ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXV. No. 3489 OCTOBER 6, 1944 9d. WEEKLY

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.
Telegrams: "WILOHM" Willenhall. Telephone: Willenhall 494-495

Can you see far enough ahead?

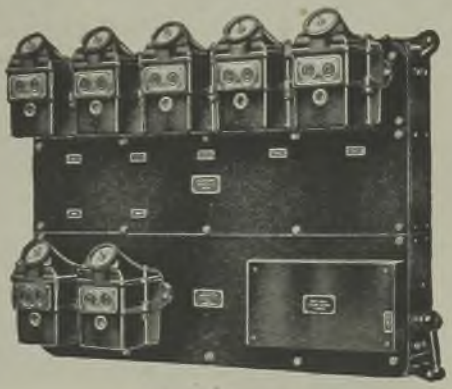
When the war is over, and supplies of lamps are more plentiful, people are going to pick and choose when they buy. The unknown lamp will have no place in their purchases. They will want reliability, quality—they will want Kye. And they will remember the shop from which they bought Kye during the lean war years. Be wise, sell Kye now.

KYE FOR GOODWILL AND SALES

Crabtree "Standard" Units . . .

Crabtree ironclad equipment for the automatic protective control of electric motors embraces a variety of 500 volt direct-on-line, reversing, automatic star-delta, semi-automatic star-delta and 2-, 3- and 4-speed pole-changing switches, variously suitable for the control of circuits with normal line currents of up to 15, 25, 26 and 43 amperes. All these switches can be supplied with or without overload release units, and the majority are also available with or without conduit entry boxes, fuse chambers, isolating switches, or combined fuse chambers and isolating switches. Suitable push-button remote control and emergency " stop " switches can also be provided to facilitate control from a distance or from a number of positions.

. . . or " Specials "



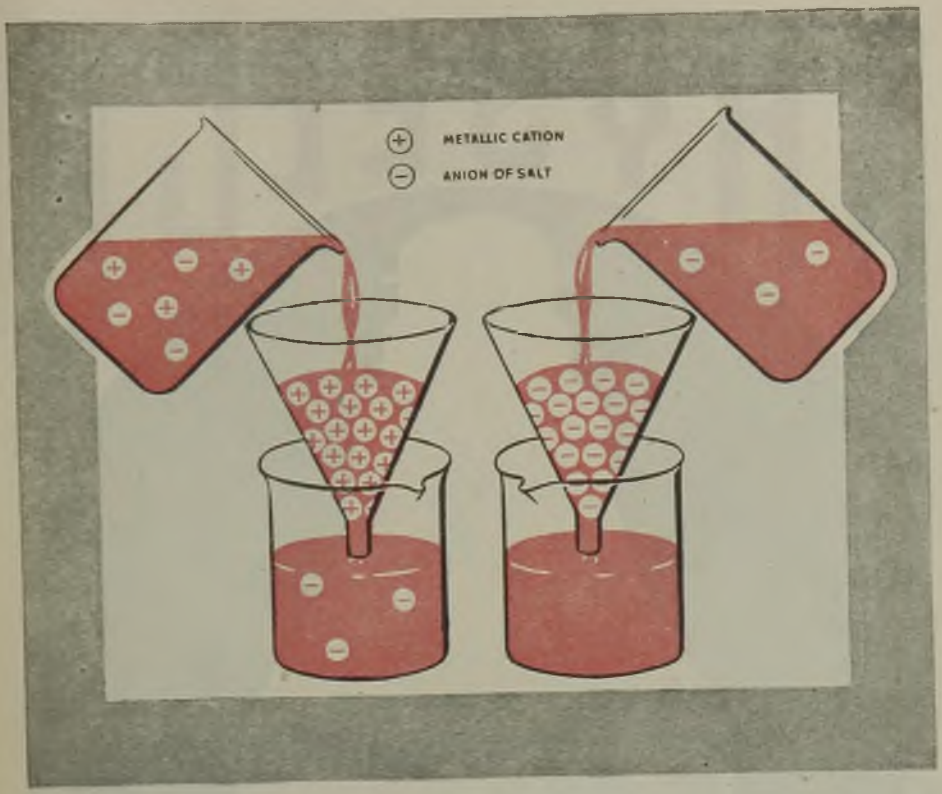
In addition to this extensive range of " standard " gear, the design of the basic Crabtree switch units is such that these can be readily arranged to meet an almost unlimited number of semi-standard and special requirements. Fuller details may be obtained on application to our Control Gear Department, whose services are freely available to all engineers concerned with the protective control of electric motors and machine-tools.

CRABTREE

A · NAME · SYNONYMOUS · WITH · PROGRESS · IN · ACCESSORIES · AND · SWITCHGEAR

" Crabtree " (Registered)

C.573/249. Advt. of J. A. Crabtree & Co. Ltd., Walsall, England



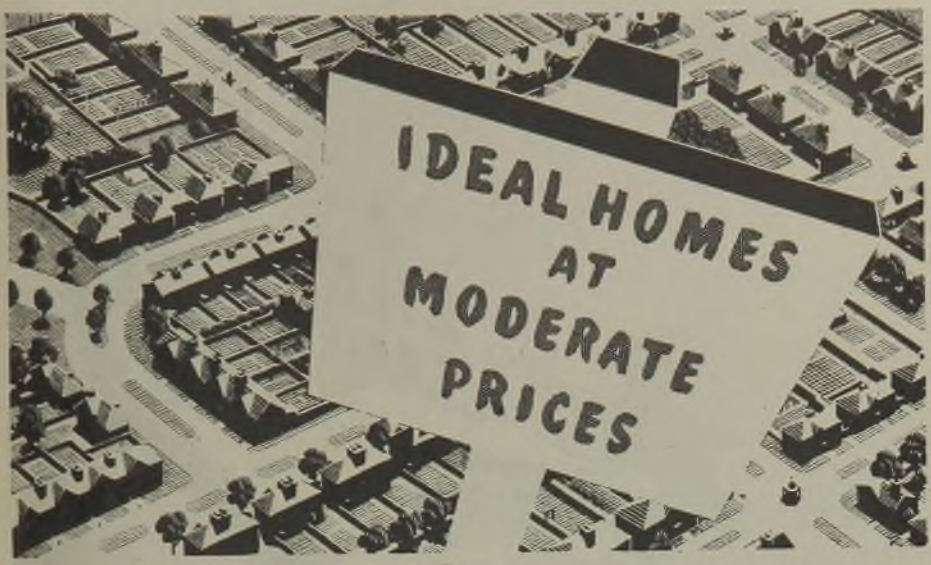
How to remove salts by "filtration"

When water containing salts in solution is passed through an acid regenerated "Permutit Zeo-Karb"* exchanger all these salts are converted to their corresponding acids. On passing this acid effluent through "Permutit De-acidite"* material, all the acids are absorbed. In this way the salts are removed and the water approximates to distilled water in quality at a fraction of its cost. Industrial applications include boiler feed and processing of fine quality products. Write for "Distilled Water Without Distillation" to The Permutit Company Limited., Department T.W., London, W.4.

* Registered Trade Marks

PERMUTIT

'DEMINROLIT' PROCESS



How many homes for how much?

The post-war demand will be for good houses in large numbers at reasonably low prices. How is the building industry to meet it? One thing is clear. As many components as possible will have to be factory-made on the most efficient and highly mechanised lines.

One kind of equipment for every building—electrical switch and fuse gear—has been manufactured by M.E.M. in this way for many years. They have shown how cost can be progressively reduced and quality improved by steadily perfecting large-scale production on the basis of experience. The war has added to this experience and the benefits will be at the service of Installation Engineers when peace comes.

'Meminx' Switch Splitter

M·E·M

SWITCHGEAR • MOTOR STARTERS

FUSEGEAR • ELECTRIC FIRES

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

London Showrooms and Stores: 21-22 Rathbone Place, London, W.1 • Manchester Showrooms and Stores: 48-50 Chapel Street, Salford, 3

I say . . .

give the public what it wants

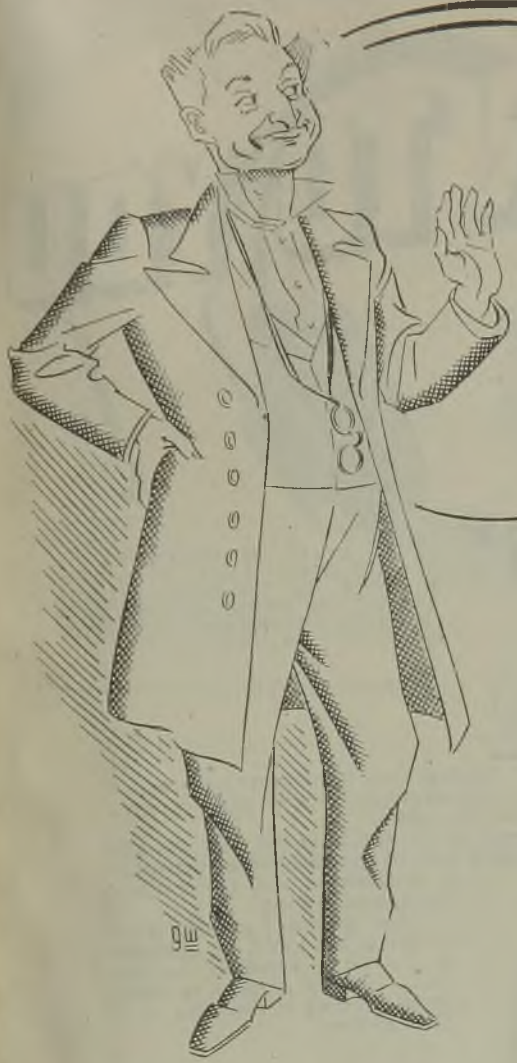
AND the Public wants Atlas Lamps — thanks to their high quality and reasonable price and to our large scale advertising. Cash in on this ever growing demand. Atlas dealers get extra good discounts, generous rebates, attractive sales aids — and perfect freedom to stock whatever make of other good lamps they like. Write for terms today.

THORN ELECTRICAL INDUSTRIES LTD.

ATLAS LAMPS

Nothing better has come to light

THORN ELECTRICAL INDUSTRIES LTD., 105-109 JUDD ST., LONDON, W.C.1. 'Phone : Euston 1183
Northern Branch : 55 Blossom Street, Manchester. 'Phone : Central 7461
N.E. Depot: 46 Sandhill, Newcastle-on-Tyne, 1. 'Phone : Newcastle 24068



"With affection beaming in one eye and calculation out of the other."

WE hope this description of Mr. Pecksniff will not have to be applied to many mains engineers as the post-war demands increase towards the full capacity of their network. Proper control equipment may save them many calculations.

D.C. BIAS SYSTEMS

FOR STREET LIGHTING AND OFF-PEAK LOAD CONTROL

Particulars gladly upon request.

STANDARD TELEPHONES AND CABLES, LTD., NEW SOUTHGATE, LONDON, N.11. 'Phone: ENTerprise 1234

D

ELECTRICAL REVIEW

October 6, 1944

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

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

Commercial Editor :
J. H. Cosens

Contents :—

EDITORIAL, ADVERTISING & PUBLISHING OFFICES : Dorset House, Stamford St., London, S.E.1
Telegraphic Address : "Ageekay, Sedist, London." Code: ABC. Telephone No.: Waterloo 3333 (35 lines).
Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.

Annual Subscription, Post free : British Isles, £2 7s. 8d. ; Canada, £2 3s. 4d. ; Elsewhere, £2 5s. 6d.

Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW LTD., and crossed "Lloyds Bank."

EARTH LEAKAGE INDICATORS

A Leakage Indicator is available for every system, including :—

- Type AS. for Trolley Bus systems with insulated negatives.
- Scaled direct in ohms.
- Type HS. for three-phase with earthed neutral.
- A leakage of $\frac{1}{5}$th ampere clearly shewn and yet cannot be damaged by the heaviest fault current.
- Current Transformer slips on Earth Conductor.

TYPE AS.

TYPE HS.

WRITE FOR CATALOGUE SHEET 340

EVERETT EDGCUMBE

COLINDALE WORKS
LONDON, N.W.9

Telephone : COLINDALE 6045

Manufacturers of all kinds of indicating and recording electrical instruments. Photometry experts

ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXV. No. 3489. OCTOBER 6, 1944 9d. WEEKLY

Industrial Disablement

Plan for Maintenance and Pensions

WHEN the original workmen's compensation scheme was introduced in 1897 it was considered a great advance in social justice—which it undoubtedly was. Since that date the system has been greatly improved in the injured workman's favour but it has remained very imperfect and a prolific source of litigation. Accordingly in the study of the subject contained in his classic 1942 report Sir William Beveridge advocated the supersession of the existing system by a scheme forming part of the general social insurance plan. The White Paper issued last week and reviewed in this issue shows that the Government has accepted this principle but not all the exact details.

Uniform Treatment

The Government has decided, for reasons stated at length, against relating pensions to earnings in favour of differentiation in benefits only according to family responsibilities. As everybody's contribution to the central fund will be the same the principle is strictly just, although in operation it may appear to bear hardly on higher-paid workers. But it has to be remembered that as things are at present they are unlikely to get more favourable compensation, even if they proceed against their employers for damages at Common Law.

Hitherto it seems to have been accepted that as it was an employer's duty to ensure the safety of his workers he should be penalised if anything happened to them. But, even in the best managed works, accidents will happen for which it is difficult to fix responsibility. Thus, although the injury or death of a workman may be the result of negligence on his employer's part this is frequently difficult to prove and the result has been costly legal proceedings.

It may be thought that the removal of responsibility for compensation from the individual employer to a central fund will lead to a slackening in precautionary measures, but that is to take a very poor view of the modern industrial employer. In any event there is still the protection afforded by the Factory and Workshop Act and careless employers will not be free from the risk of prosecution for neglecting to provide stipulated safeguards.

Compensation and Damages

Moreover, they will not necessarily escape further financial liability towards an injured employee. Sir William Beveridge dealt with this point in his report. At present an employee must elect between claiming under the Workmen's Compensation Acts and under Common Law; the Beveridge Report recommended the abolition of this requirement. It also enunciated the general principle that the employee should not in the end get more from insurance benefit and from his employer than he would have got from one source alone. Sir William Beveridge recognised that this and certain other related matters could only be properly settled after inquiry by a committee with technical and practical qualifications. The

Government has concurred in this and has already set up a committee with comprehensive terms of reference under the chairmanship of Sir Walter Monckton, K.C. It is not clear what will happen to the employers' mutual organisations for insurance against compensation claims, but it would seem that if it is considered necessary to dissolve them the staffs should be able to find employment within the framework of the new scheme. But this and other points in the White Paper will form the subject of discussion before the necessary legislation is drafted. Speaking generally, the proposals should prove welcome to both employers and employees.

Discussions

ON the threshold of a new session, the I.E.E. Council's deprecation of the (possibly growing) practice of reading contributions to discussions of papers is opportune. While reference to written headings for comment is, of course, legitimate, it is surely contrary to the spirit of discussion to read a manuscript that has sometimes the appearance of a subsidiary paper. It is noticeable that such contributions rarely sustain the lively interest of members as do those of a more spontaneous character which, moreover, can take account of the balance given to the subject by the author's abstract and of the remarks of earlier speakers. They also tend to occupy more than their fair share of time. They would be better as written contributions to the *Journal*, for which a limit, at present, of 500 words is imposed.

Heat Insulation

IT is more economical to insulate a building thermally than to attempt to make up for deficiencies in this respect by burning more fuel. The constructional principles necessary for avoiding a now prevalent cause of heat waste form the subject of Chapter 8 of the B.S. Code of Practice for Heating and Heat Insulation which has been issued in draft for comment by the Ministry of Works and can be obtained for 2s. from the British Standards Institution. Improvements in this way would influence methods of heating and so such matters as comfort, heat losses, exposure and solar heat are appropriately discussed. The elaborate chart for determining the extent of heat insulation requisite in relation to the cost of various fuels and installations is an indication of the large amount of work that has been put into the compilation of these documents.

Patent Rights

WHETHER the granting of monopoly rights in inventions makes for engineering progress is a principal subject discussed in "Electrical Technology and the Public Interest," which is a 200-page survey of research and patent-licensing practice in the United States, by F. J. Kottke, published by the American Council of Public Affairs (price $3). While the case for licences of right is arguable, experience in countries where the system has been introduced indicates that its results are likely to be retrogressive. Subject to safeguards against abuse, industrial development, as was maintained in an article in our issue of July 28th, is more likely to be stimulated by the protection conferred by a short-term monopoly.

Worse Confounded

MUCH confusion appears to exist in municipal electrical circles regarding the position of the "White" and "Brown" memoranda on electricity supply reorganisation. The "White" one, the product of representatives of the various sections of the industry, was sent to the Minister of Fuel and Power four months or so ago (*Electrical Review*, May 26th, page 746) although South Shields contested the validity of the approval given by the I.M.E.A. Yet it is now reported that the I.M.E.A. has agreed not to "press" the Minister to make any decision pending consideration of a South Shields notice of motion to rescind the resolution of approval. In July last the Sunderland Corporation Electricity Committee requested the Minister to take no action on the report.

Varying Views

SIMILARLY with the I.M.E.A.'s own "Brown" memorandum: this was to be sent to the Minister over three months ago and yet we find that it is being treated as though it were still open to discussion and amendment. At Southampton the Council has had a long debate on the subject. The Electricity Committee had recommended that the engineer should attend a conference of municipal selected station owners and vote against the proposal in

the memorandum that generating stations should be nationally owned. In this case discussion made no difference for an amendment approving the memorandum was carried. But the Huddersfield Corporation recently decided to back the retention of the existing control by selected station owners and even to co-operate with company selected station owners in this connection. The selected station owners have already submitted a counter-memorandum to the Minister.

Minister's Position

IT is difficult to see what good can come of further debate at this stage. The Minister should have a pretty good idea of the nature and strength of the cross-currents in the industry by this time. If the Government is determined to reorganise electricity supply the Minister will be asked either to get the parties together to make another attempt to arrive at an agreed scheme or to produce his own plans which will eventually go before Parliament where the debate will be resumed on more political lines.

Discouraging Self-help

IN all discussions on the registration of electrical contractors and operatives here the question of the "handyman" crops up. While it may be easy to prevent this individual from operating outside his own house, there is some difference of opinion regarding what he may do at home. It is contended that an Englishman's home is his castle and he may apparently burn it down if he likes or provide shocks for his family and friends, so long as he doesn't interfere with the supply to other consumers. In New Zealand the householder may not alter or extend his installation and prosecutions under this head are fairly frequent. It should, in fairness, be said that these prosecutions seem generally to relate to work carried out in a dangerous manner ; maybe the authorities do not discover other cases or turn a blind eye towards them.

Dignity of Labour.

CONTINUED shortage of apprentices for the electrical installation industry is reported from New Zealand. This lack of attraction is attributed to the present form of registration and the title given to the registered man—"licensed wireman." It is possible at present for a candidate to obtain registration with little or no experience outside that obtained in the wiring of small houses. Beyond this there is no qualification until the stage of electrical engineer is reached—a position above the abilities and opportunities of most apprentices. To remedy this, Mr. C. W. Wilson, chairman of the apprenticeship committee of the Wellington branch, N.Z. Institute of Electricians, suggests two classes of registration—electrician and electrical wireman. The former would receive higher pay and it is further recommended that all electrical contracting firms should be registered and be compelled to employ at least one electrician, as distinct from a wireman.

Co-operation in Development

IN our leading article of August 11th we put forward the suggestion that closer collaboration of manufacturers with the electricity supply industry in the work of the Electrical Development Association was especially desirable at the present time. We are consequently pleased to learn that a joint committee representative of E.D.A., the B.E.A.M.A., the C.M.A. and E.L.M.A. has been established under the guidance of the chairman of the E.D.A. Council for some time and is holding regular meetings. Its purpose is to discuss matters of common interest relating to the development and use of electricity for domestic purposes and, in particular, to promulgate among consumers facts and general data calculated to increase public interest in the use of electrical services.

Low-voltage Shocks

IN a reference in our September 22nd leading article to the risk of serious electric shock at 250 V or less in some conditions prevailing in factories, it was inadvertently stated that none, instead of some, of these had fatal consequences. Actually, as appeared in our review of "Electricity in Factories" in the same issue, thirty-two out of the fifty-eight electrical fatalities last year occurred at low voltages. Even at 100 V AC instances were reported of welders having lost consciousness as a result of touching live metal, entailing the application of artificial respiration. The only safeguard is the adoption of appropriate protective gear as mentioned in the article.

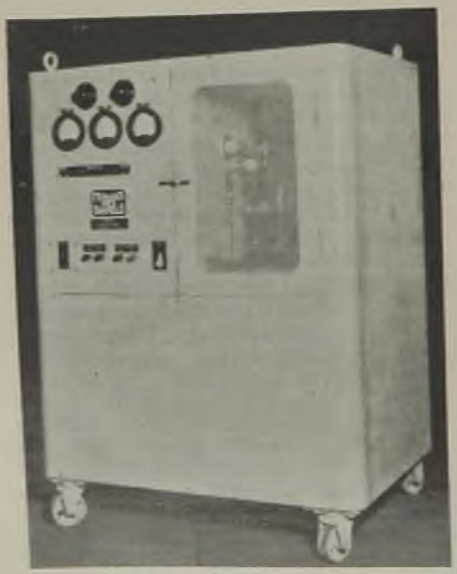
Radio-Frequency Heating

Its Sphere of Application

By E. T. Norris,
M.I.Mech.E., M.I.E.E.; Fellow A.I.E.E.

SOME of the more spectacular achievements with radio frequency heating have made it a fashionable topic. There may be, in consequence, a tendency to exaggerate its possibilities and even to suggest applications for which it is unsuitable. The subject is still in an early stage of development so that it is not possible to define or delimit its scope, but it is well to consider on broad lines the nature of its advantages and endeavour to deduce therefrom certain conclusions relating to its commercial application.

The basic field of application of radio-frequency heating can, at present, be explained simply. It is difficult to heat some materials uniformly and homogeneously because their poor thermal conductivity delays the conduction of heat through them. It is difficult to heat other materials locally because their



Radio-frequency generator for pre-heating (dielectric) plastic pre-forms (Ferranti-Wild-Barfield)

good conductivity accelerates the conduction of heat. There are important demands for both these requirements in practice and radio-frequency heating inherently solves both problems.

Fortunately thermal conductivity is directly related to electrical conductivity, so that materials of poor thermal conductivity are in general insulators and materials of good thermal conductivity are in general also electrical conductors. In each case, also fortunately, the conductivity is imperfect and neither zero nor infinity respectively. A finite value is essential for the generation of heat in the form of watt-loss due to the passage of high-frequency AC.

The subject may thus be properly divided into two branches; the dielectric heating of materials which are virtually insulators and the induction heating of materials which are virtually conductors. The virtue of the former is the homogeneous generation of heat throughout the material as distinct from the external application of heat. This effect is not practically achievable by any other method, so that radio-frequency heating is unique in this respect. The very fact that insulating materials have poor thermal conductivity accentuates the difficulty of uniform heat distribution by any form of external application.

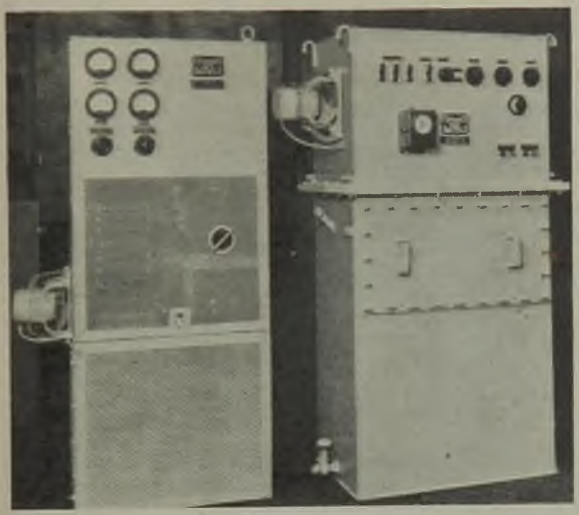
There are many instances in which the uniform distribution of heat throughout the material is a vital requirement and, moreover, those materials are very often sensitive to temperature conditions and easily affected by local excess values. Also it frequently happens that temperatures close to the dangerous values are desirable in the course of the manufacturing process or treatment of the material; this is the case, for example, in the curing or polymerisation of many plastics.

