of "Engineering Opportunities"? Containing a great deal of useful advice and detailed information on over 200 home-study courses and examinations, this handbook is of very real value to the ambitious engineer. Our highly informative handbook will be sent free and without obligation on request.—British Institute of Engineering Technology (established 1927—over 200,000 students), 12, Shakespeare House, 17, 18 & 19, Stratford Place, Oxford Street, London, W.1. 33

PLASTICS offers particularly good prospects to experienced Engineers with a sound knowledge of Plastics Technology. Authoritative home-study courses are now available in General Plastics and specialised branches of the science. Full details of these courses and the prospects in the rapidly-expanding plastics industry will be found in our handbook "Opportunities in Plastics," sent free on request. British Institute of Plastics Technology (Dept. 301), 17, Stratford Place, London, W.1. 2811

Power and Audio Frequency Transformers



POWER TRANSFORMERS 5 VA TO 5 kVA
AUDIO TRANSFORMERS UP TO 1,500 WATTS
EITHER

- Open construction in a variety of mountings, windings vacuum pressure impregnated and varnish sealed.
- Canned and bitumen or wax filled.
- Hermetically sealed, oil filled, with pressure compensation.

SPECIAL FEATURES

- Direct fixing to Transformer structure—no strain on container to cause distortion or leaks.
- No unsightly fixing lugs external to container.
- Male or female threads for upright or inverted mounting at will.

AUDIO TRANSFORMERS—SINGLE, DUAL OR TRI-ALLOW SHIELDED, GIVING NOISE SUPPRESSION UP TO 90 DB RELATIVE TO CONVENTIONAL OPEN ASSEMBLIES

APPLICATION : Microphone, driver, anode to line, line to line, etc.

ASSOCIATED ELECTRONIC ENGINEERS LTD.
DALSTON GARDENS, STANMORE, MIDDLESEX
Tel. : Wordsworth 4474-5-6 **Telegrams : "ELECTRONIC, STANMORE"**

e.h. ER4

J. M. Webber & Co. Ltd

Although supplies are still restricted we can assure our old friends in the trade that we shall do our best to satisfy their requirements

Please let us have your enquiries for :—

BOX BATTERY HAND LAMP
(To take No. 1215 Battery)
RETAIL PRICE complete **6/-**
Purchase Tax 1/-

ELMA LAMPS of all types, Cycle Dynamo and Flash Lamp Bulbs, Radio Panel and Motor Car Bulbs, Cables, Flexibles, Accessories, etc.

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LONDON, W.1
MUSeum 5351 Established 1919

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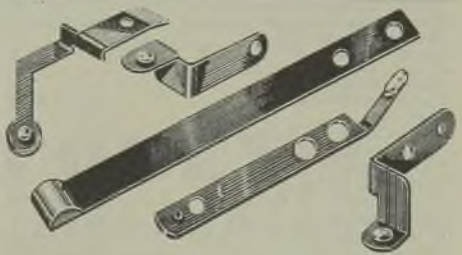

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For Springs of the most intricate designs and precision made of the highest grade materials even to precious metal tips consult Riley of Rochdale. Technical leaders since 1821. On Admiralty, War Office and Air Ministry lists.

ROBERT RILEY LTD
MILKSTONE SPRING WORKS, ROCHDALE
Phone : Rochdale 2237-8. *"Grams : RILOSPRING."*

REG. TRADE RILO MARK

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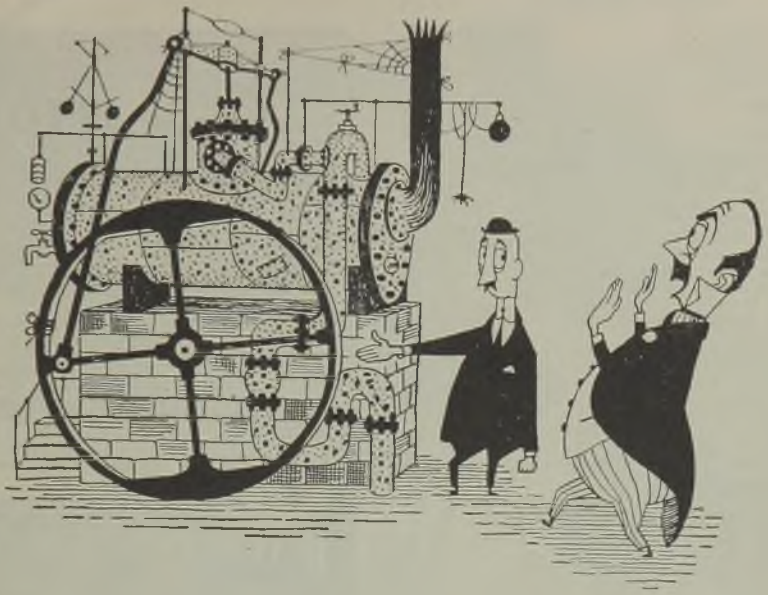

No! No! Haythornthwaite! We said MODERN!

Prejudice against the word *secondhand* dies hard. There are still people who imagine it is a polite way of saying 'out of date'. We invite such Doubting Thomases to inspect our stocks of MODERN SECONDHAND PLANT and MACHINERY. We assure them that to anything even approaching the out-of-date, we sternly refuse admittance. Our stocks include: *Generating Sets, Motors, Switchgear, Transformers, Diesel Engines, Boilers, Pumps, Air Compressors, Cranes, Locomotives, Power Presses and Sheet Metal Working Machinery, Tracks and Wagons, Tanks, Steel Sections, Tubes and Fittings, and virtually every kind of modern Secondhand Works' Equipment.*

GEORGE COHEN'S
for MODERN Secondhand
PLANT AND MACHINERY

GEORGE COHEN, SONS & CO. LTD. *ESTABLISHED* 1834. WOOD LANE. LONDON, W.12
PHONE: SHEPHERDS BUSH 2070 & STANNINGLEY, NR. LEEDS. PHONE: PUDSEY 2241
and at Birmingham, Newcastle-on-Tyne, Sheffield, Manchester, Glasgow, Swansea, Southampton, etc.

ONE OF THE 600 GROUP

4510/P97

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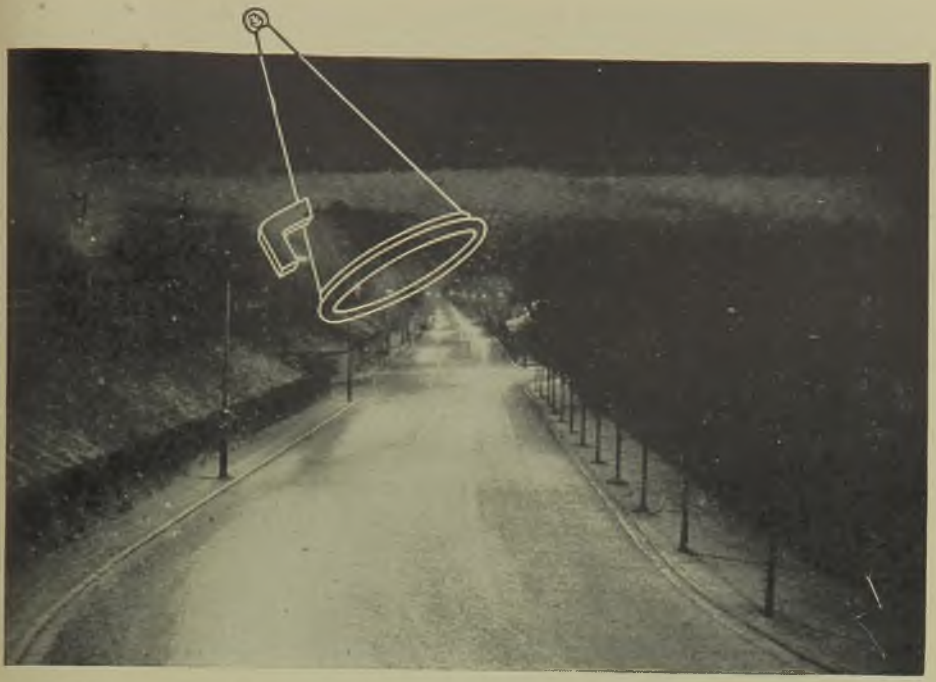
(*Continued from page* 78)

Illustrated here are specimen Window Displays and advertisements which are being used in our Autumn and Winter Lamp campaign.
Please ask your nearest EDISWAN Depot for full details, and particulars of showcards and other interesting material available.
Remember the public will be asking for Royal "Ediswan" Lamps by name.