Rapid Operation

In addition, the slow flow of heat, when it is distributed by thermal conduction, greatly lengthens the time required for the treatment. The flow of heat is slow even in good thermal conductors (otherwise the poker would be useless), but in insulating materials it is comparatively very much slower and thus involves larger temperature gradients. This limitation does not occur when the heat is homogeneously generated in the material and the time required then becomes an economical balance with the rating (and thus cost) of the equipment. This characteristic makes possible economically the very rapid heating of small masses of material and explains the application of radio-frequency heating to the "sewing", or seam welding, of plastic sheets.

The virtue of radio-frequency induction heating is its localised generation; in particular, in a concentrated form, so that the local treatment can be completed before

the good thermal conductivity of the material becomes effective; in other words, controlled intensive localisation of heat. In this case, also, the heat is generated in the material and not externally applied, though the generation is superficial and not homogeneous throughout the material as in dielectric heating. The chief applications at present are



Radio-frequency equipment for (inductive) surface hardening of gear wheel teeth (Ferranti-Wild-Barfield)

to various forms of heat treatment and surface hardening of ferrous materials (such as bearing surfaces and the teeth of gear wheels) and local soldering and brazing of both ferrous and non-ferrous metals.

Consider now the limitations of this class of heating. Both its first and its running costs are high in comparison with other methods of producing heat. The efficiency of conversion from power-frequency to radio-frequency energy is unlikely to exceed 50 per cent. while the cost of the conversion equipment obviously does not occur in other forms of heating.

The position is, therefore, one of disadvantages being offset by advantages. Since, however, the disadvantages are not only real, but inevitable, the advantages must inevitably be real. In consequence, alternative methods (using power frequencies, or oil, or steam) must be either impossible or have drawbacks.* Examples of the former are certain dehydration problems and the pre-heating and partial curing of plastic pre-forms; of the latter, the surface treatment of metals and the curing of synthetic resins.

In many instances the low efficiency of heat production in this way is more than compensated for by a higher efficiency of heat application due to the characteristic of radio-frequency energy dissipation in generating the heat in the material instead of applying it externally. This condition frequently happens in the localised treatment of metals; while, for example, in the manufacture of synthetic resin laminated boards the reduced heat loss in platens and massive press heads is appreciable.

The possibility of greatly increasing the rate of temperature rise due to the virtual elimination of thermal gradients and thus reducing the time required for a given treatment may permit a much greater output from the existing plant. The corresponding reduction of the plant cost per unit output and of the space required by it may well justify the installation of radio-frequency heating in cases in which the capital cost of the plant is an important item. This condition occurs, for example, in the manufacture of plywood and insulating boards requiring expensive high-power hydraulic presses and large scale installations of radio-frequency heating for this purpose are already in operation. The extension to large scale installations involving hundreds of kilowatts will in fact be determined by economic considerations in this way. In some cases a part of the heat applied may be provided in other ways, leaving only the essential portion for which radio-frequency heating is peculiarly suited to be so applied.

An incidental advantage of all forms of the radio-frequency method is the comparative cleanliness and comfort to operatives due to the absence of external heating and, if natural fuels are used, the products of combustion.

The position may be summarised by saying that there is a *prima facie* case for the consideration of radio-frequency heating in any application where one or more of the following characteristics appear intrinsically valuable:—For (1) dielectric heating, the generation of heat homogeneously within the material resulting in uniform temperature distribution throughout its mass; (2) induction heating, the generation of heat superficially in the material resulting in uniform temperature distribution over its surface. Also for either type of heating (3) the accurate localisation of heating for particular treatment; (4) a higher rate of heating to increase production from a given manufacturing plant; (5) ease and accuracy of control of the degree of heating.

* Both cases have already been found and are still being found to occur in practice.

Individual detailed examination is necessary to establish whether or no the new performance will be economically and practically justified.

The number of examples of practical applications mentioned are typical of the present stage of development. The field of radio-frequency heating is, however, still widening and new applications are continually being studied as industrial production engineers and chemists become aware of its possibilities.

Wiring Diagrams on Panels

Photographic Process

By T. Thorne Baker

MUCH assistance and saving of time may result from having an actual picture of a complicated wiring system photographed upon the plate or panel which is to be wired up. There have been ways and means of doing this for many years, but by slow contact printing processes which have not always left a very clear image. It is now possible to treat aluminium or aluminium alloy sheets or plates, or mild steel plates, with light-sensitive emulsion of the type used in sensitising bromide paper, giving a dead black line on a dead white background, and wherever it may be useful to do so the diagram can be produced in two or more colours each of which indicates a different circuit.

The method is to apply to the metal, or synthetic resin or wood sheets or panels, a silver bromide emulsion which can be prepared by any novice in a few minutes from a granular powder, which has merely to be soaked in cold water for half an hour or so, and then warmed to make an *emulsion*. The latter is applied with a brush, or preferably with a spray gun, and a thin coating given which dries rapidly. The sheet or panel is then printed under the wiring tracing or negative, or, if large, a diagram copied on a small photographic plate can be used and projected by enlargement, exposure being a matter in either case of a few seconds only. The printed plates have to be developed, fixed and washed, a rapid and simple procedure.

In the case of wood panels, the application of a gummy medium containing a white pigment is recommended, this sufficing to fill up the pores of the wood and to form a background for throwing the image of the wiring into high relief. Aluminium may be coated without any preparation other than that of thorough cleaning, especially if it be first anodised. The anodising is by no means essential. In the case of mild steel, a little more careful preparation is needed ; a preliminary primer is first applied with a spray gun at a pressure of about 45 lb. per sq. in. and when dry, which is a matter of a few minutes, a second coating is sprayed with a dead white primer, which also dries almost at once. The emulsion is then sprayed on top, perfect adhesion being secured. Needless to say, when a number of jigs or templates are to be made for production purposes the photographic method is very quick and economical.

The granulated emulsion is a novelty which has been introduced by Johnson & Sons (Manufacturing Chemists), Ltd., of Hendon, who supply the primers and preparations for wood and aluminium. The emulsion has the activation speed of a rapid bromide photographic paper so that it must be weighed out in yellow or orange light, and mixed with ten or twelve times its amount of cold water. This should be done in a stoneware jar with a light-tight loose lid ; for small quantities a well-made stoneware casserole pot with well-fitting lid is quite convenient. Stainless steel or nickel vessels can be used also. The spray gun must be thoroughly clean and the emulsion used warm at a temperature of about 90 to 95 deg. F. For a rush job it can be exposed by projection and processed while still wet, but in general it is best to allow the coated panels to dry in total darkness in a warm room as free from dust as possible.

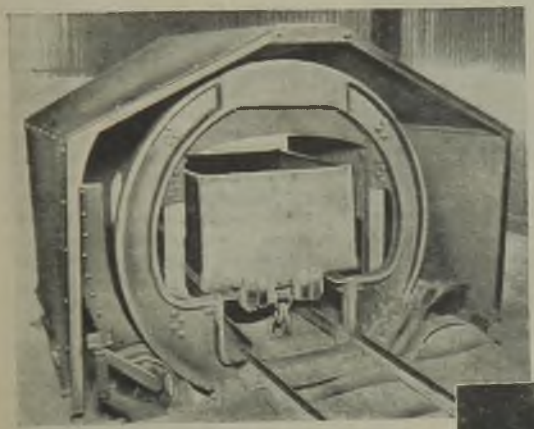
When a wiring diagram is wanted in two colours, two tracings must be made, one for each coloured circuit. The plate is sensitised, one circuit printed and developed, for example, in an ordinary metol-hydroquinone developer ; the lines in this case come out black. The panel is well washed and dried. It is then coated with a second spray of the sensitive emulsion, dried, and printed under the tracing of the second circuit. This time it is developed in one of the new type of solutions that produce a coloured image direct. Thus one can have blue and black, red and blue, or indeed any combination, and at least three different colours.

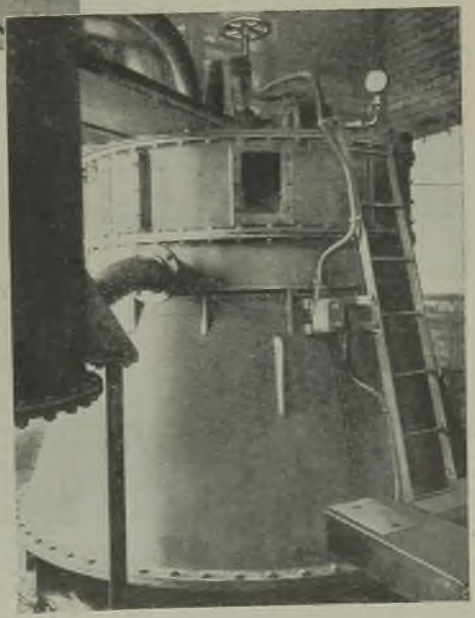
In some instrument cases or boxes it is customary to stick a paper diagram of the circuit on the inside of the door or lid. Where numbers are concerned, the doors can be sensitised and printed in quantity and the finished diagrams sprayed with a waterproof and weatherproof dope. The granulated emulsion, by the way, keeps indefinitely in the dry state in any climate and only as much as is wanted for any particular job need be made up at any time.

Modern Coal Treatment

Importance of Slurry Disposal

IN previous articles we have dealt with the operations at the Treeton Colliery of the Rother Vale Collieries Branch of the United Steel Companies, Ltd., up to the pit-head, and it is now proposed to survey what happens on the surface of the workings.





Above : From the weighing machine the tubs are passed on to any of three revolving tipplers, according to the class of coal they contain
Right : The vacuum flotation machine is so constructed that any normal variation in the rate of feed is automatically compensated for by the opening and closing of a float control valve

On arrival at the pit top the filled tubs are discharged from the cages by electro-pneumatic rams, supplied complete by the Westinghouse Brake & Signal Co., Ltd. Compressed air is fed to the cylinders from the general works compressed air system already referred to, and the entry into the cylinders proper is controlled by a solenoid-operated valve in each case. The actual discharge of the tubs is effected in two stages, the cage being lifted a few feet for the second run-out in a similar manner to the dual loading method described in the article on underground operations. At each run-out the two tubs at each of two decks are discharged simultaneously. The bottom tubs are run out directly to a weighing machine at the same level, but those on the upper deck are run out on to a gantry and on to a hydraulic drop cage which lowers the tubs to the weighing machine level when it has collected all four of the upper deck tubs. The drop cage is electrically interlocked so that it will not operate until it has been loaded with all four tubs.

From the weighing machine the tubs are passed on to any of three revolving tipplers, according to the class of coal which they contain. There is also a fourth tippler for dirt emptying, and all are arranged in a group drive which includes the shaking screens to be referred to later. A 100-HP motor belt drives a line shaft with a reduction ratio of about three to one, and this shaft serves secondary belt transmissions with about the same reduction ratios to the individual tipplers. Finally there is the gearing on the tipplers themselves, and the actual overall reduction is from 575 RPM at the motor to a complete turnover of the tub in about 10 seconds.

After the tubs are brought to the upright positions, they are discharged from the tipplers to gravitate along gantries on to two creepers which feed the top and bottom decks, respectively, of the winder cages for conveyance again to the pit bottom. The creepers are of the chain-link type and are equipped with horns which engage with the tub axles. The chain system is driven by a

15-HP, 725-RPM motor with chain transmission to give a tub speed of about 48 ft. per minute.

From the crests of the creepers the tubs gravitate to the right- and left-hand cages

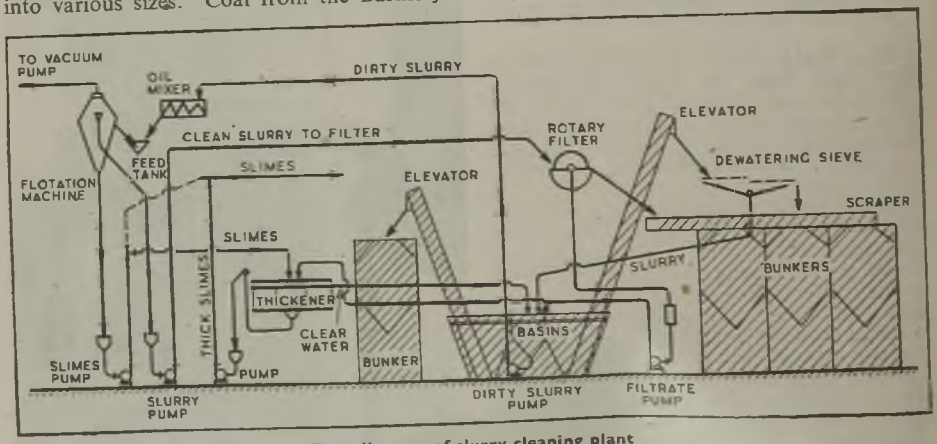
The production of the flotation machine is finally delivered, still as slurry, to the trough of a vacuum drum type filter; "cake" for mixing with the washed slack is removed from the rotating drum

where they are picked up again by the decking rams which are actually responsible for their re-entry into the cages. The coal from the tipplers falls down into any of three jigging screens, according to the class of coal being dealt with, and these screens classify the coal into various sizes. Coal from the Barnsley

pneumatic hoist by which the lower end of the loader can be raised or lowered to suit the height of the coal as loaded into the wagons.

There are four belts, all of rubber covered canvas construction, group driven by a 35-HP, 575-RPM s.r. motor *via* a line shaft which also serves the four pulsating loaders. The secondary transmissions from the line shaft are by chain cum belt, and the overall speed reduction ratio is such as to give belt speeds of about 50 ft. per minute and loader speeds of approximately the same order. The return portion of the picking band is used for conveying the faulty coal and dirt from each band back on to respective cross conveyors, passing the faulty coal through a single roll crusher en route to the washery for cleaning and sizing. The crusher is driven by the 100-HP screens motor previously referred to, from a secondary line shaft. From the cross conveyors the unwanted dirt crushed material is loaded directly into wagons for final deposition on the waste heap.

Coal from the High Hazel and Haigh Moor seams is classified into three sizes, 2 in. to 4 in. known as cobbles which are dealt with on one belt; 4 in. to 8 in., known as cubes, which are conveyed on to another picking belt; and over 8 in., known as lump coal, which are conveyed on to the third



Flow diagram of slurry cleaning plant

seam, for instance, is passed on from its own tippler over a 2 in. square mesh screen and on to a picking belt and finally to a pulsating loader which incorporates a small sieve which passes the dust created on the band. Above the bottom end of the pulsating loader is a picking belt. In order to save labour, a Berrisford two-stage dry coal cleaner has recently been installed on the above-mentioned cobbles belt, and this replaces the former hand picking process. In this dry cleaner there are two sloping jigging trays of rather

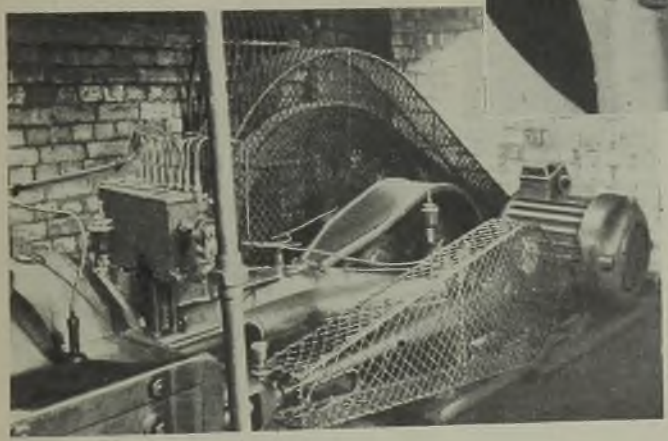
steep gradient down which the coal passes, and in each tray there is an air gap through which the heavier material, *i.e.* dirt, falls on to the dirt conveyor for disposal, leaving the lighter and good quality coal to jump the gap, which it is enabled to do by the momentum imparted to it by the throw of the jigging tray.

Reverting to the jigging screens, all the material passing through the 2 in. mesh is conveyed on a 30-in. rubber-covered canvas belt to the storage and equalising bunker serving the washery from which it is elevated at an even rate of 95 tons per hour and discharged into a revolving dry screen and along to the respective wash boxes by which the clean coal is floated as overflow and the dirt sinks into the bottom of a dirt elevator common to all wash boxes. This elevator passes the dirt into a bunker for discharge into wagons for final disposal on to the waste heap.

The fines entrained with the circulating washery water is settled in bays from which it is pumped to a Coppee slurry treatment plant. In our first article dealing with the Treeton Colliery we emphasised the importance of slurry cleaning as a measure which has made possible the commercial disposal of the slurry from the washery, and as the slurry was previously consumed in the steam-raising plant which supplied the private generation turbo-alternators and the steam-driven winders and air compressors, it will be appreciated that the successful working of this plant was of primary importance in the change over from private generation to public supply of the colliery.

The operation of the plant is on the flotation principle, and the method by which the slurry is effectively separated into coal and dirt is by the addition of a very small quantity of a suitable oil to the slurry in a special type of mixer in which mechanical agitation of the slurry is created. The selected preference of the oil for the coal particles causes partial flocculation of the fine coal. The shale and clay constituents of the slurry have little or no affinity for the oil. The aerated oiled coal particles are in a condition in which they can be separated from the dirt in a suitably designed machine by the application of a partial vacuum.

The prepared slurry is introduced to the flotation machine in which by virtue of the reduced pressure a multitude of very fine air bubbles are released from the water and attach themselves to the oiled coal particles which immediately rise to the surface to form a stable coherent coal froth while under vacuum. Owing to the expansion of the air under reduced pressure the released air bubbles increase in size and this effect enhances the buoyancy of the coal particles so that the coal and dirt can be readily separated. The principle of applying reduced



Several interesting electrical drives have an important bearing on the successful running of the slurry plant ; vertical motor-driven clean-coal pump serving the vacuum filter and (left) horizontal vacuum pumpfor thisfilter

pressure to an aerated slurry enables much coarser coal to be floated than is the case when air bubbles are produced at atmospheric pressure due to the expansion of the air bubbles released. The vacuum flotation machine consists of an outer top and bottom conical vacuum vessel in which is housed an inner cone at the upper half of the machine. A circumferential weir at the top of the machine and inside the outer cone maintains a constant water level. The machine is so constructed that any normal variation in the rate of feed is automatically compensated for by the opening and closing of a float control valve situated on the feed tank.

The product of the flotation machine is finally delivered, still as slurry, to the trough of a vacuum filter. This is of the rotating drum type and the drum revolves in the trough, thus picking up the solid from which the water is extracted by a vacuum. The resulting "cake" on the periphery of the drum filter is scraped off and this uniformly mixed with wasted slack provides a high quality fuel for coke and gas manufacture. Such material has a ready market and its production has, therefore, an obviously strong bearing on the point we have endeavoured to bring out, *i.e.* complete electrification on public supply.

There are several interesting electrical drives on this slurry plant and although they are all small in size they all play an important part in the successful running of the plant as a whole. For instance, there are the vertical motor driven clean coal pump and the horizontal vacuum pump which serves the rotary filter.

I.E.E. Centre Meetings

Programmes for 1944-45 Session

South Midland

THE president of the Institution of Electrical Engineers, Sir Harry Railing, D.Eng., is to pay a visit to the South Midland Centre on Saturday, October 21st, when the new session will be inaugurated at a wartime lunch to be held at the Grand Hotel, Birmingham (Grosvenor Room) at 12.30 p.m. for 1 p.m. This will also be the occasion for the delivery of the chairman's address, by F. W. Lawton. Applications for tickets for the lunch (7s. each) must be made before October 11th.

The following is the programme so far arranged for the rest of the session:—November 6th: "Thermoplastic Cables," by Dr. H. Barron, J. N. Dean and T. R. Scott, D.F.C. December 4th: "Standardisation and Design of AC Turbo-Generators," by G. A. Juhlin. January 8th: Discussion on "Training of an Engineer," to be opened by D. B. Hoseason.

The Radio Group of the Centre has already opened its new session. Other meetings are:—October 30th: Discussion on "Industrial Applications of High-frequency Power," to be opened by E. May. January 29th: Discussion on "Television," to be opened by Dr. D. C. Espley. April 25th (Loughborough): "Energy Conversion in Electronic Devices," by Dr. D. Gabor. April 30th: "High-frequency Dielectric Materials," by Prof. Willis Jackson.

East Midland

The chairman, W. Brookes, gave his inaugural address to the East Midland Sub-Centre on October 4th. Forthcoming meetings are as follows:—November 22nd (Derby): "Electrical Aspects of Farm Mechanisation," by C. A. Cameron-Brown. January 24th (Loughborough): "An Analysis of the Load on a Modern Electricity Supply System," by P. Schiller. February 21st (Nottingham): "The Design and Performance of Domestic Electrical Appliances," by W. N. C. Clinch and F. Lynn. March 9th (Leicester): Joint meeting with Leicester Society of Engineers. March 21st (Loughborough): Short papers by junior members. April 25th (Loughborough): "Energy Conversion in Electronic Devices," by Dr. D. Gabor.

North-Western

To-morrow (Saturday) the North-Western Centre opens the session with the inaugural address of the chairman, W. Kidd, on "Organisation of the Engineering Profession." The meeting will as usual be held at the Engineers' Club, Albert Square, Manchester, commencing at 2.30 p.m. Other meetings so far arranged are as follows:—November 4th: "Remote Switching by Superimposed Currents," by J. L. Carr. December 2nd: "Thermoplastic Cables," by Dr. H. Barron, J. N. Dean and T. R. Scott, D.F.C. January 20th: "The Influence of Resistance Switching on the Design of High-Voltage Air-Blast Circuit-Breakers," by H. E. Cox and T. W. Wilcox.

The Radio Group commences on Friday, October 13th, at 6 p.m. with an address by the chairman, G. J. S. Little, G.M. Later meetings will be as follows:—November 10th: "The Development of Polythene as a High-frequency Dielectric," by Prof. Willis Jackson and J. A. S. Forsyth. December 8th: "Theory and Performance of Corner Reflectors for Aerials," by Dr. E. B. Moullin. January 26th: Informal discussion on "High-frequency Heating," to be opened by H. Wood and J. F. Capper.

North-Eastern

The programme of the North-Eastern Centre for the first half of the session is as follows:—October 9th: Chairman's address by J. A. Harle. October 23rd: "Design and Performance of Domestic Electrical Appliances," by W. N. C. Clinch and F. Lynn. November 13th: "Organisation of Industrial Electrical Maintenance," by J. C. B. Nicol. November 22nd: Joint meeting with Inst.C.E. and I.Mech.E., arranged in conjunction with Ministry of Fuel, on open-cast coal. November 27th: "Electrostatic Precipitation of Boiler Flue Gases," by J. Bruce. December 11th: "Restriking Voltage as a Factor in the Performance, Rating and Selection of Circuit-breakers," by J. A. Harle and R. W. Wild. All meetings are held at the Neville Hall, Westgate Road, Newcastle-on-Tyne, starting at 6.15 p.m.

Post-war Houses

Electrical Equipment of Demonstration Houses

FROM the electrical point of view it is unfortunate that it has been decided to release information about the Ministry of Works' thirteen types of demonstration houses at Northolt before the equipment of the houses is completed. Some days must yet elapse before all the electrical apparatus is installed, so that it is impossible for us to give a complete description of the equipment. Sufficient progress has, however, been made to visualise fairly accurately the final electrical layout. The main purpose of the houses is to demonstrate different methods of construction and compare the advantages of different materials—brick, steel, expanded clay, foam slag, no fines, etc. The opportunity has, however, been given to the British Electrical and Allied Manufacturers' Association in a terrace block of four houses to equip two of them in accordance with the recommendations of the Electrical Installations (Study) Committee.

One of the houses is completely electric.