ROYAL "EDISWAN" LAMPS

L.77

THE BY APPOINTMENT EDISON SWAN ELECTRIC CO. LIMITED



'SNUFFER' METHODS WON'T DO FOR MODERN STREET LIGHTING

The restoration of full lighting facilities and the consequent need in many cases for provision of new material makes the present time opportune for the introduction of Rythmatic Control Equipment. The result will be streets well lighted by lamps controlled simply, efficiently, economically, from one pre-arranged convenient point.

Rythmatic Control Equipment operates through the super-imposition of a high-frequency current over the supply circuit initiated by a 'Master Switch' and transmitted as beat impulses of both pre-arranged frequency and rhythm. This is the modern method of control, proved in service in numerous installations throughout the country. The equipment can be extended to include the control of water-load and other facilities.

A3133-C1

RYTHMATIC CONTROL EQUIPMENT

AUTOMATIC TELEPHONE & ELECTRIC CO. LTD.

MELBOURNE HOUSE, ALDWYCH, LONDON, W.C.2
TEMple Bar 4506

STROWGER WORKS, LIVERPOOL, 7

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Do you need "distilled" water?

Permutit "Deminrolit" Process cuts cost as much as 95%

ANALYSES OF WATER BEFORE AND AFTER TREATMENT BY PERMUTIT 'DEMINROLIT' PLANTS IN COMMERCIAL USE.

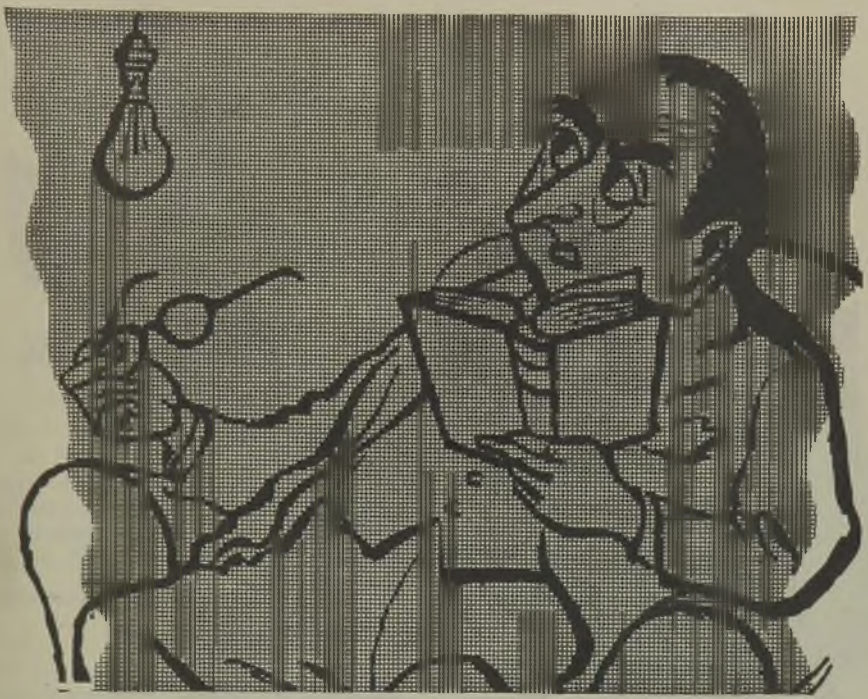
(Note - All figures in parts per 100,000.)

Plant		No. 1		No. 2		No. 3	
Water		Crude	Treated	Crude	Treated	Crude	Treated
Cations							
Calcium	Ca	3.2	-	9.4	-	10.7	-
Magnesium	Mg	0.8	-	0.36	-	1.09	-
Sodium	Na	0.46	0.23	1.0	0.31	1.66	0.44
Total		4.46	0.23	10.76	0.31	13.45	0.44
Anions							
Carbonate	CO_3	4.2	0.24	12.4	0.29	10.5	0.57
Chloride	Cl	1.8	0.06	2.5	0.12	2.84	0.30
Sulphate	SO_4	1.35	-	3.48	0.03	11.95	-
Nitrate	NO_3	-	-	-	-	1.15	-
Total		7.35	0.30	18.38	0.44	26.44	0.87
Total ions in solution		11.81	0.53	29.14	0.75	39.89	1.31
COST per 1000 gallons		5.22d		9.83d		16.5d	

The table shows the composition of some types of water before and after treatment by Permutit's "Deminrolit" Process. Water similar to a distillate is produced by this process at a fraction of the cost. Where distilled water was too expensive you can afford "Deminrolit" water. The process has been in practical use in Great Britain for over 7 years. Write for technical publication "Distilled Water without Distillation" to

PERMUTIT Company Limited

Dept. T.W., Gunnersbury Avenue, London, W.4. Chiswick 6431.