Examples of dwellings on the Northolt site

The kitchen of an electric house

In a kitchen approximately 9 ft. by 8 ft. 3 in. there are on one side a table-type thermostatically controlled cooker and a double draining board sink unit with a washing machine and a two-heat water heater beneath. On the facing wall is a kitchen cabinet with a 4-cu. ft. refrigerator built in: three plug points are provided. The equipment of the other house, which is practically all-electric, is similar, except for a vertical cooker, a wash boiler instead of a washing machine, and a coal-electric hot-water system, which incorporates a new type of heating attachment for a slow-combustion stove. Both houses have electric fires fitted neatly in the register of the living room grates, as well as out of reach in the bathrooms. Small electric heaters are also provided in the airing cupboards.

A pair of semi-detached houses designed by the Ministry of Works to form four flats is also of considerable electrical interest, or will be when it is completed. Two of the flats are fitted with prefabricated combined kitchen and bathroom units similar to that used in the Portal prefabricated house and containing an electric cooker, refrigerator, wash boiler, hot-water cylinder, cupboards, sink, bath and wash basin on a common chassis. The hot-water cylinder, which is fitted with a 2-kW immersion heater is, unlike the model in the original Portal house, of sufficient capacity to provide hot water for baths, sink and wash basin.

The other two flats in this block, though equipped for gas, are wired for all electrical services in case the tenants want to change over to electricity. The main house switch and fuseboard are conveniently inset in a single compact unit in the wall over the kitchen working table, with the meter concealed in a cupboard in the wall on the left. In other types of houses designed by the Ministry of Works alternate houses are equipped with electric cookers of the pre-war vertical type and space is provided for refrigerators, but water heating is by solid fuel boiler and gas sink heater; there is no provision for obtaining a hot bath in the summer without lighting the fire. A cabinet type electric cooker is fitted in one of a pair of houses designed by the British Iron and Steel Federation.

In all types of construction the wiring installations are mainly grip joint conduit. The provision of lighting points is reasonably adequate, but the number of plug points is hardly enough for really convenient use, though admittedly more than in pre-war "council" houses. The average number, in a three-bedroomed house, is twelve:—2-3 in the living room, 2-4 in the kitchen and dining-room (often combined), 2-3 in the first and second bedrooms, and 1-2 in the third bedroom. The all-electric house has fourteen—three each in the living-room and largest bedroom and two each in the other rooms, apart, of course, from those for the permanently fixed apparatus, such as the cooker and refrigerator. Two points only are provided in the all-gas house, one in the living-room and the other in the smallest bedroom (why here particularly we could not discover). The housewife seems likely to find it a trifle awkward when she wants to use a vacuum cleaner for instance. All the plugs are of the 15-A type: in the British Iron and Steel Federation houses fused units have been employed. All the houses have compact service units fixed in easily accessible positions.

The cost of building all the types of houses has not yet been announced, but one type, brick-built, with living-room, dining recess, kitchen and three bedrooms, is estimated to cost £759 net, without the land and without allowing any profit, if 500 houses are built. About 2,100 man-hours are required to construct it, this comparing with only 900 man-hours for the two-flat dwelling type, which incorporates a steel framework construction.

Electricians' Wages

New E.C.A.—E.T.U. Agreement

FOR some time past negotiations have been proceeding between the Electrical Contractors' Association and the Electrical Trades Union upon a number of matters concerning wages and conditions. As the outcome a new agreement has been drawn up by the National Joint Industrial Council for the Electrical Contracting Industry particulars of which are given below.

As regards the cost of living (war) addition it is provided that the temporary addition of 1d. per hour which came into operation in July shall continue up to and including the second pay day in April, 1945. In the meantime declarations as to the amount of the cost of living (war) addition in accordance with the existing agreements will be issued, and the temporary increase of 1d. per hour will be added to the war addition so determined. The present cost of living addition of 5¾d. per hour will continue in operation up to and including the second pay day in October, 1944. As early as possible a new declaration will be issued, covering the amount payable thereafter.

As from the third pay day in October, 1944, the number of provincial grades in the country will be reduced to two, with a difference of only ¾d. per hour. As from that date, Grade "B2" will cease to exist, and all territory previously included in that grade will be transferred to Grade "B," the rate for which is 1s. 8¼d. per hour, plus the cost of living addition. The present Grade "C" rate of 1s. 7d. per hour will be increased to 1s. 7½d. per hour as from the same date. This alteration has necessitated a revision of the rates paid to operatives under the age of 21.

Considerable difficulty has been experienced in the past, due, it has been alleged, to the ambiguous phraseology of Clause 12 (a) of the National Working Rules dealing with extra payment for abnormal working conditions. Amplification and clarification of the existing rule is contained in a new clause which makes it clear that no question of height can be taken into consideration in applying the provision of the clause.

An extension to Clause 8 of the National Working Rules perpetuates Clause 4 of the National Standardised Wages Agreement of 1920, and makes provision for extra payment in certain clearly defined circumstances.

It has been possible to establish a national travelling time clause to take the place of the existing local clauses, excluding only London, Manchester and District, and the Mersey District. The possibility of including Manchester and District and the Mersey District in the National Clause is under consideration by the local District Joint Industrial Councils. The clause visualises the fixing by all D.J.I.C's of the "point" from which travelling time and fares shall be calculated in respect of labour which is engaged on the site of any contract, as distinct from labour which is sent to the contract having been engaged at the employer's premises. This clause will come into operation on January 1st, 1945. A new clause is substituted for Clause 13 (d) of the National Working Rules relating to periodic returns home for men sent to jobs necessitating their lodging away from home, and it comes into operation on the third pay day in October for the war period only.

Civic Lighting

Birmingham Illuminating Engineers' Meeting

A CONFERENCE on lighting in municipal re-development took place last week at a civic meeting arranged by the Birmingham Centre of the Illuminating Engineering Society, under the chairmanship of Mr. A. J. P. Pashler (acting general manager and secretary, City Baths Department) with Mr. C. J. Allderidge as hon. secretary. Attendance was limited to 230, including some 70 members of the Society; it included 22 mayors of adjoining boroughs and other municipal officers, architects, electrical engineers and electricity supply representatives.

The proceedings commenced with a tour of inspection of the fine municipal baths, opened in June, 1940. Mr. H. J. Manzoni (city engineer) was the consulting engineer and Mr. H. W. Simister the architect. Hope's Heating & Lighting, Ltd., were the engineering contractors responsible for the combined low-pressure steam and hot water installations.

The electrical installation is a completely concealed conduit system, carried out by Rashleigh Phipps & Co., Ltd., divided into independent circuits for lighting, power for motor-driven pumps, bells, indicators, clocks and the canteen. The entrance hall of the baths is illuminated by means of decorative fittings while ceiling types, mostly spherical, are installed in the main portions of the building. The swimming hall has been specially treated; a longitudinal row of circular mirror reflectors is housed in the curved roof space along each side just below the glazed sky-lights, while underwater illumination is furnished through six rectangular portholes in each side-wall of the pond. Each contains a parabolic mirror reflector and a 500-W "Osram" lamp fitted horizontally in a metal housing, hinged to facilitate servicing. The twelve lights thus total 6,000 W for a white tiled pool 75 ft. long by 35 ft. wide.

Midland Development Plans

During tea at the Council House detail photographs and plans of experimental houses and kitchen lay-outs were exhibited together with scale models representing the Birmingham Civic Centre and the Duddleston-Nechells estate development scheme as well as suggested treatments of traffic junctions in built-up areas. Other models illustrated how Walsall has planned central area development and West Bromwich's suggested lay-out of arterial and ring roads at existing community and shopping centres.

After the mayoral welcome by Alderman L. G. H. Alldridge the conference was opened by Dr. H. Buckley (president of the Illuminating Engineering Society) and he was followed by Councillor L. J. Potts (member of the City Estates Committee), who described with the aid of lantern slides the projected Duddleston-Nechells rehousing scheme for the instruction and guidance of other municipalities contemplating post-war improvements. That scheme was only one of the five submitted to the Birmingham City Council, which approved it in principle last year. The area was almost entirely a mass of small tumble-down workshops and factories intermingled with slum-dwelling localities, which it was intended to abolish. It was proposed to strip the district almost completely of buildings, although by stages. Factories were to be segregated in two well defined positions and the main road system replanned. One of the busiest traffic arteries from the north-east into the City would divide the site into two roughly equal parts, which were to form a planned community area for re-housing the population with modern amenities.

Lighting Quantity and Quality

Mr. J. G. Holmes, chairman of the Centre for the ensuing session, spoke on the principles of good lighting. He explained that the art was in the interpretation of meaning of the word "right," in respect of the place and objects to be illuminated, the positions of the source and surfaces that might reflect light, and brightness levels, all of which must be right if the lighting was to be good. A sufficient amount of light measured in foot-candles was not enough; its character was not less important than its intensity. Also it was usual for depreciation to reduce illumination by 30 per cent. and therefore new schemes should provide approximately 1·4 times the lighting levels required for continuous service.

Although natural lighting was the concern of the architect rather than the illuminating engineer, Mr. Holmes indicated why the daylight factor would probably become the basis of official recommendations and legal requirements in the future.

In any redevelopment scheme architectural floodlighting, the sympathetic illumination of arcades and shopping areas, striking safety lighting of main and by roads, avoiding glare and garishness, would help to make residents proud of new lay-outs and buildings.

Neither the architect nor legislator could compel tenants to employ good lighting inside buildings, although the means of obtaining it could and should be provided. It was not

enough merely to provide for the supply of energy without further guidance. The architect should arrange for the installation of lighting points in the right places before the building was occupied.

After mentioning the degrees of illumination desirable in the different rooms of a house Mr. Holmes declared that the first cost of providing them was not excessive, but subsequent maintenance might be a serious charge on people with small incomes. The I.E.S. considered that good lighting was worth while and that cheaper light (electric and gas) should be made available as a public service. He personally did not think it cost more to generate electricity for light than for power; the former did more good than the latter and he considered it unfair to penalise lighting with a higher charge.

Mr. R. O. Ackerley (G.E.C.) outlined the work already being undertaken by existing committees and panels and the meeting was also addressed by Mr. H. J. Manzoni as well as by Mr. Wallace Smith (general manager Birmingham Estates Department), president of the Institute of Housing.

Workmen's Compensation

Government's Insurance Proposals

IN the reference in last week's *Electrical Review* to the Government's social insurance scheme it was mentioned that Part II of the White Paper (Cmd. 6551, price 6d.) dealt with the subject of industrial injury insurance, or workmen's compensation. It is proposed that the scheme now put forward shall eventually supersede the existing arrangements, which have often proved unsatisfactory.

The White Paper contains an interesting survey of the subject and gives the principal recommendations of the Beveridge Report in this connection. While general approval is given to these recommendations, the scheme put forward contains some noteworthy departures from them. It is proposed that the new system shall cover all employed persons, manual and non-manual, irrespective of income, and shall apply to personal injury by accident arising out of and in the course of employment and to specified industrial diseases. The provision in the existing Act for persons engaged in rescue work in mines is to be enlarged in scope to cover accidents to those engaged in rescue work and other specified emergency work in industry generally.

Central Fund

An Industrial Injury Insurance Fund will be set up and maintained by weekly contributions from employers and workmen (included in the general social insurance contributions) and from the Exchequer. The weekly rates will be 6d. for adult men and 4d. for women to be shared equally between the employer and the worker. The rates for juveniles will be half these amounts.

The scheme will be in the charge of a new Ministry of Social Insurance. The Minister will be assisted by an advisory body representative of employers and employees and local appeal tribunals will also have representatives of employers and workpeople. Claims will be dealt with by pensions officers, subject to appeal to the local tribunals and further to an industrial injury insurance commissioner.

In disablement cases benefits will be at uniform flat rates. They will consist of an industrial injury allowance payable for an initial period while the workman is incapacitated; this will be 35s. a week, but if the workman has not been previously assessed for pension it will be raised at the end of the thirteenth week to the industrial pension rate for 100 per cent. disablement (40s.). Industrial pensions will be awarded where the disablement is likely to be permanent or prolonged; they will be based on the degree of disablement, the maximum, as stated, being 40s. per week. In addition allowances will be paid for a wife (or other dependant) and the first child. These will be respectively 8s. 9d. and 5s. where the injury allowance is 35s. and 10s. and 7s. 6d. where the allowance is 40s. or where the maximum pension is awarded. Women workers will be entitled to injury allowances and pensions at the same basic rates as men with supplementary allowances where applicable. For unmarried workmen under 18 years of age the rates of benefit will be half those of an adult, to be raised to the full amounts upon attaining the age of 18; dependants' allowances will be paid in full.

In the case of a workman's death through injury or industrial disease his widow will receive a pension of 30s. per week if she is fifty or over, has the care of a child or is incapable of supporting herself, and in other cases 20s. per week. There will also be an allowance of 7s. 6d. per week for the first child. Provision is also made for allowances to other dependants in appropriate cases.

It is proposed that past cases should remain the responsibility of the employers concerned, but an allowance of 10s. per week may be made from the fund to any workman who, if he came under the new scheme, would be deemed to be virtually unemployable as the result of his injury.

CORRESPONDENCE

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

The "Cambridge" Kitchen

THE picture of the "Cambridge" kitchen on page 192 of your issue of August 11th compels comparison with my own white "planned" kitchen. My oven was at table height, avoiding stooping, and the door dropped to allow dishes to be slid out. On the same long steel table were the hot-plates with simmering control, and pilot lights showed whether these or the oven were fully or partly on. Farther along, a couple of wall sockets served portable apparatus, and a small porthole fan removed smoke, smell and steam.

The chief difference is that my kitchen was at work in 1908, and was described and illustrated in your issue of September 2nd, 1910. F. R. CRIPPS.

Worthing.

Immersion Heaters in Wash Boilers

RECENTLY I suggested to a wash-boiler manufacturing concern that the base of their boiler should be extended and fitted with an immersion heater (instead of clamped-on elements) protected by a loose perforated grid above and draw-off tap below. In my opinion, this would result in lower manufacturing and maintenance costs and higher efficiency.

The makers replied that :—"(*a*) The mountings of immersion heaters will not withstand misuse ; (*b*) Automatic devices on immersion heaters are not reliable; (*c*) Efficiency of immersion heaters is not higher than the clamped-on type, namely 83 to 84 per cent."

I pointed out that kettles with clamped-on elements are almost obsolete to-day.

Other opinions would be interesting.

"IMMERSED."

Domestic Plugs and Sockets

THE question of what size of plug to install should be answered quite easily: nothing less than a 15-A three pin in any circumstance—and that of such quality that it is really a plug and not a danger. Examples of plugs and fittings that are a danger to life can be seen in some chain stores; they should be taken off sale by law.

When a lighting plug is needed it can be used from a 15-A socket, and when a fire is required the thoughtless will use a 2-A socket and risk accident. Every plug circuit, regardless of purpose, should be wired with 7/029 cable and suitably earthed by means of an earth terminal on a 15-A plug, thus securing both standardisation and safety.

A further measure should be that every electrician should be required to report to the local authority any case of dangerous work and that body should then take the necessary action.

I am hoping in the very near future to see a safety campaign started, beginning with the elimination of all electrical sales from multiple stores and of the manufacture of all shoddy fittings. JAMES SCOTT.

Chard.

Two-Pin Plugs in America

IN your issue of September 15th Mr. Pinto contributes an interesting article on wiring accessories in which he refers to North American practice in plugs and sockets. In it he says "as one pole of the 115-V system is earthed an earthing pin is unnecessary."

I would like Mr. Pinto to amplify this statement, for it seems to me that if metal appliances are being used in a situation which is not earth free, then some means of earthing the metal frame should be provided irrespective of whether one pole is earthed or not. In fact, if one pole is earthed there is possibly an even greater reason for earthing the appliance.

Even if we assume that the neutral pole of the socket can be held at earth potential, there is still the possibility that the metal frame of the appliance may become alive. Is it suggested that the metal frame as well as the neutral end of the winding shall both be connected to the neutral pin? If so, what happens when the neutral flexible breaks as it will sooner or later? The answer to this is that the appliance stops and the frame becomes alive.

It is, I think, probable that the two-pin plug is used in America for the same reason that it is used here, *i.e.*, that it got there first and that in normal domestic earth free situations it gives little trouble. The lower voltage in America is perhaps an added justification. I doubt, however, if earthing or non-earthing of one pole of the system has anything to do with the matter and I should like the views of Mr. Pinto and other readers on this point.

London. FORBES JACKSON.

Cheapening Electricity

REFERRING to Mr. B. Crowsley's letter in your issue of September 29th, may we know whether or not he accepts my contention that space heating cannot be economically supplied with a two-part tariff running charge of ½d. per kWh and if not, what are his reasons?

In reply to his question, I confirm that even with a mid-day peak I would still give a rebate to consumers using electric cookers. Two reasons must suffice. First, because for every kW of cooking load on the peak the number of cooking units sold throughout the year would give a load factor substantially greater than could possibly be given by unrestricted space-heating; secondly, because I would not overlook the fact that, in all but a few exceptional undertakings, the highest peaks of the year (which largely determine what plant and mains capacity must be provided) inevitably occur during cold weather, *i.e.*, when the diversity of the space-heating load is at the minimum.

Certainly let us also reduce generation and distribution costs by every practicable means, but let the benefit go primarily to the "good" consumer without whom reductions of any kind would be impossible.

*London, W.*1. A. M. HARKER.

Preventing Accidents

FOLLOWING upon the suggestions in your leader of September 22nd, I would urge that the safety provisions of the Factory Act be made applicable to conditions everywhere. For instance, why should the average commercial passenger lift be permitted to operate without any legal safeguards?

I daily use two passenger lifts that are real death traps, and close at hand is a goods lift which is in daily use and is uninsurable. E. W. ASHBY.

Liverpool.

Anisotropic Permanent-Magnet Alloys

WE were interested to read in your correspondence columns of August 4th a letter by Mr. Turnbull, who, after referring to an article by one of us, suggests a theory of his own to explain the remarkable properties of anisotropic permanent-magnet alloys. He considers that normal permanent magnets contain veins of iron which short-circuit a portion of the flux and so make the apparent properties poor; and that when the magnet is heat-treated in a strong magnetic field such veins become magnetised and permanently lose their power of short-circuiting magnetic flux.

Mr. Turnbull implies that if his theory had been fully investigated, anisotropic permanent-magnet alloys might have been discovered many years ago. This may leave your readers with the impression that the Permanent Magnet Association has perhaps been lax in failing to investigate a possibility which was apparent to persons outside the trade.

Mr. Turnbull did not discuss his theory with us; had he done so we trust we should have given him a courteous hearing, and then would have asked him and ourselves the following questions. Why have these veins of iron never been seen under the microscope in any of the examinations of magnet alloy structures? It might reasonably have been suggested that they are too small. If this is so then why have they not been detected by the X-ray analyses, which would have shown their presence, even if each vein were only a few atoms in diameter? And even if their presence is assumed in spite of all the evidence to the contrary, how can heat-treatment in a magnetic field prevent them from short-circuiting the rest of the magnet?

We should then have produced the results of tests carried out on tungsten, chromium, and cobalt magnet steels, which show quite conclusively that if the cooling rate of the magnets is sufficient to ensure proper hardening, the presence or absence of a magnetic field during cooling has no influence on the results. These are the magnet alloys which contain the greatest proportion of iron; in them, if anywhere, one would expect to find the free iron required by Mr. Turnbull's theory.

We believe that the magnetic anisotropy is due to asymmetry of the lattice which facilitates an orientation of the magnetic domains at high temperatures under the influence of an external magnetic field. For these effects to be large it is necessary that the rate of cooling through a region of temperatures in the neighbourhood of the magnetic transformation should not be too great. This theory is in accordance with all the known facts and appears to us far more reasonable than the suggestion put forward by Mr. Turnbull.

In conclusion, we would say that we are always ready to discuss any suggestions intended to improve the performance of permanent magnets, but it is only reasonable that we should examine them in the light of all the information that is available.

K. HOSELITZ.

Sheffield. ALUN EDWARDS.

Electric Grain Drying

I WOULD like to support the letter published in the *Electrical Review* of September 29th from Mr. T. S. Parkinson. There is now in operation at Spalding a seed and grain drying plant which is entirely electrically operated with a total loading of 237 kW. To anyone interested in the germination of seed after drying, the charts from the mercury in steel thermograph, fitted to the plant, are a selling agent in themselves. The whole of the electrical plant has been arranged and installed by the Spalding U.D.C. Electricity Department, of which Mr. F. R. C. Roberts is engineer and manager. A. J. GROVER,

Spalding. *Deputy Engineer.*

PERSONAL and SOCIAL

News of Men and Women of the Industry

ON September 26th **Major G. Lloyd George**, Minister of Fuel and Power, was the guest of honour at a private dinner at the Savoy Hotel, London, of leading figures of the electrical industry. Mr. Clarence Parker presided, and those present included Mr. R. Birt, Mr. V. W. Dale, Sir John Dalton, Capt. J. M. Donaldson, Miss C. Haslett, Brig.-Gen. Wade H. Hayes, Mr. E. E. Hoadley, Mr. H. Hobson, Sir Hubert Houldsworth, Sir Cyril Hurcomb, Alderman H. Leese, Sir George Nelson, Mr. F. Newey, Sir Leonard Pearce, Sir Thomas Purves, Mr. H. J. Randall, Mr. W. Riggs, Mr. O. A. Sherrard, Mr. L. W. Smith, Sir Frank Tribe, Mr. V. Watlington, Mr. W. H. Williams and Mr. H. T. Young.

Mr. E. L. A. Mathias, general manager and chief engineer of the Marconi Radio Telegraph Co. of Egypt, has been awarded the O.B.E. for services to the Forces and in connection with military operations in the Middle East.

Sir George Jessel has joined the Board of Edmundsons Electricity Corporation, Ltd. He is chairman of the City of Buenos Ayres Tramways Company (1904), Ltd.

Mr. D. Innes, installation and testing superintendent, Huddersfield Corporation Electricity Department, was married last Saturday to Miss N. R. Jones, of Bron-y-Gaer, Dwyran, Anglesey.

Sir Archibald McKinstry, deputy chairman and managing director of Babcock & Wilcox, Ltd., is retiring from the managing directorship, at his own request, at the end of December.

Sir Archibald McKinstry and Mr. C. K. F. Hague

He will remain a member of the board and deputy chairman. **Mr. C. K. F. Hague,** deputy managing director, has been appointed to succeed Sir Archibald McKinstry as managing director.

Mr. E. H. Cockshott, constructional engineer (electrical), London Passenger Transport Board, who at Leeds took part in designing and installing one of the first two trolley-bus systems to be operated in Great Britain, has retired. During his long association with the Underground and London Transport, he has been principally employed on the provision of power-supply equipment for the many extensions to the Underground railways. He was responsible for the reconstruction of the boiler and generating equipment at Lots Road power station, and for the turbo-generators, boilers, coal plant and high-voltage switchgear at Greenwich and Neasden generating stations.

Mr. Peter d'Eyncourt Stowell, B.Sc., A.M.I.E.E., senior technical engineer in the Edinburgh Electricity Department, has been appointed deputy engineer and manager. Mr. Stowell was educated at Downside School, Somerset, and at Faraday House Electrical Engineering College, London. He was awarded the silver and gold medals of Faraday House as the leading student of his year, and in 1931 gained the B.Sc. degree in engineering with honours at the University of London. As part of the Faraday House course he obtained practical training in mechanical and hydraulic engineering with the East Ferry Road Engineering Co., of London, and in electrical and civil engineering with the L.M.S. Railway Company in London, Manchester and Liverpool.

Mr. P. d'E. Stowell

In November 1931 he became a technical assistant in the L.M.S. Electrical Engineer's Department, and for six years was engaged on a wide variety of engineering schemes in connection with the company's docks and steamers at Holyhead, Heysham and Liverpool; the Manchester-Altrincham and Liverpool-West Kirby railway electrification schemes; the company's power stations at Stonebridge Park, Formby and Derby; and the London District electrified lines.

In April 1937 Mr. Stowell went to Edinburgh as technical engineer, and since then has assisted in several new developments in both the power station at Portobello and the distribution of electricity throughout the city. He has lately been concerned with the preparation of plans for the post-war development of Edinburgh's electricity. He is a member of the Council of the Royal Scottish Society of Arts, vice-president of the Edinburgh Electrical Society, and hon. secretary of the Edinburgh Branch of the E.I.B.A.

Miss Margaret W. Dalton, A.T.S., only daughter of Sir John Dalton, manager and secretary of the County of London Electric Supply Co., Ltd., and Controller of Fuel and Power, London and South Eastern Region, was married at St. James's, Spanish Place, on Saturday to Capt. H. M. Rimmer, R.E.

Alderman S. C. Grimwade, J.P., chairman of the Ipswich Corporation Electric Supply and Transport Committee since 1927, is mayor-elect for 1944-45. He has been a member of the Council since 1924 and was mayor in 1929-30.

At a luncheon held by the Independent Cable Makers' Association on September 26th, a presentation was made by the members to

Mr. Sidney Geipel on his retirement as honorary secretary of the Association, and in recognition of his work on its behalf over many years.

Mr. Alfred Brookes, chief of the research laboratories of Ericsson Telephones, Ltd., is chairman of the East Midlands Sub-Centre of the Institution of Electrical Engineers for 1944-45. He has been a member of the Sub-Centre Committee since 1923 and was chairman in 1926-27. In addition he is a member of the Committee of the South Midlands Centre and its Radio Section Committee, as well as of the Local Centres Committee, London. He is president of the Nottingham Society of Engineers for 1944-45 and has been a member of the Electrical Engineering Advisory Committee of University College, Nottingham, for over twenty years, a member of the Board of Studies, U.C.N., for many years, evening class lecturer, and a member of main and sub-committees of the British Standards Institution. Among many other activities, Mr. Brookes was in 1938 chosen as a delegate to represent Great Britain at the International Conference in London of the C.C.I.F. "Comité Consultatif International Téléphonique à Grand Distance." He graduated with the B.Sc. at the University of Liverpool in 1907 after a session in the Honours School of Electrical Engineering, and obtained the M.Sc. by research in 1918.

Mr. A. Brookes

The close of the first 1944 session of the Crompton Parkinson occupational training scheme was marked by a distribution of prizes in the Social Centre at Chelmsford on September 15th. Pupils who completed the course numbered 120 and 139 are entered for the new session. Mr. T. H. Windibank, M.I.E.E., works director, presiding over the gathering of some 170 departmental representatives, lecturers and pupils, expressed the thanks of the directors to the principal and governors of the Mid-Essex Technical College for their co-operation. Mr. M. Garside, principal, in replying, advised the boys to take full benefit of what he considered to be the best training facilities offered in industry to fit them to the right occupation. Mr. B. Hallowes Garside, A.M.I.E.E., general manager, presented book prizes to eighteen students and certificates of training to nineteen pupils completing the final year of instruction under the training scheme. He expressed appreciation of the work of the twelve regular lecturers. The education officer, Mr. J. G. P. Anderson, B.Sc., summarised past activities and showed how pupils could prepare themselves for their future place in industry.

Mr. B. Hallowes Garside presenting prizes to G. L. Boatman who gained the highest total

The Willesden Borough Council is inviting applications for the position of borough electrical engineer at the Walker Scale salary of £1,861 per annum of which 85 per cent. will be paid for the first year, 92½ per cent. for the second year and the full amount thereafter. The vacancy is caused by the retirement of **Mr. J. D. Spark,** who was "re-engaged" last year at a salary which took account of his pension.

Another corporation seeking an electrical engineer is Darwen, which advertises the post at a salary of £650, rising to £700 at the end of the first year, plus "Whitley Council bonus," at present about £50.

Mr. S. H. Rawlings.—A memorial service to the late Mr. Sydney H. Rawlings, of the Automatic Coil Winder & Electrical Equipment Co., Ltd., will be held at St. Stephen's Church, Rochester Row, S.W.1, on October 12th at 11 a.m.

Technical Education

IN his address as chairman of the I.E.E. Mersey and North Wales Centre delivered at the opening meeting on October 2nd Mr. J. Cormack, B.Sc., expressed the fear that the implementing of the new Education Act might be seriously jeopardised by the magnitude of the task. A short Act prohibiting classes of over 30 pupils and placing a time-limit on the use of black-listed buildings would have been more likely of fulfilment and its results would have permeated the whole educational system. Mr. Cormack contended that legislation could not alter innate ability and aptitude, hence, even with secondary education for all, it would still be a minority, possibly not more than 25 per cent., who would be able to profit from a moderately advanced academic or technical curriculum. He anticipated that the junior technical school would become the technical high school and provide the normal avenue of approach to the technical faculties of the university or full-time courses in the senior technical college. He hoped that the new county colleges would not be attached to the technical colleges. Provision, however, should be made in the latter institutions for a continuance and extension of the present schemes of part-time day release for apprentices.

With regard to the universities, the speaker said that the appointment of lecturers, as opposed to research staff, should be determined primarily on ability to teach and not because of a flair for original research.

COMMERCE and INDUSTRY

Plant Export Conference.

Increased Unemployment Benefit

UNDER the Government's social insurance plan the proposed standard rates of sickness and unemployment benefit are 40s. a week for a married couple and 24s. for a single person. Some time must elapse before the plan begins to operate and in the meantime it is proposed to raise the existing unemployment benefit. A Bill for this purpose was introduced into the House of Commons last week by the Minister of Labour. It raises payments under the general scheme by 4s. to 24s. a week for men and 22s. a week for single women and by 2s. to 20s. a week for married women. Rates for young men and women are also increased and the benefit in respect of a wife or other adult dependant is increased by 6s. to 16s., that for the first two children by 1s. to 5s. each and for subsequent children to 4s. each. There is to be no increase in contributions; the Unemployment Fund now amounts to £285,000,000.

Power Plant Manufacturers Confer

Plans to meet overseas demands for British power plant are being discussed at a three-day conference convened in London by the Industrial and Engineering Development Association. Managing directors and sales representatives from nine concerns, members of the Association, met at the Holborn Restaurant on October 4th for the first sessions in this three-day interchange of information. Existing plant, new products, sales and advertising policy are under review. The object of the meeting, it is stated, is to decide upon a unified post-war plan to cope with the large demands for all kinds of plant in the immediate post-war period.

South Shields and Joint Memorandum

The South Shields Corporation questioned the validity of the resolution purported to have been adopted at an extraordinary meeting of the I.M.E.A. approving the joint memorandum upon the reorganisation of electricity supply and issued a writ against the Association. It is now reported by the *Shields Gazette* that the Town Clerk has been informed that the Association will refrain from pressing the Minister of Fuel and Power to make any decision on the matters dealt with in the joint memorandum, pending consideration of a South Shields notice of motion to rescind the resolution.

Removal of Heating Ban

Under a new Direction and Order (operative for 1944 only) made by the Minister of Fuel and Power the use of any form of heating is permitted in Scotland and Northern England on and after October 8th and in the remainder of England and in Wales on and after October 15th.

The two amending regulations are entitled the Control of Fuel (No. 3) Order, 1944, General Direction (Central Heating and Hot Water Plants) No. 3, and the Control of Fuel (Restriction of Heating) (No. 2) Order, 1944.

Hackney Labour Problem.

The Minister emphasises that military operations will place a great strain on fuel supplies during the coming winter and that the demands for all types of fuel, including coke, gas and electricity, may, if anything make the position more difficult than in previous years. Even after the ban is lifted, central heating plants and fires should not be lighted at all on those days when the temperature does not fully warrant their use. The need for economy of all fuels is still vitally important.

In the House of Commons last week Major Lloyd George promised Mr. Denman to see that in the coming winter increases in the use of gas and electricity for street lighting were not allowed to restrict the supply for domestic heating.

Acquisition of Diesel Engine Business

The proposed acquisition by Associated British Engineering, Ltd., of the Diesel engine business of Mirrlees, Bickerton & Day, Ltd. (reported in our issue of September 15th) has now been approved by the Mirrlees shareholders. The Glasgow factory of the Mirrlees Co. is to continue to operate under the name of the Mirrlees Watson Co. in the production of sugar machinery, etc.

American Plant for Chile

The Chilean Government has purchased for future delivery "substantial orders of transformers, generators, and other electrical equipment," officials of the International General Electric Company have announced. Three large power plants are already scheduled for production, and others are planned for the near future. In addition a large steel mill will be built, which will be the first such plant in Chile. Post-war development is being directed by a Government agency, the "Corporacio de Fomento de la Produccion."—*Reuter* (New York).

Labour Shortage at Hackney

Representations were recently made by the borough electrical engineer of Hackney (Mr. E. A. Mills) that unless something were done to relieve the serious labour shortage he would have to repudiate responsibility for failure to fulfil the Central Electricity Board's requirements. Reference to this is made in a report by the Hackney Electricity Committee which says that with few exceptions the men who had been sent for interview were unsuitable for the class of work required.

Visits to the undertaking were subsequently made by representatives of the Electricity Commission, the Central Board and the Ministry of Labour and National Service, who agreed in every detail that the requests for labour were justified, and indicated that immediate steps would be taken to meet the requirements. The promises made are, the Committee states, beginning to materialise, but some of this unskilled labour can only be regarded as very temporary. Several skilled men necessary for the maintenance of the plant, whose services

were requisitioned some months ago, have not yet arrived and in consequence the annual overhaul programme is much delayed. The Committee adds that other London undertakings appear to be similarly affected and suggests that the matter should be brought to the notice of the Metropolitan Boroughs' Standing Joint Committee.

Brush Foremen's Conference

The Foremen's Association of the Brush Electrical Engineering Co., Ltd., held its second annual conference at the company's works at Loughborough on September 22nd to 24th. In addition to Brush foremen the delegates represented a number of important industrial concerns throughout the country. Mr. Alan P. Good, managing director of the company, presided at the dinner on the first evening and stressed that the time had arrived for foremen to consider entirely new methods in control and management to stabilise post-war production. Sir Frederick Leggett, C.B., Deputy Secretary of the Ministry of Labour and National Service, said that the country owed a great debt to men of the foreman type who had done a magnificent job in maintaining high production with flexibility during the war in the face of difficult labour conditions.

During the various sessions addresses were given by Dr. Maurice Dobb (lecturer in economics at Cambridge University), Mr. L. H. Pearmaine (national secretary of the Transport and General Workers' Union), Mr. F. J. Burns Morton (works manager, Sketchley Dyeworks, Hinckley), Dr. J. A. Bowie (in charge of research on personnel administration) and Group Captain C. J. S. O'Malley, C.B.E., M.B. (R.A.F. Rehabilitation Unit, Loughborough). The chair was taken at the various meetings by Messrs. W. M. Good, H. E. Midgley and D. B. Hoseason, directors of the Brush Company and subsidiaries.

Delegates at the second annual conference of the Brush Foremen's Association

Motor Claim Succeeds

At Stamford County Court on September 25th His Honour Judge Galbraith gave his reserved judgment in an action brought by Blackburn, Starling & Co., Ltd., Nottingham, against Stamford Electrical, Ltd. The plaintiffs claimed £13 odd, expenses incurred in transporting two motors from the defendants' premises to a customer and correcting faults.

The defendants contested the claim on the grounds that it was stated in their printed catalogue that they would make good any defect in their machines if they were returned carriage paid; all other warranties were excluded. His Honour said that the quotation for the motors specified delivery free to Blackburn, Starling's works, or equal, prices and delivery being "subject to alteration under Emergency Regulations."

It was argued for defendants that the plaintiffs had their catalogue and thus having knowledge of the printed conditions could not claim damages for breach of warranty. Plaintiffs' counsel contended that as the catalogue conditions were not referred to in defendants' estimate they were not a part of the contract and therefore the plaintiffs could claim for breach of warranty for the expenses to which they had been put. This view was adopted by the judge who said that as the catalogue conditions had not been brought to the plaintiffs' notice they did not constitute part of the contract. He gave judgment in favour of the plaintiffs for the amount claimed, with costs.

Linesman's Injuries

In the King's Bench Division of the High Court last week Mr. Justice Hallett had before him an action by Mr. Albert Steven Crouch, of Hastings, against the Steel Scaffolding Co., Ltd., of Weybridge, and Watshams, Ltd., of Caversham, to recover damages for personal injuries he had sustained. Both defendants admitted liability and the only question before the Court was one of damages.

Plaintiff was working as a linesman on pylons erected for the Central Electricity Board at Gloucester and was so employed by the second defendants who were the sub-contractors for the first defendants. On a date in September, 1941, he was engaged in wiring on one of the high-voltage towers and went to the end of one of the cross-arms, when it gave way and he fell 60 ft. to the ground. At the time he was 34 years of age. He suffered terrible injuries, including fractures of the spine, and would now only be able to do very light duties. His wages had averaged about £6 a week or just under that amount. The special damages were put at £900.

His Lordship said it was obvious that the plaintiff had suffered much pain and distress. He awarded him £2,500 damages and £900 agreed special damages. and entered judgment for the plaintiff for £3,400 with costs.

Jet Propulsion

In our issue of February 25th we referred to the pioneer work carried out by the British Thomson-Houston Co., Ltd., in connection with jet-propelled aircraft, regarding which the company was approached by Air-Cmdre. Whittle in 1936. The first engine was built at Rugby in the following year. It is announced in the *Daily Telegraph* that jet-propulsion engines are now being manufactured in bulk by the company. This is surely one of the best kept secrets of war preparation, as for eight years developments have proceeded without leakage to the outside world.

Electricity Failure in Suffolk

The whole of Suffolk except Ipswich, Lowestoft, Woodbridge and their environs was affected by a breakdown of the electricity supply which occurred on Monday evening. Shortly before six o'clock there was a cable breakdown near the Ipswich power station and an hour later an alternative supply also failed.

Civilian Production in America

The director of the U.S. War Production Board's region No. 2 at New York has announced that the Electrolux Corporation has been granted permission to produce a limited number of new vacuum cleaners in its New York plant. The corporation thus becomes the first New York concern to resume civilian production under the W.P.B.'s "spot authorisation" reconversion plan. The "spot authorisation" order, issued August 14th, empowers local production man-power officials to permit the manufacture of a long list of civilian articles in 79 categories in individual plants when man-power, machinery and materials are available and can be employed without detriment to the war effort.—*Reuter.*

T.U.C. Reconstruction Policy

When the Trades Union Congress meets at Blackpool on October 16th it will consider a lengthy report on post-war reconstruction which has been prepared by the General Council. Dealing with the Government's White Paper on Employment Policy, the report contends that the problem of full employment neither can nor should be solved only by attempts to expand our export trade and least of all by methods of cut-throat competition, although it recognises the importance of increasing the efficiency of our export trade. The view is expressed that the Government should each year endeavour to balance man-power requirements with man-power supply, estimating the probable amount of private expenditure both on consumption and investment and proposing public outlay on a scale to employ all available labour. Establishment of a national investment board is proposed in order to ensure the comprehensive planning of all forms of investment and avoid violent fluctuation.

Proposals for the nationalisation and control of industry are set out. Industries are divided into three classes, namely, those considered ripe for socialisation, others needing some measure of regulation in the public interest, and the remainder, industries of minor importance which can be left for the time being to completely private enterprise. The first class includes the coal mines and railways, with all fuel and power and all transport undertakings ranking high. The suggested form of public ownership is by a public corporation, appointed by a Minister, and compensation, it is considered, should be based on "reasonable net maintainable revenue" and be payable in Government bonds. For the regulation of important industries, where immediate action is desirable, industrial boards should be established, composed of representatives of workpeople and employers, with an impartial chairman and other independent members appointed and paid by the Government. Industries which are considered to require regulation are those in need of unification; those controlled largely by one combine or financial group; those producing mainly capital goods with production concentrated mostly in few establishments; and those the products of which are in general demand and it is necessary to ensure an adequate supply (domestic electrical appliances are specified under this heading). The boards would have no final authority on the regulation of prices or the restriction of output or entry into the industry. These would be subject to sanction by a special public authority.

The report declares that most wartime financial controls should be maintained.

Trade Announcements

From next Monday the sales and general offices of De La Rue Insulation, Ltd., will be situated at Imperial House, 84, Regent Street, London, W.1 (telephone: Regent 2901).

Barimar, Ltd., have moved to Barimar House, Peterborough Road, Fulham, S.W.6.

Fillet Welding

There are many ways of making fillet welds in downhand, vertical and overhead positions. As an aid to training and inspection, as well as to facilitate the interchange of drawings between establishments, schedules of recommended procedures have been issued (for guidance only) by the Research Council of the Institute of Welding, 2, Buckingham Palace Gardens, London, S.W.1. The pamphlet includes sketch drawings and tabulated data; the electrode figures relate to types in general use in shipyards and the recommended current values have been measured with an ammeter as distinct from those indicated by the settings of the machine regulator.

Indian Scientists' Visit

A party of distinguished Indian scientists is expected to arrive in this country in the second week of October for a stay of about seven weeks, during which they will visit important scientific laboratories, and industrial, medical and agricultural research institutions. They will also discuss modern scientific progress with such bodies as the Royal Society, the Department of Scientific and Industrial Research, the Agricultural Research Council and the Radio Board. The visit follows that to India last winter of Professor A. V. Hill, M.P.,

Secretary of the Royal Society. The plans for the visit are being prepared by a small committee consisting of representatives of the Royal Society, the British Council and the Department of Scientific and Industrial Research.

It is understood that the party will include Sir Shanti S. Bhatnagar, F.R.S. (Director of Scientific and Industrial Research, India), Sir Jnan Chandra Ghosh (Director of the Indian Institute of Science, Bangalore, and President of the National Institute of Sciences of India), Prof. S. K. Mitra (of the University College of Science, Calcutta, chairman of the Radio Committee of the Board of Scientific and Industrial Research), Prof. J. N. Mukherjee (Professor of Chemistry at Calcutta University) and Prof. Megh Nad Saha, F.R.S. (the eminent physicist, of the University College of Science, Calcutta).

Bedford Exhibition

Farming Equipment and Domestic Appliances

CO-OPERATION between the Bedford Corporation Electricity Department and the Beds., Cambs. & Hunts Electricity Co. was responsible last week for an exhibition which, though primarily dealing with electrically operated farming equipment, included specimens of a number of new types of domestic appliances that will be available after the war. Dairy equipment was well represented, with bottle washers, sterilisers, coolers, coldrooms, and wash basins with water heaters beneath. On market day actual demonstrations of the milk cooling apparatus were given.

A special feature was made of the Essex mill which is becoming so popular and also its "big brother," the "Briton," which is fitted with a 10-HP motor instead of one of 3 HP. Other farming equipment represented included a new type of E.R. and F. separator for dressing and grading grain, a grain dressing machine, root cutters and sorters, a selection of motors and pumps, welding apparatus, soil heating and sterilising equipment, a water heater for slightly warming water for greenhouses, and various examples of poultry farming apparatus such as incubators, hovers and pluckers. Besides a model grain dryer there were photographs of an electrically heated unit for which the Bedford Electricity Department has been responsible. Other photographs dealt with such aspects of rural development work as generation, transmission and distribution and street lighting.

The post-war domestic appliances included English Electric and Jackson cookers an English Electric washing machine and a J. & P. 20-gal. 2½-kW water heater. Cabinet type construction has been employed in each case with the minimum of dust collecting surfaces. Thermostatically controlled ovens and four-heat switching with a simmering position for the hotplates are features of both the cookers.

Hotplate control was taken a stage further in an adjacent exhibit where demonstrations were given of an improved type of Sunvic "Simmerstat" infinitely variable unit which the manufacturers expect to be able to put on the market after the war at a price not much higher than that of a normal 3-heat switch. In the latest model the scale has been made non-linear, and the dimensions and terminal arrangements are the same as those of a 3-heat switch. It can be used with any type of hot-plate, though, of course, it does permit the use of a single element plate with its simpler construction and maintenance.

A part of the dairy equipment display at the Bedford electrical farming exhibition, with the "Briton" and "Essex" mills on the right. Above are some specimens of post-war domestic appliances

Organisations of the Industry—XVI

Electrical Wholesalers' Federation

By A. Albrecht, Director

SINCE its creation in 1914 the Electrical Wholesalers' Federation has strictly maintained the fundamental principle that its members must be accredited electrical wholesale distributors, with suitable premises, equipment, and organisation, carrying adequate stocks, and therefore in a position to render a proper, and efficient, service to the contracting and retailing side of the electrical industry.

Essentially the Federation is a commercial organisation, with well-defined limits to its activities. For instance, it takes no part whatever in the fixing of prices which it regards as the sole concern of the manufacturers. It does not participate in technical matters. With rare exceptions, the Federation does not function to secure advantages restricted to its members. Its object is to secure proper, and equitable, trading conditions for electrical wholesalers. Whatever benefits are derived from the result of this work may be made freely available to all "bona-fide" wholesalers, whether they are members of the Federation, or not. The result of this broad outlook has been a stabilisation of wholesale distribution, with equitable discount margins.

Mr. A. Glenister, President and Chairman of the Council, and (right) Mr. W. H. Swain, Vice-president

The Federation is governed by a Council limited to twelve members. Membership is divided into six sections, or areas; each section is entitled to nominate a councillor to represent its interests and these are designated section councillors. The remaining members of the Council are known as general councillors, and may be nominated by any two members, or by the Council; if necessary a ballot decides the election of a general councillor. The rights and powers of both types of councillor are identical. The term of office is for three years, one-third of the councillors retiring each year.

Originally the E.W.F. was established as a company limited by guarantee but in 1933 its work was segregated, and the major functions passed to the Federation which was certified as a trade union. Both bodies continue to function in spheres incidental to their constitution, and control and policies are identical.

The first general meeting which set up the Federation was held in London on June 9th, 1914. The advent of the first world war, far from nullifying the efforts of the young association, appears to have lent zest to its ambitions. It proceeded to clear out the foreign element from its membership and pledged itself to "the encouragement of commercial unity between manufacturers and wholesalers, and the promotion of a better home trade." The succeeding years laid a heavy hand upon the Federation and its members. At an early stage there was a short-lived, and abortive, attempt by the Government to eliminate all wholesalers. It was the manufacturers of foodstuffs and domestic goods in daily consumption, who quickly convinced the Government of the folly of its proposal, since they could not function efficiently without their organised wholesale distribution.

The year 1919 is the outstanding period in the history of the Federation. In that year there was a substantial influx of new members, whose enthusiasm and capacity left an indelible mark upon its fortunes. Now commenced the task of formulating the principles which were to guide the Federation in the years ahead. In the next few years was fashioned the policy which has stood the test of twenty-five strenuous years, and an intensely critical examination at the hands of the various trade associations, and individual manufacturers, who were asked to accept it: no mean accomplishment. Looking back, one is constrained to acknowledge the extraordinary breadth of vision running through this work, and the courage with which it was attempted. Many of the Federation's proposals, rejected at first as revolutionary, or received by manufacturers with cold disdain, are to-day accepted trading practice.

Now commenced the research work which permitted a scientific approach to the problem of electrical wholesale distribution. Coincident with it was the attempt to eliminate

the "brass-plate merchant," and to ensure that every firm claiming wholesale status was in a position to render a proper service both to the manufacturers, and the contractor retailers. To this end an investigation was made of every firm claiming status, and from this work sprung the exceptionally valuable status records possessed to-day by the Federation.

Glancing back through the records of this period it is interesting to note the unrest and anxiety which prevailed. The war was over, and all sections of the industry were concerned with post-war problems and planning. Individually, and in groups, the manufacturers approached the Federation, or were approached by the Federation, in an endeavour to organise wholesale distribution. It was an arduous work that was undertaken, but it persisted through the years, and where it succeeded it built up a confidence and an interworking which has been invaluable not only to the interested parties, but to the electrical industry generally. From that work has sprung so much of the interworking, organisation, and control, which is an outstanding feature of that part of the trade to which wholesale distribution applies.

Support for British Manufacturers

About this time one of the most momentous decisions of the Federation was made. After a careful and critical examination, and with the full support of its members, the Federation resolved that it would lend its fullest support to the home manufacturers. To appreciate the importance of this decision one must have regard to the very large volume of imported goods (*e.g.*, motors, cables, fittings and accessories), which passed through the hands of the wholesalers before 1914. The Federation could not forbid its members to handle foreign goods, but it resolved not to treat with the foreign manufacturer and bent the whole of its efforts in support of the home market. What that decision has meant to manufacturers is difficult to appraise, but unquestionably it has been a powerful influence in their substantial success. The Federation's trading charts, based upon information made available to it, bear ample testimony to this fact. Some of the most successful manufacturers to-day are firms who in the early days wholeheartedly embraced the Federation's proposals and reaped a rich reward.