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NEXT TIME HE'LL GET AN ATLAS

Men and women who buy lamps remember the Atlas message because it strikes the right note. That moment of baffled exasperation when a lamp fails—that is the moment when the public is really lamp conscious.

At that moment they remember the Atlas message . . . it is always in the right place . . . at the right time . . . in the leading newspapers and magazines . . . on the best poster sites . . . in the best dealers windows.

Atlas offer the dealer generous rebates and discounts—without any restrictions. Sales aids include attractive display material and a comprehensive window-dressing service. Give YOUR lamp sales new staying power! *Write for Atlas terms today.*

ATLAS LAMPS

FOR STAYING POWER

EXPORT ENQUIRIES WELCOMED

Thorn Electrical Industries Ltd., 105-109 Judd Street, London, W.C.1. Phone : EUSton 1183

Northern Branch : Stevenson Square, Manchester 1. Phone : Central 3185

N. E. Depot : 46 Sandhill, Newcastle-on-Tyne 1. Phone : Newcastle 24068

Paxolin Tubes and Cylinders

Because of their light weight, good mechanical and electrical properties, Paxolin tubes and cylinders were called upon during the war to do many jobs that we had never even thought about. This meant that they were in short supply for their usual job of helping to keep electricity in its proper place. Supplies are now getting back to normal, and we are always pleased to give full particulars of Paxolin tubes and cylinders to those who would like to know more about their electrical or mechanical properties or both.

THE MICANITE & INSULATORS COMPANY, LTD.

Empire Works, Blackhorse Lane, Walthamstow, London, E.17.

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Manufacturers of MICANITE (Built-up Mica Insulation). Fabricated and Processed MICA, PAXOLIN (Synthetic-resin laminated sheets, rods, tubes and cylinders). HIGH-VOLTAGE BUSHINGS and TERMINALS for indoor and outdoor use. EMPIRE varnished Insulating Cloths and Tapes and all other forms of Electrical Insulation. Suppliers of Vulcanised Fibre, Leatheroid, Presspahn, etc. Distributors of Micoflex-Duratube Sleevings and Kenutuf Injection Mouldings (P.V.C.).

A NEW and comprehensive List of **SLIDING RESISTANCES** and **DIMMERS** is now available on application

THERE HE STANDS—symbol of authority in an orderly World — controlling — directing — obeyed because absolutely trustworthy and reliable. What a fitting comparison with BIRCH RESISTANCES, *Arms of the Ohm's Law.* Backed by many years of practical experience in which their reliability has been tested under all conditions, BIRCH RESISTANCES, in their various applications, stand up to their job and can always be depended upon to provide specified service because of their first-class workmanship.

Birch

Please call upon us to help you solve any Resistance problem.

Resistances

ARMS OF THE OHM'S LAW

May we quote you for any of the following:—

DIMMERS — REGULATORS (Field, Shunt, Voltage) — RESISTANCES (Arc Lamp, Charging Regulating, Sliding) — RHEOSTATS — ELEMENTS and SPIRALS.
ASBESTOS WOVEN RESISTANCE NETS AND GRIDS

H. A. BIRCH & CO. LTD., Wilohm Works, Wood Street, WILLENHALL, STAFFS.
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VACUUM & PRESSURE GAUGES

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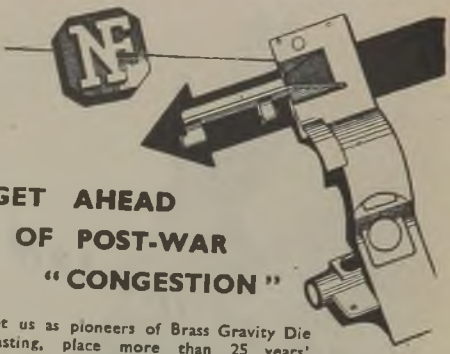
PRECISION MANUFACTURERS SINCE 1750



GET AHEAD OF POST-WAR "CONGESTION"

Let us as pioneers of Brass Gravity Die Casting, place more than 25 years' experience at your disposal. Our technical experts will at all times be happy to give unbiased advice on any and every Die Casting problem involving the use of ALUMINIUM - BRONZE, ALUMINIUM ALLOYS, BRASS and WHITEMETAL.