It would serve no useful purpose to enumerate the various committees on which the Federation serves, but on every important committee dealing with the wholesale distribution of electrical goods, the Federation is represented by men highly qualified to speak with authority on the subject. There is a permanent contact between the Federation, and most of the electrical manufacturers' associations. Every important change of trading conditions is reviewed, and adjusted if necessary, through this medium: trading codes, status discount margins, methods of marketing, trade abuses, all are matters which come under consideration, and the manufacturers are able to draw upon the rich experience of the Federation. In actual practice once a course of action has been mutually agreed, it is rarely challenged by any individual firm of wholesalers. I have previously mentioned that the Federation does not seek to restrict to its members the terms or conditions it may arrange. Here is one of the advantages accruing from that liberal policy.

Let it be quite clear that the Federation does not restrict itself to associations of manufacturers in its functioning. Every individual manufacturer is equally at liberty to seek its assistance, and many do. A very large volume of business is done with non-associated manufacturers, and for the purpose of proper trading they have an equal interest to the Federation. The difficulty is to treat with individual firms in such an involved subject as wholesale distribution. That the Federation finds most of its work lies with the associated manufacturers is not an accident, it is a natural tendency, and from this interworking springs the standard of trading which influences all manufacturers.

Actually many of the activities of the Federation do not lend themselves to publicity. Because of its peculiar position as the handmaid of the manufacturers, the Federation is in receipt of much information of a highly confidential nature: confidential as between the associated manufacturers, and the non-associated firms, or even as between the individual manufacturers of an associated group. One has need, therefore, to be circumspect in writing. Indeed, to safeguard this aspect of its working, the Council denies itself the right of access to information of this nature which is not essential to its proper functioning.

A Well-Organised Industry

The voluntary interworking, or interlocking, of the different trading sections of the electrical industry (manufacturers, wholesalers and retailer-contractors) is a most important development of recent years. Many times during this war period when a Government Department has desired to discuss a proposal affecting trading with a particular section, the association concerned has refused to proceed unless the other sections were represented at the discussions. This has created a most favourable impression and it has been made clear that there is no other industry so splendidly organised in its trading as the electrical industry. Perhaps I am digressing, but I cannot refrain from noting this tribute to the electrical industry.

It may be that no little credit for this state of affairs is due to the Fair Trading Council, which has afforded a forum where the trade associations of the industry can meet and discuss their affairs on common ground, but perhaps the major credit is due to the trade associations themselves, who, by their individual efforts, have built up this splendid confidence. It is to this end the Electrical Wholesalers' Federation has laboured since its inception.

Since the outbreak of war, and at the request of the Government, the Federation has undertaken to advise all wholesalers on the various Government controls affecting them—purchase tax, limitation of supplies, Prices of Goods Act, cable control, etc. It has proved to be a very onerous work. This service is rendered willingly, and without charge, to the non-associated wholesalers, as the Federation's contribution to the national effort. In addition the Federation has rendered service to numerous Government Departments which has won appreciation.

Wholesalers' Useful Functions

This last paragraph prompts a final observation. It has needed two world wars to throw into high relief the important function of wholesale distribution. If one will have regard for the multifarious, but withal magnificent, controls which have been built up for the well-being of the populace, one cannot be insensible to the fact that nearly all of them pivot on wholesale distribution. Without that pivot the schemes could not function. Note also that the impact of purchase tax falls upon the wholesaler as the pivotal point at which tax can be collected. For those who talk lightly of the "middleman" there is room for thought in these facts.

The Federation's membership to date is 143. If this number is small in comparison with the 600 firms who are recorded by the manufacturers as receiving wholesale status terms, the purchasing capacity of members is very great, and represents substantially the major portion of the business passing through wholesale channels. It is not possible within the limits of this article to analyse the service rendered by members to the industry; that must wait for another time, but perhaps one point is worthy of note. The members operate 347 well-stocked depots in 90 of the principal towns in the United Kingdom (excluding Northern Ireland). At a conservative estimate, and quite apart from forward commitments, these depots normally will carry a floating stock exceeding one million pounds. At the peak period it is considerably higher. Here is a simple example of the unparalleled service offered by this wholesale distribution, which functions and has its well-being under the ægis of the Electrical Wholesalers' Federation. How much the electrical industry owes to the Federation is best known and appreciated by the trading groups and individual firms who work in close co-operation with it.

Perhaps it is invidious to single out individuals for especial mention, but none will begrudge a passing reference to a few of the old members to whom the Federation owes so much. First must come Mr. A. G. Beaver (Sun Electrical Co., Ltd.), a founder member, three times president, and in the early days the honorary secretary, and later, for many years honorary treasurer: literally "head cook and bottle washer" to the Federation in its early days, and until its organisation was firmly established. He figured in all the early negotiations and was a bonny fighter with a fine sense of proportion that was invaluable in negotiations.

Then there is Mr. R. W. Smith (Drake & Gorham Wholesale, Ltd.), also a founder member, the first chairman of the Federation, and until this year a member of the Council (both he, and Mr. Beaver, have recently retired from the Council to make way for younger men to whom will fall the burden of post-war problems). A fearless critic, not given to many words, he could abruptly knock the bottom out of an argument, or put over a trenchant criticism, and then disarm ill-feeling with the most compelling of all smiles which has helped to smooth out many an awkward moment in the affairs of the Federation.

The brothers George and Walter Donovan (Donovan Electrical Co., Ltd.) were both founder members, and presidents in their time, and both did yeoman service on the Council. Mr. George Donovan will be remembered for his outstanding work for many years on the Fair Trading Council. When eventually the Fair Trading Policy was launched he felt his work was completed, and retired from the Council to make way for a younger man. Mr. Walter Donovan worked more behind the scenes, but both brought to their work a charming courtesy, and a strict integrity that is the symbol of their type. Unselfish in their service to the Federation from its earliest days, they must receive a full share of the credit for its success.

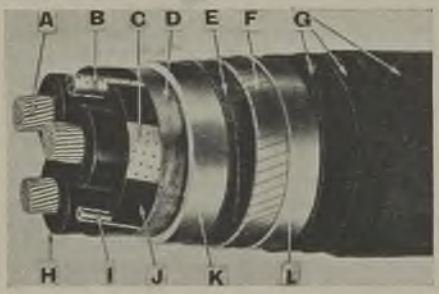
Last, the late Mr. J. W. Dodds (E.G.S.C. Co., Ltd.), the dreamer who was content to stand in the background, and let others make real his dreams. So much of what he dreamed is now the substance and soul of the policy of the Federation. Also a past-president, and in the early days a member of the Council, he was not a man who could easily win his audience, or even put over his thoughts with felicity. Yet he could be staunch in his friendship, and nothing could cramp the horizon of his dreams for the electrical industry. A man of principle, he was a great influence in the fashioning of the Federation.

Three-Core 132-kV Cable

Nitrogen Raises Stress Limit

SOME months ago what is claimed to be the first three-core 132-kV cable to be installed under a normal commercial contract was laid by Callender's Cable & Construction Co., Ltd., in a locality that may not yet, for security reasons, be further identified. In this cable, through the application of nitrogen at 200 lb. per sq. in., the dielectric strength of voids in the insulation, which follow the thermal expansion and contraction of compound in service, is raised to that of the impregnated paper.

In this way the maximum stress can be taken as 100 kV per cm. of wall thickness instead of the 50 kV per cm. used with ordinary solid dielectrics, which calls for a wall thickness of 0·6 in. A three-core 66-kV cable and even a single-core 132-kV cable would therefore be impracticable on account



Three-core 0·40 sq. in. 132-kV impregnated gas pressure and combined pilot cable
A. Stranded copper conductor. B. M.p. screened pilot cable. C. M.p. screen. D. C.w.f. tape binder. E. C.w.f. tape bedding. F. Longitudinal steel strip reinforcement. G. Rubber-bitumen sandwich serving. H. Impregnated paper dielectric. I. Gas channel. J. Impregnated paper fillers. K. Lead sheath. L. Helical steel tape reinforcement

of size. The application of pressure, however, so greatly reduces the dielectric thickness that three-core 132-kV cables become feasible.

The cable described has an overall diameter of 4·8 in. It includes stranded copper conductors of 0·4 sq. in., which are insulated with paper impregnated with a new type of low-loss compound and wound with metal tapes to provide for the radial and longitudinal mechanical forces exerted by the gas pressure between dielectric and lead sheath. A new type of overall serving prevents corrosion of the reinforcement.

Joints are built-up with paper tape and preformed paper rolls enclosed (without compound filling) in a lead sleeve, which is in turn enclosed in a copper reinforcing sleeve, the whole being surrounded by a standard pitch-filled concrete box. Dimensions of dielectric in the joint are controlled in accordance with the intensity of the electric field at every point and an earth screen is placed immediately over the dielectric. The space between the dielectric and joint sleeve provides the gas path between adjacent lengths of cable.

Nitrogen is introduced into the cable at one end of the route. Should the internal pressure fall, a switch in the joint box places a resistance across the two-core pilot cable embodied in the main cable and an automatic Wheatstone bridge at the end of the feeder is brought into action. This measures the resistance of the pilot cable and thereby locates the joint in which the drop in pressure has occurred.

The cable terminates in a horizontal dividing box with single-conductor cables leading to the sealing ends, which are insulated from their supporting structure and earthed at the dividing-box position so as to prevent the introduction of circulating currents in the sheathing and reinforcement.

After installation the cable was subjected to an acceptance over-voltage test of 264 kV DC (the same voltage as was successfully withstood by the company's gas-pressure cable tested in Holland a few years ago) between conductors and earth. This test was carried out by means of one of the company's vans equipped with high-voltage gear built to the designs of its outside testing department. In order to minimise the number of joints, the cable was manufactured in the long drum lengths made possible by the large capacity of the plant available at the Callender works.

Scottish Mining Electrical Engineers

AT the opening meeting of the West of Scotland Branch, Association of Mining Electrical and Mechanical Engineers, held at the Institution of Engineers and Shipbuilders, Glasgow, there was a large attendance to hear Mr. C. S. Buyers deliver his presidential address. Mr. Buyers spoke on the evolution of the electrical engineering industry, and dealt with the history of electricity from the earliest days down to the present time, demonstrating how each discovery led the way to further progress. Many lantern slides of historic interest were shown, and a sound film entitled " Col. Crompton " was also screened.

I.E.E. Benevolent Fund.—As the result of a recent appeal by the Mersey and North Wales Centre of the Institution of Electrical Engineers, £160 has been handed over to the Institution's Benevolent Fund.

Special Lathe Drive

Pre-selection of Speed with Infinitely Variable Regulation

A VERSATILE lathe for research into cutting tool behaviour, the machinability of various materials and the relative merits of different cutting lubricants, which has been built by George Swift & Sons, Ltd., Halifax, has been equipped electrically by the Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, so as to permit pre-selection of the spindle speed and, by remote control, infinitely variable regulation throughout a wide range. Rapid acceleration and deceleration are achieved without excessively stressing the electrical or mechanical transmission components.

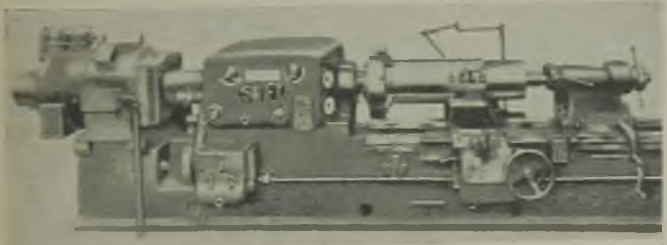
A good finish is imparted to the work piece by the "smooth running" motor, which is of 75 HP at 1,500 RPM, attached directly through a flexible coupling, and exerts a constant torque down to 600 RPM. Sliding reduction gears in a box in the headstock provide additional speed ranges of 600 to 250, 250 to 100, 100 to 40 and 40 to 17 RPM. It is an AC commutator motor, type CH, whose speed remains practically constant, when adjusted, irrespective of the load.

The efficiency is high as external losses are not involved, and the power factor is higher than that of the more usual industrial machines throughout the major part of the speed range. Resistances are not required for accelerating and the starting current is limited by the pilot motor resetting the brush gear automatically to the correct position for starting. Smooth acceleration is ensured by the gradual movement of the brush gear to the pre-selected speed.

Overload protection at all speeds is provided by a thermal tripping device in the secondary circuit of the motor, which is in the stator. The primary winding is in the rotor and is connected to the supply lines through slip-rings with brushes. It is thus an inversion of the usual induction disposition in this respect. On the rotor there is also a regulating winding connected to a commutator in the ordinary DC way, with two brush rockers which can be moved relatively to each other, displacement being effected from a distance by control of a pilot motor mounted on the main motor. On each phase, one end of the secondary winding is connected to a brush stud on one rocker and the other end to a stud on the opposite rocker. The more the rockers are moved apart round the commutator, the greater will be the number of commutator segments and consequently the amount of regulating winding connected in series with the secondary winding.

Pre-set speed controller

If the regulating brushes are brought together, the whole of the regulator winding will be cut out and the secondary winding short-circuited so that the machine will act as an ordinary induction motor and will run at slightly below synchronous speed with a relatively small voltage induced in the secondary winding. If the regulating brushes are separated by rotating them relatively to each other around the commutator, then a certain voltage will exist between the brushes of each phase, its value depending on the amount of regulating winding in circuit between them. The effect of this voltage injection into the secondary circuits is to compel the motor to change from synchronous speed to that speed at which the voltage induced in the secondary windings is sufficiently increased to restore the balance in the circuit. Thus, any speed within the range, above or below the synchronous speed, can be obtained by rotating the brushgear in one direction or the other.



Lathe designed for study of cutting tools in a research laboratory

To enable the lathe operator to have full control of the spindle speed a switch is included in the control panel for pre-selecting the desired speed or, alternatively,

for allowing the speed to be modified by push-button control on the headstock. The pre-selecting controller has been developed mainly for adjusting the speed automatically to the desired value with an AC variable speed commutator motor instead of depending on the operator for manœuvring to that speed. It consists essentially of a contact arm with pointer rotated over a calibrated contact disc by the handwheel and works in conjunction with a contact disc driven by the pilot motor which moves the brushgear. Speed can be pre-set with the motor at rest or obtained when running, and thereafter the handwheel can be left at that setting while the operator continues to control the motor by push buttons on the headstock, which are arranged for "start," "stop," and "inch" on the main motor, "raise" and "lower" for the pilot motor and "start" and "stop" for the pump motor. Duplicate push buttons are provided on the saddle to give those three motions for the main motor and, in addition, "left" and "right" rapid power motion of the saddle.

The feed box change gears are gear driven from the headstock by an external train of gears and a sliding clutch is included to protect the gears from excessive overloading.

The saddle movement is performed by a separate squirrel-cage induction motor, end-shield mounted at the back of the saddle and surmounted by a direct-on reversing contactor starter. Its controlling push buttons are in the "station" at the front of the saddle, as already mentioned. Cutting lubricant is circulated by a motor-driven 12-gall. suds pump under the control of push buttons on the headstock.

The contactor gear for main and pilot motors is contained in a floor-mounted cubicle and is arranged for direct-on starting with AC protection of the main motor. Rapid stopping is achieved by plugging in conjunction with a reverse rotation relay, thus preventing the motor from running in the reverse rotation. Resistances are inserted in the secondary circuit during plugging to limit the current drawn from the line. Reversing contactors, electrically interlocked with the brushgear and main motor starter, are provided for control of the pilot motor. The control circuit is protected by double-pole fuses. A triple-pole isolator, externally operated, electrically interlocked with the line contactor and mechanically interlocked with the doors of the cubicle, provides isolation for the complete equipment.

Electricity in Ulster

Proposed New Authority

As reported in our last issue, the creation of a new authority to direct the development of electricity supplies in Northern Ireland is recommended by the Joint Committee of representatives of the Ministry of Commerce and the Belfast Corporation which have been considering the question. The aim of the investigation was to ensure that in the post-war years electricity would be available for the whole of the Province at an economic rate. The proposed authority would not interfere with the management of stations, except in so far as production is concerned. The agreed recommendations are as follows:—

(1) Creation of a Northern Ireland Authority to assume duties generally corresponding to those now exercised by the Central Electricity Board in Great Britain and also by the Electricity Commissioners, subject in the latter case to the general directions of the Ministry of Commerce.

(2) The Authority to be responsible for the adequate and efficient production of electricity and also for the framing of generation and transmission development schemes and their adoption after consultation with the Ministry.

(3) The Ministry to retain responsibility to Parliament for policy through (*a*) Ministerial nomination of the personnel of the authority, (*b*) presentation of the reports of the authority, (*c*) the making of Special Orders and (*d*) the right to initiate policy through the Authority and to require it to act in an emergency.

(4) The Ministry to retain the right to hear appeals or to refer to arbitrators where the actions of the Authority could be challenged.

(5) The Authority to purchase at cost of production all electricity generated in Northern Ireland and to resell to undertakings at equitable tariffs.

(6) The Authority to have power to direct the operation of generating stations as to quantity and rate of output and times of operation, and power to acquire generating stations by agreement or by compulsion in cases where stations are not operated according to its requirements.

(7) In principle the Ministry will not continue to act under the Electricity (Emergency Supplies) Act, 1942, except as may be necessary for works and duties already initiated.

Production costs, it is believed, would be pooled under the proposals and provision would be made for appeals for revision of charges for bulk supplies to undertakings in the event of the tariffs being in excess of what they would have been if the undertakings had generated for themselves.

The Joint Committee which makes these recommendations is composed of Mr. Brian Maginess, Parliamentary Secretary to the Ministry of Commerce (chairman) and Messrs. J. I. Cook and W. Rigby Foster (Ministry representatives); Councillors A. Scott, J. Hopkins and W. J. Leeburn (Belfast Corporation Electricity Committee); and Mr. W. Robinson (chairman of the City Administrators, who took part in the deliberations in a private capacity). The town clerk (Mr. J. Dunlop) and city electrical engineer (Mr. W. J. McC. Girvan) also attended the meetings.

ELECTRICITY SUPPLY

Erith's Post-War Plan. Important Ipswich Scheme.

Bradford.—EMPLOYEES' NEWS SHEET.—The employees of the Electricity Department have produced a news sheet, one of the principal objects of which is to provide a new contact with members serving in the Forces. The first number contains a foreword by the city electrical engineer (Mr. T. H. Carr), messages from the various sections and a complete list of all members of the Department who have left since the beginning of the war to join one or other of the Services.

Clackmannan.—OVERHEAD LINES.—The Town and Country Planning Committee of the County Council has agreed to allow the Scottish Midland Electric Supply Co., Ltd., to erect an overhead line at Alexandra Street, Devonside. A similar application to construct a line to miners' houses at Fishcross has also been granted.

Dudley.—SERVICE CABLE.—The Shropshire, Worcestershire & Staffordshire Electric Power Co. is to lay a service cable in Saltwells Road and Cradley Road, Netherton and to Queen's Cross.

Erith.—POST-WAR WORKS.—The borough electrical engineer (Mr. E. A. Logan), in surveying probable post-war development, expresses the opinion that the war period has tended to reinforce public acceptance of electrical methods and to break down old prejudices. At the moment the Department has 12,000 consumers and he estimates that it will be necessary to provide services for 500 new houses in the first two years and 200 additional houses in each of the following three years. For this purpose at least one new 500-kVA substation each year will be necessary. There are at present 4,600 cookers and 3,000 water heaters connected to the mains and in Mr. Logan's opinion the potential number of these to be handled should be up to 80 per cent. saturation, assuming that there is no artificial restriction brought about by legislation in favour of gas interests.

The Department possesses modern showrooms, the steelwork of which was originally arranged to take an additional floor. This extra accommodation is now needed to meet the expansion of the undertaking. Among other things, it is mentioned that the accommodation for maintenance electricians is already inadequate, and this will become more apparent when the numbers are increased by embodying an installation staff. A new consumers' section is proposed and will constitute an important part of the undertaking.

Incidentally, although outside the scope of the estimate, Mr. Logan considers that a good case can be made out for the provision of a selected station on the River Thames at Belvedere.

Glasgow.—ELECTRICITY CHARGES.—In August last, following the further advance in the price of coal, it was decided that, subject to the consent of the Electricity Commissioners, electricity charges should be increased. The town clerk reported to the Electricity Committee that he had made application to the Commissioners for consent to the changes and submitted a reply from them with regard to the application. It was resolved that one member of the Committee and the manager should meet the Commissioners.

ELECTRIFICATION OF PUMPING STATION.—Recently the Water Committee accepted a tender of G. & J. Weir, Ltd., for the installation of three electrically driven pumps in connection with the electrification of a hydraulic pumping station. The manager of the Electricity Department has reported that it will be necessary to provide a 440-V main switchboard, cables, etc., at an estimated cost of £2,300, and the committee has agreed to the Department carrying out this work.

Guildford.—REVENUE IN RELATION TO LOAD.—Some small power consumers with quite a large horse-power installed provide the undertaking with very little revenue. As an example, one consumer was found to have approximately 20 HP installed on his premises and the total revenue for the past twelve months amounted to only £3 3s. The borough electrical engineer (Mr. W. E. Affleck), in a report on the subject, points out that if this horse-power were taken at any one time the undertaking would be called upon to pay to the Central Electricity Board a sum of approximately £40. The Electricity Committee is satisfied that some steps should be taken to safeguard the undertaking and recommends that in such cases the consumers should be asked in future for a guaranteed minimum annual revenue in relation to the costs which the undertaking would have to meet under the circumstances outlined by the electrical engineer.

ADDITIONAL DEMAND.—In a further report the electrical engineer states that the Department recently experienced heavy demands on the mains in one district and it was found that this was due to a company taking additional power without notifying the Department. This will necessitate an extension of the mains at a cost of £744, and as this is solely for the benefit of the company it is proposed that it should bear this cost.

ASSISTED WIRING.—The Electricity Committee reports that the total number of houses wired under the assisted wiring scheme is 4,687 and 2,036 consumers have completed the purchase of their installations.

Ipswich.—RURAL ELECTRIFICATION.—At the meeting of the Electric Supply and Transport Committee on September 28th, a scheme for completing the electrification of the whole of the Corporation's statutory area was approved. The proposal provides for the execution of the necessary works over a period of three years and will result in affording electricity supply to every isolated farm, small hamlet and dwelling within the area, at an estimated cost of £17,000.

NEW GENERATING STATION.—The Electric Supply and Transport Committee has received instructions from the Central Electricity Board to proceed immediately with the building of the new Cliff Quay power station for ultimate completion in 1948, to a capacity of 278,000 kW (the original proposal providing for 180,000 kW

ultimate total). As reported in our last issue the estimated cost of the new station is £1,907,125, and sanction has been obtained to borrow £1,250,000.

London. — INSTALLATION AND DEVELOPMENT WORK.—The Hackney Establishment and General Purposes Committee has approved a report of the borough electrical engineer (Mr. E. A. Mills) which proposes the division of the sales department of the undertaking into two sections. One will cover all installation work, including the preparation of estimates, maintenance and repair of domestic and industrial plant and apparatus, meter fixing and inspection of installations. This will be under the direction of the installation engineer. The other section, under the consumers' engineer, will cover development and sales.

Morley. — COOKERY DEMONSTRATIONS POPULAR.—In his report for the year ended March 31st the borough electrical engineer (Mr. N. Hunter) says there is ample evidence that contact with the public through the medium of the showrooms has been well maintained. The special weekly wartime cookery demonstrations are still very popular. Total cash sales, hire-purchase and turn-over at the showrooms for the year amounted to £1,306, against £1,258 in 1942-43. He expresses the view that there will be keen competition from the local gas company after the war and hopes that the Electricity Committee will strongly support electrical development, particularly on the domestic side.

Southend-on-Sea. — PEACE ILLUMINATIONS ?—The borough electrical engineer has reported that if an illuminations display is desired in connection with peace celebrations the equipment will have to be overhauled at an estimated cost of £2,700. The General Purposes Committee has been asked for its views.

Wisbech.—SUPPLY TO HOSPITAL.—A subcommittee has been appointed by the Wisbech Joint Isolation Hospital to consider and report on the terms on which the Wisbech Electric Light Co. would be prepared to provide a supply of electricity to the hospital.

Overseas

Eire.—INCREASED CONSUMPTION PERMITTED.—The continued high level of inflow into the River Shannon has enabled the Electricity Supply Board temporarily to relax the restrictions on electricity consumption. In the case of industrial motive power, industrial process heating and traction, rationing is removed altogether, while for other purposes consumers will be allowed to use as much as in the corresponding period of 1941. Normal broadcasting hours have been restored.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Jerusalem Electric & Public Service Corporation, Ltd.—Payment of a dividend of 5 per cent. (same) on the ordinary shares for the year ended March 31st is recommended. The balance carried to the appropriation section of the profit and loss account for the year is £80,263 as compared with £77,551 in the previous year's account.

The Madras Electric Supply Corporation, Ltd., has decided to pay a dividend of 4 per cent. for 1943. This is the rate paid for 1941; last year the company announced that the position did not warrant the payment of a dividend. We reported last week that the associated company, Madras Electric Tramways, was paying off all arrears on its 6 per cent. cumulative preference shares.

Broadcast Relay Service, Ltd., is to redeem all its outstanding 5½ per cent. preference shares (£266,597) on December 31st at 21s. per share. Holders are invited to exchange their shares for 5s. ordinary shares at the rate of one ordinary share plus 4s. 6d. in cash for each £1 preference share.

W. T. Henley's Telegraph Works Co., Ltd., has announced payment of an interim ordinary dividend of 5 per cent., the same as last year.

Murex, Ltd., is recommending a final dividend on the ordinary stock of 10 per cent., together with a cash bonus of 2½ per cent., which maintains the total distribution for the year at 20 per cent. The profit for the year ended June 30th, before providing for taxation and appropriations to reserves, was £439,446 (£516,507).

The British Vacuum Cleaner & Engineering Co., Ltd., proposes to pay a final dividend on the ordinary shares of 17½ per cent., making 30 per cent. for the year ended September 30th, 1943 (same). The net profit for the year was £88,640 (against £95,888).

Rawlings Bros., Ltd., report a profit for the year ended March 31st, amounting to £8,408, as compared with £10,069 for the preceding year. The ordinary dividend is maintained at 7½ per cent. and £4,257 (£4,348) is carried forward.

Peto Scott Electrical Instruments (Holdings), Ltd., report a gross profit of £59,608 for the year ended March 31st last. This is £42,740 more than in the previous year. After providing £53,249 (£10,855) for income tax and E.P.T., the net profit is £6,359 (£6,013). The first and final dividend is increased from 20 to 25 per cent. and £7,298 (£4,659) is carried forward.

The Renold & Coventry Chain Co., Ltd., is again paying a final dividend of 7 per cent. (making 10 per cent.) out of a net profit of £105,098 (against £97,461).

The British Electric Transformer Co., Ltd., announces an interim dividend of 5 per cent., against 17½ per cent. last year.

The Salisbury Electric Light & Supply Co., Ltd., is paying an interim dividend of 4 per cent. as last year.

The S.W. & S. Electric Power Co., has declared an interim dividend of 2½ per cent. (same) on the "B" ordinary.

The South Wales Electric Power Co., is again paying an interim dividend of 2 per cent.

The Urban Electric Supply Co., Ltd., is maintaining its interim distribution at 4 per cent.

Cable & Wireless, Ltd. (operating company), has declared an interim dividend of 1½ per cent. (same).

The Telephone & General Trust, Ltd., has declared an interim dividend of 3 per cent. (same).

The Rheostatic Co., Ltd., is again making an interim payment of 4 per cent.

New Companies

South Eastern Radio and Electrical Distributors, Ltd.—Private company. Registered September 25th. Capital, £2,000. Objects: To carry on the business of manufacturers of, and dealers in, wireless and television sets and accessories, lighting apparatus, electrical fittings and appliances, etc. Directors: G. C. Gardiner, The Rock, Alpha Road, Birchington; and Dr. D. P. Pielou, Highcliffe, Abbot Road, Guildford. Registered office: 1, Albion Road, Birchington, Kent.

Kresta Electric, Ltd. — Private company. Registered September 25th. Capital, £5,000. Objects: To acquire the business of a manufacturing radio and electrical engineer carried on by K. H. Kerr, at Parkes Street, Warwick, as the Kresta Co. Directors: K. H. Kerr, Broomlands, Blackdown Hill, Leamington Spa (permanent managing director) and two others.

Ohmlite Installations, Ltd.—We regret that the name of this company was incorrectly spelt in our issue of September 15th. It is also pointed out that Violet H. Sparks is not a director. She was one of the subscribers and is a shareholder but the only directors are A. V. Bennett and D. C. Bennett.

Companies' Returns

Increases of Capital

Thurso & District Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £10,000 in £1 ordinary shares, beyond the registered capital of £10,000.

Dorman & Smith, Ltd.—The nominal capital has been increased by the addition of £6,000 in £1 ordinary shares beyond the registered capital of £21,000.

Statements of Capital

Gent & Co. Ltd.—Capital, £70,000 in £1 shares (10,000 preference and 60,000 ordinary). Return dated April 13th. 7,427 preference and 48,752 ordinary shares taken up. £13,387 paid. £42,792 considered as paid. Mortgages and charges: £9,000.

George H. Scholes & Co., Ltd.—Capital, £8,500 in £1 shares (5,000 preference, 3,000 preferred ordinary and 500 ordinary). Return dated November 11th, 1943 (filed April 14th, 1944). 4,482 preference, 3,000 preferred ordinary and 500 ordinary shares taken up. £5,098 paid. £2,884 considered as paid. Mortgages and charges: Nil.

Newcastle & District Electric Lighting Co., Ltd.—Capital, £600,000 in £1 shares. Return dated April 7th. All shares taken up. £600,000 paid. Mortgages and charges: £350,000.

Mortgages and Charges

Instanta Electric, Ltd.—(a) Satisfaction to the extent of £1,800 (amount issued) on August 17th of debentures authorised February 14th, 1939, and registered July 6th, 1939, securing not more than £5,000 and (b) to the extent of £500 (amount issued) on same date of debentures authorised July 29th, 1938, and registered August 6th, 1938, securing not more than £1,000.

Adelaide Electric Supply Co., Ltd.—Issue on September 1st of £250,000 3¾ per cent. "K" consolidated debenture stock (Australian Stock), part of a series already registered.

T.N.J. Electrical Engineering Co., Ltd.—Satisfaction in full on July 1st, 1944, of debenture dated January 10th and registered January 28th, 1944, securing £500.

Bankruptcies

J. A. Whiteman, lately carrying on business at 4, Northfields, Kilburn, Derbyshire, under the style of Northfield Radio.—This debtor's application for discharge was heard recently at the Court House, 20, St. Peter's Churchyard, Derby, and was granted, subject to judgment for £50. It was stated that the debtor's father was prepared to find the £50 and had also withdrawn a claim for £549, leaving liabilities of £431, on which a dividend of 2s. 6d. in the £ would be paid.

P. W. Penty, electrical contractor, trading as the Sackville Electrical Co., 38, Mannville Terrace, Morley Street, Bradford.—Supplemental dividend of 13s. 8½d. in the £ payable October 10th at the Official Receiver's Office, Hallfield Chambers, 71, Manningham Lane, Bradford.

W. T. Dalton, wireless engineer, 62, East Street, Horsham.—Supplemental dividend of 1s. 9¾d. in the £ payable at the Official Receiver's Office, 8, Old Steine, Brighton, 1.

E. H. Goldie, formerly carrying on business as the Dudley Radio and Electrical Service, Castle Street, Coseley, Staffs.—Public examination October 24th at the Court House, Priory Street, Dudley.

T. Johnson, electrician, lately carrying on business at 25, Granville Street, Sheffield, as Tom Johnson & Co., mechanical and electrical engineer and contractor.—Application for discharge to be heard on November 2nd at the County Court Hall, Bank Street, Sheffield.

Liquidations

Killamarsh & District Electric Supply Co., Ltd.—Meeting November 14th at the Co-operative Hall, Bridge Street, Killamarsh, to receive an account of the winding up by the liquidator, Mr. J. Gadsby.

STOCKS AND SHARES

TUESDAY EVENING.

THE condition of business in the Stock Exchange markets cannot be described as altogether satisfactory from the point of view of activity. Few departments boast any display of animation. People are holding back, for the time being, money which is known to be accumulating in the banks. There is a feeling of uncertainty as to how the immediate prospect will develop. Moreover, the post-war possibilities are still more difficult to envisage. That an immense amount of trade will be awaiting all industrial companies, it is generally acknowledged, but whether there may not be a hiatus between the end of the war and the smooth revolving of peace-wheels, is a matter for discussion and consideration. Shares of companies connected with electricity and with equipment, such as those quoted overleaf, are however maintaining their prices, although the full extent of the recent fall has not been entirely recovered.

The Modified Black-out

Relaxing of the black-out has had no effect upon prices of home electricity supply shares. For one thing, the difference that the lightening of the regulations has made to London householders is so trifling that it can hardly be noticed in the majority of districts. Street lighting in the metropolis has returned but partially into operation. There is nothing to attract particular attention to the lighting industry or to its various branches. In consequence, the investment shares in these various groups hold their prices, without there being any great alteration.

It may be mentioned, however, that during the past few business days an inquiry for preference shares has developed. This brought about rises in a few of the 6 per cent. issues of the principal companies. County of London ordinary are better at 45s. The Stock Exchange Committee has granted leave to deal in the 150,000 County of London ordinary shares issued in payment for Brentwood District Electric ordinary. London Associated Electric and Midland Electric Power are both 6d. up.

Market Movements

Enfield Cable ordinary stand out with a gain of $\frac{1}{8}$, the price rising to 61s. 6d. By comparison with the shares of various other cable companies, Enfields are still not overvalued. Tube Investments and Murex—the first with a rise and the second with a fall—have met at the common price of 95s. Both companies are paying 20 per cent. dividends, and the yield at $4\frac{3}{4}$ is £4 4s. 4d. per cent. Lancashire Dynamo, where the dividend is $22\frac{1}{2}$ per cent., stand at 94s. 6d. and return $4\frac{1}{4}$ per cent. to the buyer of to-day. General Electrics at 92s. 6d., Associated Electricals at 51s. and Siemens at 35s. have improved. Automatic Telephones are again a few pence over £3.

On the other hand, Electric Constructions quoted at 57s. have lost 3s. of their recent gain. Falls of $\frac{1}{16}$ have occurred in British Insulated, $5\frac{5}{16}$, Chloride Electrical Storage, $4\frac{3}{8}$, Revo, 40s., Mather & Platt, 51s. 3d. Strand Electrics at 8s. 9d. are the pence up. Walsall Conduits can be bought 6d. cheaper, at about 49s. Vactrics continue dull at 16s. 6d. De la Rue, which dipped under 9, are now $9\frac{5}{16}$. Ward & Goldstone at 30s. have gained 1s. 3d.

Ericsson Telephones

An interim dividend of 5 per cent., has been declared by Ericsson Telephones, Ltd., this being at the same rate as the interim in each of the last five years. Of late, the dividend has been made up for the year to 17 per cent., plus a bonus of 3 per cent., 20 per cent. in all. For the year ended December 1940, the dividend was 22 per cent., following annual dividends for some years of 25 per cent. The company is now 41 years old. It manufactures telephonic apparatus of all descriptions, Stock Exchange price displays, wireless headphones, intercommunication telephone systems, etc. The issued capital is £575,000 of which £375,000 is in ordinary stock of 5s. units.

In the black days of 1940, after the fall of France, the price of the shares dropped to 22s. 6d. Previously, it had been up to 63s. 9d., some eight years ago. The present quotation of 51s. 3d. gives a yield on the money of £1 19s. 1d. The dividends are paid free of tax and the yield, therefore, is equivalent to £3 18s. 2d. taking tax at 10s. in the £. It has been the custom of the company for years past to pay the dividends on its ordinary shares tax free.

Madras Electric

Hard upon the heels of the arrears of dividend being cleared off the preference shares of the Madras Electric Tramways Co., as mentioned in last week's notes, the Madras Electric Supply Co. has returned to the dividend list with 4 per cent. on its ordinary shares. This goes against nothing in the previous year : in the two years before 1940, the dividends paid by the company were 4 per cent. net.

The decline in earnings which caused the disappearance of the dividend on the ordinary shares last year was said to have been due to the threatened bombing of Madras by the Japanese. This led to an exodus from the city and, according to rumour, which may possibly be malicious, some of the Madras Electric customers left hurriedly, without the formality of paying their bills. Evidently

(*Continued on page* 502)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Oct. 3	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	64/6	..	3 17 4
British Power and Light	7	7	33/6	..	4 3 7
City of London	7	5½	30/–	..	3 13 4
Clyde Valley	8	8	42/–	..	3 16 0
County of London	8	8	45/–	+6d.	3 11 1
Edmundsons:					
7% Pref.	7	7	34/6	..	4 1 4
Ord.	6	6	31/–	..	3 17 5
Elec.Dis.Yorkshire	9	9	45/6	..	3 19 6
Elec. Fin. and Securities	12½	13½	60/–	..	4 10 0
Elec. Supply Corporation	10	10	48/6	..	4 2 4
Isle of Thanet	Nil	Nil	19/6	..	—
Lancs. Light and Power	7½	7½	37/–	..	4 1 1
Llanelly Elec.	6	6	26/6	..	4 10 7
Lond. Assoc. Electric	3	4	26/–	+6d.	3 1 6
London Electric	6	6	30/6	..	3 18 8
LondonPowerRed. Deb.	5	5	103½	..	4 16 7
Metropolitan E.S.	8	8	44/–	..	3 12 9
Midland Counties	8	8	41/6xd	..	3 17 0
Mid. Elec. Power	9	9	44/6	+6d.	4 1 0
Newcastle Elec.	7	7	31/6	..	4 9 0
North Eastern Elec. Ordinary	7	7	35/–	..	4 0 0
7% Pref.	7	7	35/–	..	4 0 0
Northampton	10	10	50/6	..	3 19 6
Notting Hill 6% Pref. (£10)	6	Nil	10¾	−¼	—
Northmet Power:					
Ordinary	7	7	44/6	..	3 2 9
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	25/6	..	4 14 1
Scottish Power	8	8	41/–	..	3 18 2
Southern Areas	5	5	23/–	..	4 7 0
South London	7	7	29/–	..	4 16 7
West Devon	5	5	23/6	..	4 5 1
West Glos.	4½	3½	24/6	..	2 17 0
Yorkshire Elec.	8	8	43/–	..	3 14 5
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	7/6	..	—
Calcutta Elec.	6*	6*	47/6	+6d.	2 10 6
Cawnpore Elec.	10	7	40/–	..	3 10 0
East African Power	7	7	34/6	..	4 1 4
Jerusalem Elec.	7	5	29/6	..	3 8 0
Kalgoorlie (10/–)	5	5	11/6	..	4 7 0
Madras Elec.	Nil	4	30/–	..	2 13 4
Montreal Power	1½	1½	24¼	..	—
PalestineElec."A"	5*	5*	40/–	..	2 10 0
Perak Hydro-elec.	6	7	14/–	..	—
Shawinigan Power	83cts.	90cts.	16	..	—
Tokyo Elec. 6%	6	6	30	+2	—
VictoriaFallsPower	15	15	4¼	..	3 10 7
WhitehallInv.Pref.	—	6	25/6	..	4 14 0

Company	Dividend Previous	Dividend Last	Middle Price Oct. 3	Rise or Fall	Yield p.c. £ s. d.
Public Boards					
Central Electricity					
1955–60 (Civil Defence)	3	3	100	..	3 0 0
1955–75	5	5	114½	..	4 7 4
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	104½	..	3 7 0
1974–94	3½	3½	101	..	3 4 4
London Elec. Trans. Ltd.	2½	2½	97½	..	2 11 3
London & Home Counties 1955–75	4½	4½	112	..	4 0 4
Lond.Pass.Trans.Bd.					
A	4½	4½	120½	..	3 14 8
B	5	5	121½	..	4 2 4
C	3	3½	68	+1	4 15 7
West Midlands J.E.A. 1948–68	5	5	106½	..	4 14 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	123	+1½	4 17 7
Def.	1½	1½	30	..	5 0 0
Anglo-Portuguese	8	8	28/6	..	5 12 4
Cable & Wireless:					
5½% Pref.	5½	5½	115	..	4 15 1
Ord.	4	4	82	..	†4 17 9
CanadianMarconi$1	Nil	4cts.	9/–	..	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	39/6	−6d.	2 10 8
Pref.	6	6	30/6	+6d.	3 18 8
Great Northern Tel. (£10)	Nil	Nil	30	..	—
Inter. Tel. & Tel.	Nil	Nil	21½	+½	—
Marconi-Marine	7½	7½	36/–	..	4 3 4
Oriental Tel. Ord.	16	10	50/6	−6d.	—
Telephone Props.	Nil	6	22/6	..	5 6 8
Tele. Rentals (5/–)	10	10	11/3	..	4 9 0
Traction and Transport					
Anglo-Arg. Trans.:					
First Pref. (£5)	Nil	Nil	2/6	..	—
4% Inc.	Nil	Nil	7	..	—
Brit. Elec. Traction:					
Def. Ord.	45	45	1225	..	3 18 6
Pref. Ord.	8	8	180	..	4 9 0
Bristol Trams	10	10	57/–	..	3 10 2
Brazil Traction	1¾	2	27	+½	7 8 2
Calcutta Trams	6½	7½	64/6	−1/–	2 6 6
Cape Elec. Trams	5	6	25/6	..	4 14 1
Lancs. Transport	10	10	45/6xd	+6d.	4 8 0
Mexican Light:					
1st Bonds	5	5	105½	..	4 14 9
Rio 5% Bonds	5	5	106½	+1	4 14 0
Southern Rly.:					
5% Prefd.	5	5	74	..	6 15 2
5% Pref.	5	5	114½	..	4 7 4
T. Tilling	10	10	60/–	..	3 6 8
West Riding	10	10	46/–	..	4 7 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Oct. 3	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron Elec. Ord.	10	15	61/–	..	4 18 4
Assoc. Elec.:					
Ord.	10	10	51/–	+6d.	3 18 4
Pref.	8	8	39/–	..	4 2 0
Automatic Tel. & Tel.	12½	12½	60/6	+6d.	4 2 4
Babcock & Wilcox	11	11	49/6	+6d.	4 8 9
British Aluminium	10	10	47/–xd	..	4 5 1
British Insul. Ord.	20	20	5[illegible]	−⅛	3 15 6
British Thermostat (5/–)	18½	18½	20/–	..	4 12 6
British Vac. Cleaner (5/–)	15	30	29/–	..	5 3 5
Brush Ord. (5/–)	8	9	10/9	..	4 3 9
Burco (5/–)	15	17½	17/–	..	5 3 0
Callender's	15	20	5½	..	3 16 2
Chloride Elec. Storage	15	15	87/6	−⅛	3 8 7
Cole, E. K. (5/–)	10	15	32/–	+6d.	2 6 11
Consolidated Signal	24	27½	6⅝	..	4 3 6
Cossor, A. C. (5/–)	7½*	10*	25/6	+9d.	1 19 7
Crabtree (10/–)	17½	17½	41/–	..	4 5 4
Crompton Parkinson Ord. (5/–)	20	22½	32/–	..	3 7 3
E.M.I. (10/–)	6	8	33/6	..	2 7 9
Elec. Construction	10	12½	57/–	−3/–	4 7 9
Enfield Cable Ord.	12½	12½	61/6	+1/8	4 1 2
English Electric	10	10	50/6	..	3 19 0
Ensign Lamps (5/–)	25	15	21/3	..	3 10 8
Ericsson Tel. (5/–)	22*	20*	51/3	..	1 19 1
Ever Ready (5/–)	40	40	41/–	..	4 17 5
Falk Stadelmann	7½	7½	34/6	..	4 7 0
Ferranti Pref.	7	7	31/3	..	4 9 7
G.E.C.:					
Pref.	6½	6½	32/6	..	4 0 0
Ord.	17½	17½	92/6	+9d.	3 15 9
General Cable (5/–)	15	15	15/–	..	5 0 0
Greenwood & Batley	15	15	43/9	..	6 17 0
Hall Telephone (10/–)	12½	12½	30/6	..	4 2 0
Henley's (5/–)	20	20	26/3	..	3 16 0
4½% Pref.	4½	4½	24/–	..	3 15 0
Hopkinsons	15	17½	69/3	..	5 1 1
India Rubber Pref.	5½	5½	23/–	..	4 15 9
Intl. Combustion	30	30	6¾	..	4 10 8
Johnson & Phillips	15	15	75/–	..	4 0 0
Lancashire Dynamo	22½	22½	94/6	+1/–	4 15 5
Laurence, Scott (5/–)	12½	12½	13/–	−6d.	4 16 2
London Elec. Wire	7½	7½	37/6	..	4 0 0
Mather & Platt	10	10	51/3	−⅛	3 18 0
Metal Industries (B)	8	8½	50/6	..	3 7 6
Met. Elec. Cable Pref.	5½	5½	21/3	..	5 3 6
Murex	20	20	95/–	..	4 4 4
Pye Deferred (5/–)	25	25	33/9	−⅛	3 14 5
Revo (10/–)	17½	17½	40/–	−⅛	4 7 6
Reyrolle	12½	12½	72/6	..	3 9 1
Siemens Ord.	7½	7½	35/–	+1/–	4 5 9
Strand Elec. (5/–)	7½	10	8/9	+9d.	5 14 4
Switchgear & Cowans (5/–)	20	20	19/–	..	5 5 1
T.C.C. (10/–)	5	7½	22/6	..	3 6 8
T.C. & M.	10	10	56/–	..	3 11 6
Telephone Mfg. (5/–)	9	9	11/6	..	3 18 3
Thorn Elec. (5/–)	20	20	25/–	..	4 0 0
Tube Investments	20	20	95/–	+3d.	4 4 4
Vactric (5/–)	Nil	22½	16/6	−3d.	6 16 3
Veritys (5/–)	7½	7½	8/–	..	4 13 9
Walsall Conduits (4/–)	55	55	49/–	−6d.	4 9 9
Ward & Goldstone (5/–)	20	20	30/–	+⅛	3 6 8
Westinghouse Brake	12½	14	75/–	..	3 14 8
West, Allen (5/–)	7½	7½	7/9	..	4 16 0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 500)

things are now much more settled and the company is therefore able to resume dividends on the ordinary shares. The price remains at 30s., at which the yield is £2 13s. 4d. per cent.

Miscellaneous Matters

The International Telephone & Telegraph Corporation of the United States has recently come into notice on account of a brisk rise in the price of the shares. Down to 14½ at the beginning of the year, it is now 21½. The Corporation has announced a net loss for the six months to June 30th last of $1,443,432, being $250,000 more than this time a year ago.

The "T. and T." Corporation states that the interim results are not usually indicative of those for the full year, owing to the fact that several subsidiaries ordinarily declare the greater part of their dividends in the later six months. The loss just announced had no effect on the price, which, indeed, shows ¼ rise on the week. Other dollar stocks are inclined to be better owing to a general recovery in the New York Stock Exchange. Brazil Tractions are up ½ to 27, following upon their last week's rise of 1⅜. The advance is due to the increased dividend making 2 dollars for the year. Anglo-American Telegraph preferred has put on 1½, rising to 123.

Calcutta Trams

The atmosphere of optimism which surrounded the dramatic rise in Calcutta Trams is no longer in evidence. The price rose to 79s., and fell to 58s. 6d. within less than a month. After rallying to 67s. 6d. it is now back to 64s. 6d. Speculation in the shares has greatly diminished. India is no longer a persistent daily buyer of the shares. The Bengal Government has given no indication of the reason for its claim to be informed of the terms, etc., which may be arranged between the Calcutta Corporation, as purchaser, and the Calcutta Tramways as seller, of the company's undertaking.

Calcutta Electric Supply ordinary shares are 6d. better at 47s. 6d. The only other noteworthy change in the Overseas group is a rise of 2 points in Tokyo Electric sixes, to 30, on the success of the American campaign against the Japanese.