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Enquiries Invited

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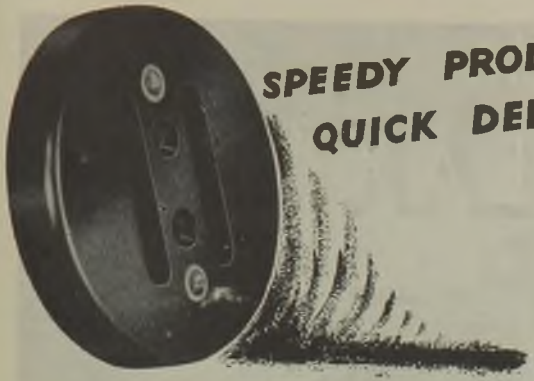
PLAIN & ENAMELLED H.C. COPPER STRANDS



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Our organisation is equipped for the speedy production of high quality mouldings up to 8 ins. square —a compression process in conjunction with electronic pre-heating is used.

Special facilities are available for the design and production of moulding dies to your own specification or samples.

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In every sphere where Bells and sound signals are used, the name "Tangent" is familiar.

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They are made by a firm engaged in the Electrical Industry for over seventy years.

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ESTAB. 1872

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Faraday Works, LEICESTER

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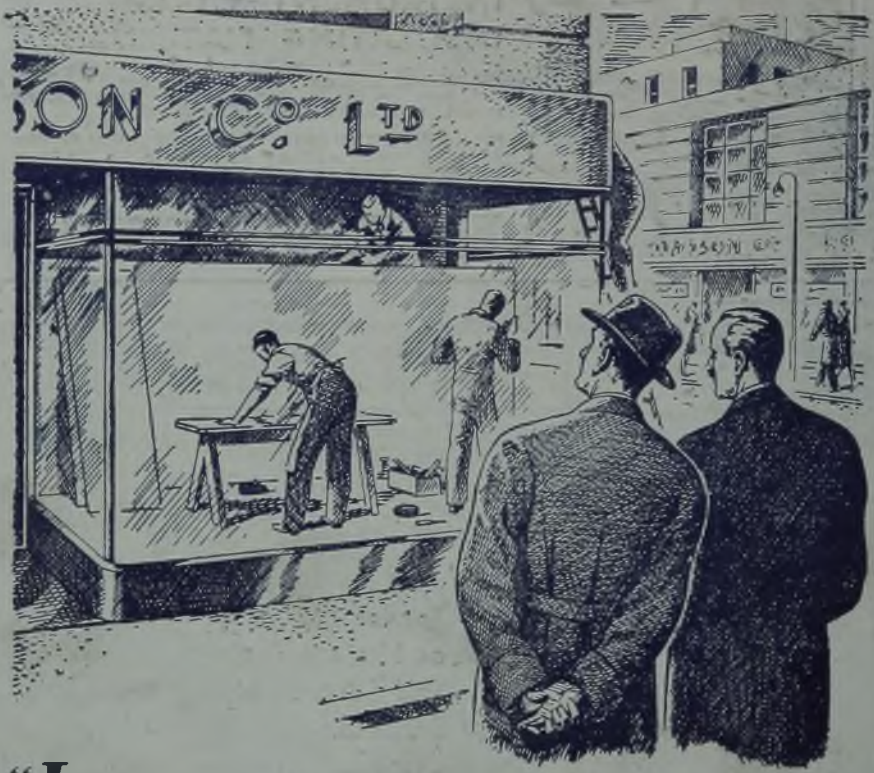


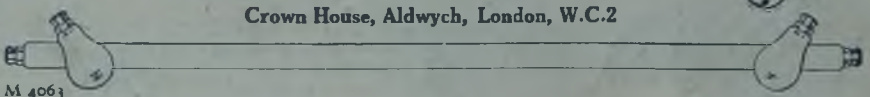
"Lighting is going to be the biggest improvement . . ."

LIGHTING ADVISORY SERVICE *All concerned with the installation or renewal of lighting are invited to communicate with our Lighting Advisory Service, Bridle Path, Watford. Telephone Watford 7701*

HIS contractor very wisely got in touch with the Mazda people. Their Lighting Advisory Service sent qualified engineers to discuss plans — and eventually provided a comprehensive and practical scheme giving due emphasis to the *psychological* and *aesthetic* aspects of lighting in relation to modern selling.

MAZDA LAMPS IN MAZDALUX FITTINGS

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



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