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.

ALLMANNA Svenska Elektriska Aktiebolaget.—"Compressed air circuit-breakers combined with disconnecting switches." 9519/43. May 29th, 1942. (564184.) "Means for reproducing a direct current." 9520/43. June 16th, 1942. (564185.)

British Thomson-Houston Co., Ltd.—"Electric fuse devices." 17993/42. December 26th, 1941. (564058.) "Lighting fittings." 8423/43. May 26th, 1942. (564080.) "Electric circuit-interrupter control systems." 2199/43. February 13th, 1942. (564128.) "Movable coil constant current transformers and reactors." 1849/43. February 11th, 1942. (564204.)

British Thomson-Houston Co., Ltd., and W. S. Adams.—"Electrical circuit selector." 1770. February 3rd, 1943. (564203.)

British Thomson-Houston Co., Ltd., and W. D. Sinclair.—"Chucks." 3982. March 11th, 1943. (564140.)

Britannia Batteries, Ltd., R. M. Blomfield and F. E. Burt.—"Alkaline electric batteries or accumulators." 6721. April 28th, 1943. (564077.)

G. Franklin.—"Separators and casings for accumulators." 15098. October 28th, 1942. (564156.)

A. G. Gulliford.—"Stoppers for miners' electric lamp batteries." 9392. June 11th, 1943. (564178.) "Combined electrical filler and tester for miners' lamp batteries." 9417. June 11th, 1943. (564180.)

Hazeltine Corporation.—"Wave-signal translating channel." 3912/43. May 8th, 1942. (564135.)

Hewittic Electric Co., Ltd., L. J. Martin and R. Wells.—"Supply systems operating with mercury-arc rectifiers and supplying loads capable of regenerative operation." 9058. June 5th, 1943. (564084.)

Hoover, Ltd. (Hoover Co.).—"Suction-cleaning systems." 3956/7. March 11th, 1943. (564138/9.)

Igranic Electric Co., Ltd.—"Electric motor controllers." 2716/43. February 23rd, 1942. (564207.)

Londex, Ltd., W. S. F. Brown and B. Martin.—"Cam-controlled electric timing device." 2235. February 10th, 1943. (564066.)

Marconi Instruments, Ltd., and C. F. Brockelsby.—"Electrical filter networks." 3980. March 11th, 1943. (564164.)

Marconi's Wireless Telegraph Co., Ltd.—"Mounts for electron-discharge devices." 361/43. January 31st, 1941. (564160.)

S. Marks and E. R. Booth.—"Multi-way electric switches." 9137. June 7th, 1943. (564085.)

Bruce Peebles & Co., Ltd., and J. W. Rodger.—"Lifting magnets." 3797. March 9th, 1943. (564110.)

Pirelli-General Cable Works, Ltd., H. Barron and G. L. Barron.—"Preparation of plastic compositions." 18438. December 29th, 1942. (564127.)

Simmonds Development Corporation, Ltd.—"Electrical indicating instruments and scale adjustments therefor." 9479/43. June 12th, 1942. (564181.)

H. G. Taylor and A. P. Smith.—"Appliances for use in electric flash welding." 3683. March 6th, 1943. (564210.)

Wilson Welder & Metals Co., Inc.—"Welding transformers." 3907/43. September 10th, 1942. (564213.)

H. Ziebolz.—"Electronic translating devices." 16482/42. December 22nd, 1941. (564193.)

H. Ziebolz and P. Glass.—"Electronic translating devices." 16483/42. December 6th, 1941. (564194.)

Forthcoming Events

Friday, October 6th.—*London.*—At 39, Victoria Street, S.W.1. 6.30 p.m. Junior Institution of Engineers. Discussion on "Proposed Formation of a Research Section," to be opened by S. J. Moore.

Manchester.—At Engineers' Club. 6.30 p.m. Manchester Association of Engineers. Inaugural address by the president, H. H. Asbridge, M.B.E.

Birmingham.—Imperial Hotel. 6 p.m. Illuminating Engineering Society (Birmingham Centre). Address by J. G. Holmes, chairman.

Tuesday, October 10th.—*London.*—At Lighting Service Bureau, 2, Savoy Hill, W.C.2. 5 p.m. Illuminating Engineering Society. Presidential address by E. Stroud.

Wednesday, October 11th.—*London.*—At I.E.E. 5.30 p.m. Radio Section. H. L. Kirke's inaugural address.

Thursday, October 12th.—*London.*—At I.E.E. 5.30 p.m. Installations Section. Inaugural address of G. O. Watson as chairman.

London.—Waldorf Hotel, Aldwych. 12.30 for 1 p.m. I.E.E. Installations Section informal luncheon.

London.—Connaught Rooms, W.C.2. 12.30 for 1 p.m. Annual luncheon of Institute of Fuel. 2.15 p.m. Annual meeting and Melchett Lecture.

Exeter.—Royal Clarence Hotel. 3 p.m. I.E.E. Devon and Cornwall Sub-Centre. Inaugural address by the chairman, F. E. Pitt.

Friday, October 13th.—*Bath.*—Pump Room. 7.15 p.m. I.E.E. Bristol Students' Section. Address by D. Garnett, chairman.

Monday, October 16th.—*London.*—At I.E.E. 7 p.m. London Students' Section. "Brains Trust" meeting.

Tuesday, October 17th.—*Stockport.*—At Mersey Hotel. 7.30 p.m. Association of Supervising Electrical Engineers (Manchester Branch). Branch papers.

Saturday, October 21st.—*London.*—At Lighting Service Bureau, 2, Savoy Hill, W.C.2. 2.15 p.m. A.S.E.E. Technical film display and presidential address.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Orders Placed

Glasgow.—Corporation Education Committee. Accepted. Heating installation at school dormitory accommodation (£278); G. N. Haden & Sons.

Jarrow-on-Tyne.—Town Council. Accepted. Electric lighting installation, Croft Terrace School (£207).—J. McCabe.

London.—POPLAR.—Electricity Committee. Accepted. Feeder pillars (£456).—British Insulated Cables.

Northumberland.—County Education Committee. Accepted. Electrical installation at Bedlington Colliery School (£156).—T. Sloane.

Tynemouth.—Watch Committee. Accepted. Electric clock at New Quay (£250).—Chas. H. Potts & Co.

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.

Ashbourne.—Parish hall; Canon Farrow, The Vicarage, Ashbourne.

Bollington.—Houses (98), Bollington Cross, for U.D.C.; W. Dobson Chapman, architect, Pear Tree House, Jordangate, Macclesfield.

Brighouse.—Works extensions, Station Road; Gregson Bros., worsted coating manufacturers, Cranbrook Mills, Norwood Green, near Halifax. Works additions; Womersley & Broadbent, Denholmegate Road.

Cowdenbeath.—Memorial Town Hall; burgh surveyor.

Croydon.—Kitchen, Archbishop Tenison's School (£1,474); Norman Wright, Ltd.

Gateshead.—Alterations to transport depot (£1,930); borough engineer.

Harpurhey.—Works extensions, Hendham Vale; H. S. Fairhurst & Son, architects, Chancery Chambers, 55, Brown Street, Manchester, 2.

Inverness.—Post-war development scheme for Corporation, including church and hall, school, shops, community centre, houses, etc.; I. W. Jack, burgh surveyor.

Llangefni.—Houses (44), Bridge Street; T. Kyffin Jones, surveyor, Town Hall.

London.—ST. PANCRAS.—Rebuilding power house, Gough Street; *Daily Sketch.*

STOKE NEWINGTON.—Laboratory, etc., 235, Church Road; Peto-Scott Electrical Instruments, Ltd.

Macclesfield.—Welfare clinic and school cooking centre, High Street; M. Tetlow, borough architect, Pear Tree House, Jordangate.

Manchester.—Child welfare centre, Collyhurst (£3,664); A. Hodkinson, Ltd., builders, 62, Greenhill Street, Manchester, 15.

Montrose.—Block of offices at Ferry Road for George Ogilvie, Ltd., potato merchants; manager.

Northampton.—Reconstruction, 18-20, Lower Hester Street; L. M. Allison.

Extensions, Northampton General Hospital, Cheyne Walk; governors.

Oldham.—Assembly hall, gymnasium, workshop, etc., at Ward Street Central School; G. E. Hardy, borough engineer, 75, Union Street.

Orrell.—Houses, Moor Lane; J. F. Smithies, surveyor, Council Offices, Orrell Post, near Wigan.

Salford.—Nursery, Pendleton (£2,521); F. J. Gibson (Builders), Ltd., building contractors, Manchester Road, Wilmslow, Cheshire.

Salop.—School canteen, Ifton Heath; A. Guy Chant, county architect, 5, Belmont, Shrewsbury.

Stafford.—Houses (76) for Rural District Council; E. M. Coombs, architect, County Offices, Stafford.

Stourbridge.—Extensions to sewage works for Upper Stour Main Sewerage Board; G. P. Deeley, engineer, Church Street.

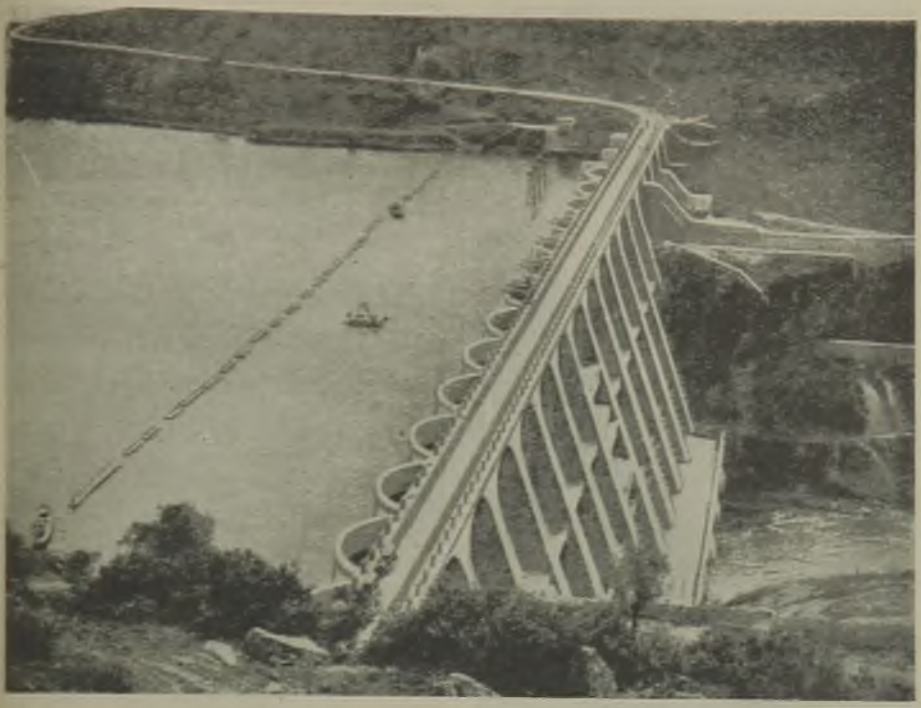
Tynemouth. — Factory, Chirton Trading Estate; Fleming Bros., Ltd., dyers and cleaners, Newcastle-on-Tyne.

West Riding.—Elementary school, Elland Edge; A. L. Binns, county education architect, County Hall, Wakefield.

I.E.E. Students

THE North-Western Students' Section of the I.E.E. is holding a luncheon at the Engineers' Club, Albert Square, Manchester, at 1.15 p.m. on Saturday, October 14th (tickets 5s. each) after which (at 2.30 p.m.) the Section chairman, J. B. Higham will give an address on "An Introduction to the High-Voltage Cathode-Ray Oscillograph." On November 13th (6.30 p.m.): W. A. Hatch, M.B.E., is to speak on "Recent American Hydro-Electric Schemes, with Special Reference to the Boulder Dam," and on December 12th (6.30 p.m.) W. M. Butler will lecture on "The Theory and Design of Air-Blast Circuit-Breakers." Saturday, February 3rd (2.30 p.m.) has been fixed for the Students' Lecture. A works visit (Switchgear Testing Co., Ltd.) has been arranged for Saturday, October 28th.

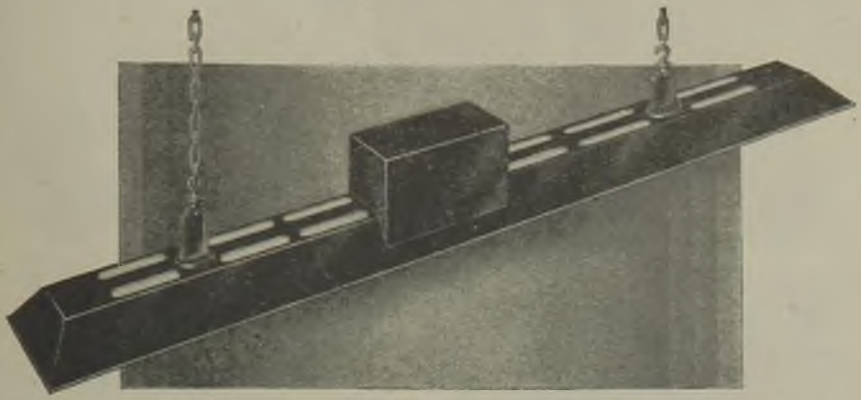
The next meeting of the South Midland Students' Section is to be held at Loughborough on October 13th at 6.30 p.m. when A. J. Lund will speak on "An Introduction to Circuit Diagrams." Other meetings are as follows (at the James Watt Institute, Birmingham, except where stated):—October 25th (6.30 p.m.): "Diesel Electric Traction," by F. L. Toombs. November 9th (at Stafford, 6.30 p.m.): "The High-Voltage Laboratory," by O. D. Penzig. November 22nd (7 p.m.): Students' Lecture, "The Cathode-Ray Tube and its Applications" (Part I), by Dr. W. Wilson. November 29th (7 p.m.): Students' Lecture (Part II). December 13th: "Mica and Micanite," by W. B. Robertshaw. Social events include a dance at the Market Hotel, Station Street, Birmingham, on November 10th.



FAMOUS HYDRO-ELECTRIC STATIONS

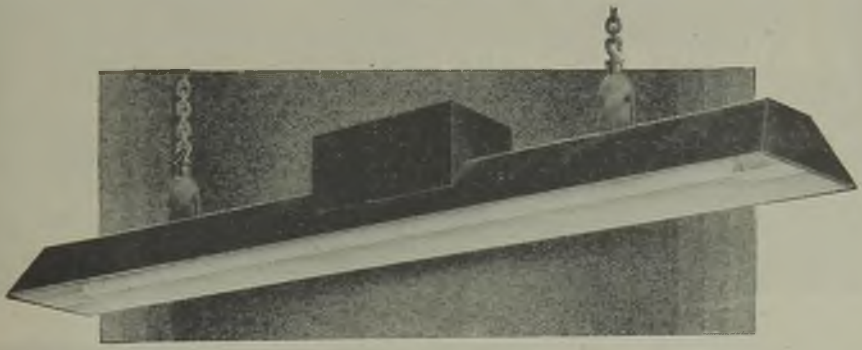
The Tirso Dam laid down in 1914 and completed in 1923 is situated in Sardinia and lies about half way up the River Tirso, creating the largest artificial lake in Europe with a capacity of 374,000,000 cubic metres. It has four groups of electrical generators which develop an electrical power of 20,000 H.P. and is considered an exceptionally fine example of engineering skill and simplicity of design.

THORLUX REFLECTORS FOR 80 WATT TUBULAR FLUORESCENT LAMPS



WITH SLOTS FOR UPWARD ILLUMINATION

1748 1 Lamp with Box **£3 0 0** + 25%
1749 1 Lamp without Box **2 7 6** + 25%



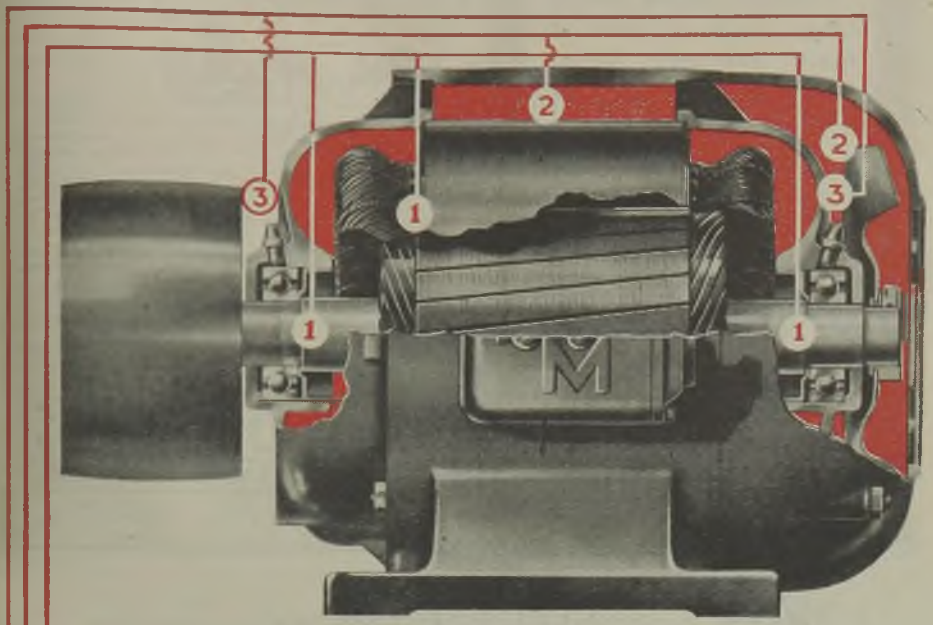
WITHOUT UPWARD ILLUMINATION

1764 1 Lamp with Box **£3 0 0** + 25%
1762 1 Lamp without Box **2 7 6** + 25%

Prices include Hooks and Patent easy wiring box on top of trough.
Fixings arranged for any make of control gear.

F·W·THORPE LTD. WELBY ROAD HALL GREEN BIRMINGHAM 28
Telegrams: THORLUX, B'HAM 28 Telephone: SPRINGFIELD 3318-9

ECONOMY of MAINTENANCE



1. Windings and bearings are totally enclosed against ingress of dust, grit, damp and chemical fumes.

2. Ventilating channels carrying cooling air between stator laminations and frame cannot become choked.

3. Only maintenance required is an occasional shot with a grease gun.

NEWMAN MOTORS
TOTALLY ENCLOSED - FAN COOLED

Head Sales Office: 32 VICTORIA STREET, WESTMINSTER, LONDON, S.W.1
Tel.: ABBey 2023

THIS IS A *Complete* SUB-STATION

JOHNSON & PHILLIPS LTD.

CHARLTON, LONDON, S.E.7

Telephone: Greenwich 3244 (13 lines). *Telegrams:* "Juno," Charlton, Kent

The mark that means that "little more" in quality

CLASSIFIED ADVERTISEMENTS

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

THE CHARGE for advertisements in this section is 2/- per line (approx. 8 words) per insertion, minimum 2 lines 4/-, or for display advertisements 30/- per inch, with a minimum of one inch. Where the advertisement includes a Box Number there is an additional charge of 6d. for postage of replies.

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

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

Original testimonials should not be sent with applications for employment.

SITUATIONS VACANT

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

BOROUGH OF WILLESDEN

Appointment of Borough Electrical Engineer and Manager

APPLICATIONS are invited for the above appointment from qualified Engineers not exceeding 45 years of age who are experienced in the management and administration of an electricity undertaking.

The salary will be in accordance with the Agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers dated 9th July, 1941. The present salary according to the scale is £1,861 per annum.

In accordance with the provisions of Clause 10 of the Agreement, 85% of the salary will be paid for the 1st year, 92½% for the 2nd year, and the full scale salary at the commencement of the 3rd year.

The appointment will be terminable by 3 months' notice by either party and is subject to the provisions of the Local Government Superannuation Act, 1937. The person appointed will be required to pass a medical examination.

Particulars of the conditions of the appointment may be obtained from the undersigned, and applications stating age, qualifications, previous experience and present office and salary, accompanied by copies of three recent testimonials and endorsed "Borough Electrical Engineer and Manager," must be delivered to me not later than the first post on the 23rd day of October, 1944.

Canvassing, either directly or indirectly, will be a disqualification.

W. T. PIRIE,
Town Clerk.

Town Hall,
Dyne Road, Kilburn, N.W.6.
October, 1944. 722

LONDON POWER COMPANY LIMITED

Bow Generating Station

APPLICATIONS are invited for the position of Shift Charge Engineer.

Applicants must have experience in the operation of E.H.T. Electrical Plant and H.P. Steam Generating Plant.

Salary, N.J.B. Schedule, Grade 8, Class H, subject to superannuation deduction.

Applications must include the following particulars:—Age; practical and technical training and experience; also details and dates of prior position held, and should be addressed to:—

Station Superintendent,
Bow Generating Station,
London Power Co. Ltd.,
Marshgate Lane,
London, E.15.

The successful candidate will be required to pass a medical examination and contribute to the Company's superannuation fund. 736

METROPOLITAN BOROUGH OF FULHAM

Electricity Department

Assistant Operating Engineer

APPLICATIONS are invited for the position of Assistant Operating Engineer at the Fulham Base Load Station. Applications will be considered only from persons who:—

(a) are under 40 years of age;
(b) have had a sound technical education;
(c) have had a sound technical training;
(d) possess qualifications which include Mechanical, Electrical, Boiler House and Turbine Room experience in a senior capacity;
(e) have been an authorised person to operate on E.H.T. Switchgear;
(f) have had considerable experience in the Control and Organisation of Labour.

The position is in Class L, Grade 7, plus 10%, of the National Joint Board Schedule, with a commencing salary of £665 5s. 7d. per annum subject to superannuation deduction.

The Fulham Station is a base load station, the ultimate designed capacity being 310,000 kW.

Further particulars and form of application will be forwarded on receipt of stamped addressed foolscap envelope.

Applications, endorsed "Assistant Operating Engineer," must be received not later than noon on Monday, 16th October, 1944.

WILFRED TOWNEND,
Town Clerk.

Town Hall,
Fulham, S.W.6. 708

CITY OF LEICESTER EDUCATION COMMITTEE

College of Technology and Commerce
(Principal: L. W. Kershaw, O.B.E., B.Sc., A.M.I.C.E.)

APPLICATIONS are invited for the post of Lecturer in Engineering for Day and Evening Classes, duties to commence as soon as possible.

The post is a full-time one, a University Degree in Engineering or its equivalent, together with industrial experience, being essential.

Salary will be in accordance with the Burnham Scale for Technical Teachers, plus current war bonus.

Applications, together with copies of not more than three recent testimonials, and names of two persons to whom reference may be made, should be sent to the Principal, College of Technology and Commerce, The Newarke, Leicester, not later than October 18th, 1944.

H. S. MAGNAY,
Director of Education.

25th September, 1944. 739

SURREY COUNTY COUNCIL

Netherne Hospital, Coulsdon.

ENGINEER required to maintain engineering plant consisting of steam generating sets, Lancashire Boilers, centralized heating and hot water services, refrigeration, and usual Mental Hospital engineering equipment. Salary £300-£400 per annum according to experience and qualifications plus the County Council bonus, at present £49 8s. per annum. House is provided on Hospital Estate for which a rental of 7s. 9d. per week is charged. Applications, giving particulars of age, training, qualifications, and experience, together with copies of three recent testimonials, to be forwarded not later than the 20th October to the Clerk and Steward. 720

METROPOLITAN BOROUGH OF FULHAM

Electricity Department

Charge Engineer

APPLICATIONS are invited for the position of Charge Engineer at the Fulham Base Load Station. Applications will be considered only from persons who:—

(a) are under 40 years of age;
(b) have had sound technical education and training;
(c) have previous experience in the operation of modern electrical plant associated with grid supplies employing high pressure and high superheat temperature;
(d) have experience in load control and despatch.

The position is in Class L, Grade S, of the National Joint Board Schedule, with a commencing salary of £555 9s. per annum, subject to superannuation deduction.

The Fulham Station is a base load station, the ultimate designed capacity being 310,000 kW.

Further particulars and form of application will be forwarded on receipt of stamped addressed foolscap envelope.

Applications, endorsed "Charge Engineer," must be received not later than noon on Monday, 16th October, 1944.

WILFRED TOWNEND,
Town Clerk.

Town Hall,
Fulham, S.W.6. 707

BOROUGH OF DARWEN

Appointment of Electrical Engineer

APPLICATIONS are invited for the appointment of Electrical Engineer. Candidates must be Corporate Members of the Institution of Electrical Engineers and have had practical experience in the generation, conversion and distribution of electricity.

Salary, £650 rising to £700 per annum at the end of one year, plus Whitley Council bonus (at present £49 10s. 9d.).

The appointment will be terminable by three months' notice by either party and is subject to the provisions of the Local Government Superannuation Act, 1937. The person appointed will be required to pass a medical examination.

Applications to the undersigned, endorsed "Electrical Engineer," to be delivered not later than 10 a.m. on Monday, the 23rd October, 1944, and should state age, qualifications, training and experience, and be accompanied by not more than three recent testimonials.

C. C. BYERS,
Town Clerk.

Town Clerk's Office,
Darwen.
30th September, 1944. 742

ASSISTANT Mains Engineer. Location, County Borough of Eastbourne. Salary, in accordance with N.J.B. Schedule, Class F, Grade 8b (at present £335 p.a.). Applicants must have had a sound technical training together with practical experience in the installation and operation of H.T. and L.T. underground and overhead distribution systems and equipment. Corporate or Graduate Membership of the Institution of Electrical Engineers or equivalent qualifications essential. The appointment is subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination. Applicants should write, quoting D.948XA, to the Ministry of Labour and National Service, Room 432, Alexandra House, Kingsway, London, W.C.2, for the necessary forms which should be returned completed, together with copies of not more than three testimonials, on or before October 16th, 1944. 753

BOOKKEEPER-Typist, knowledge of the trade, for contractors' office. Permanent. All details to—Bilton Smith Ltd., Acton, W.3. 6293

BULL Motors (E. R. & F. Turner Ltd.), Ipswich, in preparing plans for post-war marketing of Electric Motors, invite applications from men who are keen and able to play an important part in a progressive sales organisation. Whilst reinstatement of employees serving in the Forces will be given first place, the expansion of the organisation in the interests of full employment and increased exports necessitates the appointment of Managers for (a) Home Sales and (b) Export Sales. Applicants should state age, brief resume of qualifications, training and experience. Applications from, or on behalf of men serving in the Forces will be taken into consideration. All correspondence, which will be treated in strictest confidence, should be sent to—The Secretary, E. R. & F. Turner Ltd., Foxhall Works, Ipswich. 735

CHARGE Engineer required for Power Station in India. Experience with large water tube boilers and steam turbines essential. Salary, Rs. 800 per month, with free quarters and passage. Apply—Box 721, c/o The Electrical Review.

CHIEF Engineer required for the Town Council of New Amsterdam, Berbice, British Guiana, for one tour of 3 years in the first instance. Salary £500 by £50 to £600 per annum. Free passages. Candidates must not be more than 45 years of age; should preferably be corporate members of the Institutions of Mechanical or Electrical Engineers, and have had good experience of internal combustion engines. Previous experience in an executive capacity is necessary and experience of suction gas producers would be an advantage. Applicants should write, quoting C2296A, to the Ministry of Labour and National Service, Room 432, Alexandra House, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before October 16th, 1944. 734

COMMERCIAL Manager required for illuminating engineering department of progressive, well-established organisation. First-class experience in electrical fittings essential. Excellent opportunity for capable and energetic man. Present staff already advised. Write in confidence, with full details of experience, age and salary required, to—Box C.D.9, c/o 5, New Bridge St., London, E.C.4. 676

ELECTRICAL Accessories. Experienced Engineer wanted to take charge of drawing office and experimental departments. Vacancy is with established manufacturer (London) and offers excellent post-war opportunities for one with initiative for design and development of electrical accessories. Write, giving details of experience, age and salary required, to—Box 744, c/o The Electrical Review.

ELECTRICAL Engineer with practical experience in the manufacture of electrical accessories required in a permanent, part-time advisory capacity by small, progressive manufacturer. Our staff are aware of this advertisement, and strictest confidence in every way will be observed. Write fully to—Box 654, c/o The Electrical Review.

MANAGER for Coilwinding and Transformer Dept. by firm of radio and electrical engineers in North London. Only men of proved ability and fully competent with modern methods and machinery, also up-to-date technical and practical experience, need apply. Good salary and post-war prospects. Write, stating age, experience and salary required.—Box 6310, c/o The Electrical Review.

PROGRESSIVE transformer manufacturing company requires full-time Representatives for the Midland and Southern Counties. Applicants, age 35 to 45, should have experience of meeting responsible engineers and be capable of discussing technical matters. Corporate membership of the I.E.E. is desirable. Apply in confidence, giving full particulars, including suggested terms of remuneration, to—Box 709, c/o The Electrical Review.

SALES Engineer Assistant required for Glasgow branch of large manufacturing firm making heavy electrical equipment. State age, salary, experience.—Box 719, c/o The Electrical Review.

SALES Estimators and Representatives. Permanent progressive positions for adaptable men. Some knowledge of power application of A.C. and D.C. motors desirable. Apply—Higgs Motors, Birmingham, 6. 689

SALES Representatives required. Remunerative position with excellent post-war prospects for keen, energetic men not liable for national service. Connections among electrical and hardware trade and large wholesalers an advantage. Salary, commission and expenses. Write in confidence, with details of past record, to—Box D.H.7, Thorn Electrical Industries Ltd., 105-9, Judd Street, London, W.C.1. 711

STOREKEEPER wanted by a City firm of electrical contractors. Suitable opportunity for ex-service man. Write, stating age, experience and salary required, to—Box 6282, c/o The Electrical Review.

TRAVELLERS, Commission Agents are required throughout the U.K. by wholesale house to market industrial and other electrical articles, also large range of electrical fancy goods. Connections essential with industrial organisations, large turnover. Good commission basis only. Write to—Box T, c/o Pethicks, 30, Bouverie St., E.C.4. 692

WORKS Manager required for important engineering works employing between 5,000 and 8,000 people, with excellent record pre-war and prospects post-war. The works has a high reputation for accurate, efficient and economical production of well-known engineering products, covering a wide range in size of product, manufacturing methods, processes used, and numbers produced. Applications will only be considered from engineers who have had direct responsibility for control of works or sections of works employing substantial numbers of men and women. Apply to—Box 697, c/o The Electrical Review.

SITUATIONS WANTED

A District Manager (45) requires position offering wide scope with manufacturers, agents or contractors. Successful sales record (specialty, trade and direct); practical, technical and executive electrical knowledge. Please write—Box 6304, c/o The Electrical Review.

A Representative with wide experience in lighting fittings, domestic appliances, accessories, glassware, etc., seeks position; 24-year connection in West of England, South Coast, among contractors, wholesalers, supply undertakings, etc. Car; exempt.—Box 6314, c/o The Electrical Review.

A Technical Engineer, age 39, general distribution experience, including consumers' installations, knowledge of generation, specialised experience measurements, testing and protective gear, A.M.I.E.E., seeks post offering scope for experience, moderate salary.—Box 6295, c/o The Electrical Review.

ADVERTISER (exempt) seeks position as Sales Representative where energy and initiative could be employed to advantage.—Box 6290, c/o The Electrical Review.

ELECTRICAL Engineer (27) desires position of responsibility, technical representative or assistant to Manager Birmingham area. Works training, design, research experience, transformers, aircraft electrical equipment. Available November. Own car. Higher National Certificate, etc.—Box 6312, c/o The Electrical Review.

ELECTRICAL Engineer, 24 years' experience in power company supplies, general distribution, factory installations, erection and maintenance of plant, requires permanent post, just released from Government appointment. —Box 6280, c/o The Electrical Review.

ELECTRICIAN requires good responsible position, anywhere, installations, repairs, etc.—c/o 9, Frank Rd., Cardiff. 6306

ENGINEER, age 23, B.Sc. 1st Hon., with general engineering and design experience, seeks position, preferably in London area.—Box 6279, c/o The Electrical Review.

ENGINEER, 27, seeks change. Full technical training and qualifications, eight years' works and office experience of light current and automatic equipment. Requires position with London firm, preferably on commercial or administrative staff.—Box 6297, c/o The Electrical Review.

FOREMAN desires change, supervision of cable laying, jointing, substations, etc., 18 yrs.' experience with large undertaking. Age 41.—Box 6313, c/o The Electrical Review.

GRADUATE (Hons.), Electrical, Mechanical and Radio Engineer (26), with qualifications in television, seeks engagement in radio or electronic industry.—Box 6309, c/o The Electrical Review.

LINESMAN seeks change, 19 years' experience, H.T., L.T., tram, trolley, etc., N.S.O. permission granted. —Box 6317, c/o The Electrical Review.

OVERSEAS Appointment. Highly qualified Mechanical and Electrical Engineer, age 42, requires post as engineer in charge of construction and/or maintenance of large electrical and mechanical installation. 28 years' experience on construction, operation and maintenance of large power plants, hydro electric, steam and Diesel. 13 years as chief construction and maintenance engineer with one of the largest power companies operating in Asia. Recently completed the installation of a large turbo generating station in the West Indies under war-time conditions. Knowledge of Eastern languages. At present engaged in an executive position in one of the Ministries, but can be released.—Box 6291, c/o The Electrical Review.

POWER Station Engineer, M.V.E. Co. training and experience 12 years, manufacture, testing, erection, commissioning all types electrical machinery up to 60,000 kW, 66 kV, 14 years' power station experience charge of operation 60,000-kW high pressure generating plant, free for engagement with supply authority or manufacturers.—Box 6259, c/o The Electrical Review.

PRODUCTION Manager (32), 15 years' experience radio-aircraft equipment manufacture, desires change. London/Essex districts preferred. Alternative post considered.—Box 6307, c/o The Electrical Review.

PROGRESSIVE Elec. Engineer and Designing Draughtsman are interested in Domestic Appliances, etc. Free to accept outside development work. Any other suggestions welcomed.—Box 6311, c/o The Electrical Review.

SENIOR Electrical Draughtsman and Engineer (35), qualified, experienced, with good references, desires permanent position of trust, industrial, public or domestic installation design, maintenance of electrical and general plant, works supervision, wide experience in field, drawing office, correspondence, specifications and control. Willing to live Continent.—Box 6316, c/o The Electrical Review.

FOR SALE

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

WATER TUBE BOILERS IN STOCK

Two 12,000 lbs. evaporation. 200 lbs. W.P.
One 12,000 ,, ,, 160 ,, ,,

We install complete, including brickwork. Economisers. Pumps. Piping Valves, Generating Sets and Motors in stock. Please send us your enquiries; we can give immediate delivery.

BURFORD, TAYLOR & CO. LTD.,
Boiler Specialists, Middlesbrough.
Telephone, Middlesbrough 2622.
1

ELECTRIC MOTORS AND DYNAMOS

WE hold one of the largest stocks of New and Second-hand Motors. Secondhand machines are thoroughly overhauled. Inspection and tests can be made at our Works.

For Sale or Hire. Send your enquiries to:—

BRITANNIA MANUFACTURING CO. LTD.,
22-23, BRITANNIA STREET,
CITY ROAD, LONDON, N.1.
Telephone: 5512-3 Clerkenwell. 13

ARC WELDING MACHINES FROM STOCK

WE offer our latest type No. 2 Max-Arc Welder for immediately delivery, 15/250 amperes. Operates off any A.C. supply voltage. Send for details.

MAX-ARC WELDERS LTD.,
190, THORNTON ROAD, CROYDON.
THOrnton Heath 4276-8.
35

A large stock of surplus Ebonite, Fibre, Carbon Rods, A.I.D. Turnbuckles, etc., also Searchlights (sale or hire), Mirrors, Lenses, also Winches of our well-known self-sustaining types. Hundreds of thousands supplied during the last 40 years to Govt. depts., corporations and traders.—London Electric Firm, Croydon. 55

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

A.C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 4422). 6115

A.C./D.C. Welding Set, input 400-3-50, output 200 amps., 40-60 volts, 1,500 revs., on bed.—J. Gerber & Co. Ltd., Wembley. 725

A.C.-driven Plating Dynamo, 1,000 amps., 16 volt, 570 r.p.m., direct coupl. on bedplate, reconditioned.—J. Gerber & Co. Ltd., Wembley, Middx. 726

A.C. Motors, 1/50th h.p. to 3 h.p., from stock, for essential work only.—The Johnson Engineering Co., 5, Spencer Street, Leamington Spa. 57

AERIAL Cables, all sizes quoted for: good deliveries against Government contract numbers.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6319

ALLEN single bearing D.C. Generator on baseplate, 250 kW, 230 volts, 375 r.p.m., date 1928, compound interpole.—Box 695, c/o The Electrical Review.

ALTERNATING Petrol Set, semi-portable, 5 kVA, 400/3/50, direct coupled, like new.—J. Gerber & Co. Ltd., Wembley. 727

ALTERNATOR, 500 kVA, 3-p., 50 c., 400/440 v., 750 revs., direct coupled exciter, 2 brgs., on bedplate.—Stewart Thomson & Sons, Fort Road, Seaforth, Liverpool, 21. 58

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

BEST English Cables, 1/.044 up to 127/.103, deliveries against M.O.S. requirements.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6320

CARBONS, large stocks assorted sizes, solid and cored.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6321

CHOKES, 80 watt, for fluorescent lamps, 150 for sale, 30s. each.—53, Aston Lane, Birmingham, 20. 715

ELECTRIC Hoists!! Save time and labour. We can supply any size from 5 cwts. upwards, and any other type of Lifting Gear. Send us particulars of your requirements.—George Cohen, Sons & Co. Ltd., Wood Lane, London, W.12, and Stanningley, near Leeds. 34

ENAMEL Shades, 16", for 200-watt lamps, some detachable and some solid, 13 dozen for sale, 12s. and 10s. each.—53, Aston Lane, Birmingham, 20. 714

EXHAUST Fans, new, 14", 1-phase, 200/250 v., 1,900 cu. ft./min., £11 15s.—Southern Ignition Co. Ltd., 190, Thornton Road, Croydon. 75

FOR disposal, 15,000 ft. Brown Bakelite Tubes (Tufnol grade), size ⅜" inside diameter × ¾" outside diameter, in random lengths 35" up to 47". Cheap price to clear, 8½d. per foot; small lots, 9½d. per foot.—Box 718, c/o The Electrical Review.

FOR sale, 80-h.p., 485-r.p.m., 400-volt, 3-phase, 50-cycles, ball-bearing Slip-ring Motor, by Phœnix, complete with B.T.H. floor-mounting, oil-immersed stator and rotor starter. Apply—Box 640, c/o The Electrical Review.

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

HEAVY duty Arc Welding Plants, 200 amps. Price £31 10s. complete. Also Spot Welders, £36 15s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 50

IRON Connectors, Lampholders and Bakelite Wiring Accessories. Deliveries from stock.—RCM/ELEC., London, W.C.1. 6294

LEAD-covered and Armoured Cables, P.I. and V.I.R., various special lines at low prices.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6322

LIGHTMETER, Weston Model E703, 0-50 fc., multiplier disc up to 500 fc., leather wallet, overhauled, recalibrated, as new.—Box 6315, c/o The Electrical Review.

MOTOR-Generator Set: Dynamo 5 kW, 100 v., direct coupled to 7½-h.p., S.C., 3/50/400-v. G.E.C. Motor, 1,500 r.p.m.—S. C. Bilsby, Crosswells Road, Langley Green, near Birmingham. Broadwell 1359. 659

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

MOTORISED ½" Bench Drilling Machine, 13 speeds, £11 11s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 51

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

ONE modern 60-kVA, 1,000-r.p.m., 400-volt, 3-phase, 50-cycles, 4-wire Alternator, by Mawdsley, with overhung exciter, ball bearings and automatic voltage regulator. Apply—Box 641, c/o The Electrical Review.

PHONE 98 Staines. 60-kW crude oil Generating Set, 220 volts D.C.; 35-kW crude oil Generating Set, 220 volts D.C.; 250-kW Browett Steam Set, 220 volts D.C.; Weir Feed Pump, 9½" × 7" × 21"; 35-h.p. Ruston Twin Vertical Diesel; cylindrical pressure Tank, 30' × 7' dia.—Harry H. Gardam & Co. Ltd., Staines. 60

PORCELAIN Cleats, 2 and 3 groove, various sizes ex stock, price list.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6323

PORCELAIN Insulators and Spindles, also Cleats, cheap.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6324

QUANTITY new, screwed Conduit Fittings for disposal. List on application.—W. Cogger, St. Luke's Road, Maidstone. 6318

QUANTITY of V.I.R. and T.R.S. Cable for sale. Apply—Wholesaler, 68a, Harrow Road, W.2. 712

R. F. S. Howell & Co. Ltd., Stroud, Glos. 'Phone 222. Comprehensive selection of D.C. Motors in stock for immediate delivery. Enquiries invited. 6261

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

SELF-Priming Electric Pumps, 300 g.p.h., £11 11s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 53

SEMI-Diesel, 50 kW, 210 v. D.C., direct coupled (Allen, 1926), well maintained. Box 6305, c/o The Electrical Review.

SINGLE-core V.I.R., Braided Flexible, heavy insulation, carry 24 amps., cheap. Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6325

SIX duplicate 30-h.p., 720-r.p.m., 400-volt, 3-phase, 50-cycles, ball-bearing Slip-ring Motors, by Crompton Parkinson. Apply—Box 642, c/o The Electrical Review.

SPECIAL line, Bell and Telephone Wires, also screened wires, large quantity, cheap.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6326

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

SWITCH and Fuse Units. Conduits and fittings, works requirements stocked. Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6227

TRANSFORMERS, single and three-phase. All types up to 10 kVA.—Woden Transformer Co. (Phone, Bilston 41959), Moseley Road, Bilston, Staffs. 12

TRS Cables and Flexibles, Welding Cables, supplied to MOS requirements.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6228

2 Mirlees, Bickerton & Day, 200-b.h.p., 4-cylinder, 250-r.p.m. Diesel Engines, coupled to 135-kW, 220-volt D.C. Generator, by Electric Construction Co., with S.P. circuit breaker, ammeter and kilowatt hour meter; 2 ditto, 110 volt D.C. All in perfect order. Can be seen running in London.—Box 724, c/o The Electrical Review.

6 Transformers, 6,600-200, s.-p., 50 c., 50 to 100 kVA: Motor, D.C., 420 v., 25 h.p., 500 r.p.m.—Box 669, c/o The Electrical Review.

9-kW Plating Generator, separately excited, 1,500 amps., 0/6 volts, 750 r.p.m., direct coupled 20-h.p. squirrel cage Motor, 440 volts, 3-phase, 50 periods. B. & R. A.C. and D.C. control switchgear, new condition: also 70-kVA "B.I." Static Condenser, 400 volts, 3-phase, 50 periods, oil cooled. Apply—F. S. Slater & Co., 34 Princes Way, Team Trading Estate, Gateshead-on-Tyne. 6283

60 yds. 9/029 (1 sq. in.), single core, V.I.R. Braided Flexible.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6229

100-h.p., 400/3/50, 580-revs. S.R. E.C.C., 3 brgs., with switchgear.—Greenhalgh Bros., Burtons Field Mill, Atherton, nr. M/cr. 741

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

ARTICLES WANTED

ELECTRICAL Cycle and Lighter Accessories wanted for spot cash. Manufacturers please send particulars to—Turners, 58, Montpellier Terr., Cheltenham. Tel. 5095. 649

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, Wevbridge. 62

FIVE 2-h.p., 400-volts D.C., approx. 800-r.p.m. Electric Motors.—E.P.R. Co., 16, Clerkenwell Green, London, E.C.1. Tel. Cle. 4019. 6202

REQUIRED, Winding Machine, secondhand or new, if possible Douglas type.—Box 717, c/o The Electrical Review.

TECHNICAL Book wanted, "Generation, Transmission and Utilisation of Electrical Power," by A. T. Starr, published by Pitman.—Kerslake, 100, Hillcrest Rise, Cookridge, Leeds. 740

URGENTLY wanted, Autom. Kohler Sets, 800 and 1,500 watts, 110 volt, any cond. Full details to—Box 728, c/o The Electrical Review.

WANTED, Rotary Converters, any size.—Universal, 221, City Road, London, E.C.1. 22

WANTED, small Vacuum Impregnating Plant, or Vacuum Pot, 18" diameter by 3' deep approximately. Also interested in larger sizes.—Box 716, c/o The Electrical Review.

10-h.p., 440-volt, 750-r.p.m. D.C. Motor; 15-h.p., 400-volt, 3-phase, 50-cycles, 960-r.p.m., totally enclosed, slip ring Motor and Starter.—C. F. Pardoe, 73-79, Clarence Street, Hull. 743

27-kVA Alternator, output 400/230 volts, 3-phase, 50 cycles, A.C., and control panel.—Ernest Doe & Sons, Ulting, Maldon, Essex. 729

5,000-amp., 20-volt D.C. Generator, or 2,500-amp., 40-volt.—Browning's Electric Co. Ltd., Boleyn Castle, Green Street, Upton Park, E.13. 701

WORK WANTED AND OFFERED

MOTOR REPAIRS

REWINDING and Repairs. Small Motors and Electric Tools rewound and repaired by firm having long experience in this work. Guaranteed work and prompt service. Large assortment of Motors available from stock.

SOUTHERN IGNITION CO. LTD.,
190, THORNTON RD.,
CROYDON.
THOrnton Heath 4276-8. 37

REWINDING AND REPAIRS

WE rewind and repair any motors, A.C. or D.C., from 1 h.p. to 500 h.p. Motors lent while repairs are being carried out. Established over 24 years.

W. H. SUGDEN & CO. LTD.,
Glenny Road, Barking, Essex.
Phone, Rippleway 3302. 48

A.C. and D.C. Rewinding and Repairs, Small Motors and Electric Tools, guaranteed work.—W. Burgess, 297, Romford Road, Forest Gate, E.7. Maryland 2237. 6228

ARMATURE, Rotor and Stator rewinds and repairs, fractional to 60 h.p. Prompt deliveries.—T. A. Boxall & Co., Horley, Surrey. Phone 654. 6253

ELECTRICAL Measuring Instruments skilfully repaired and recalibrated.—Electrical Instruments Repair Service, "Stanimede," Forlease Road, Maidenhead. 6263

FOR Repairs, Assembling and Re-conditioning of Electrical Accessories and Lighting Fittings, please phone or write—H. Reichbach, 96, Gt. Titchfield St., W.1. Teleph. MUS. 0891. 6306

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

MEASURING Instrument Repairs. All makes of meters and instruments skilfully repaired by experts. Prompt service for essential purposes.—Runbaken Electrical Repairs, Meter Dept. (Q22), Manchester, 1. 54

REPAIRS. Clocks, Watches, Time-Switches, Jewellery, Radios, Gramophones, Electric and Mechanical Apparatus of all kinds repaired by skilled staff. Inquiries welcomed. Representative will call in the London area if required.—Hughes (Ground Floor), 58, Victoria Street, London, S.W.1. Phone, Victoria 0134. 6038

AGENCIES

INDIA NOW AND POST-WAR

TO those manufacturers contemplating extending their export markets to rapidly expanding British India excellent opportunities are offered through the medium of The Industrial and Commercial Trust Limited—an experienced, well-established company, financially sound, with extensive ramifications throughout the country—to further that end.

This company is prepared to consider the sole agency for India for machine tools, cutting tools, plywood and plastics of all kinds. Domestic radio apparatus and accessories, automobiles and parts, and kindred lines.

Bank and other references submitted.

Communicate direct to:
THE INDUSTRIAL & COMMERCIAL TRUST LTD.,
Wavell House, 15, Graham Road, Ballard Estate, Fort, BOMBAY.

Representative now in England:
Mr. R. Williams, c/o Hongkong & Shanghai Banking Corporation, 9, Gracechurch Street, London, E.C.3. 713

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.

AGENT with good Scottish connection wishes representation.—Box 6257, c/o The Electrical Review.

ARTHUR Ford Ltd., Electrical Engineers, 8, Commerce Square, Nottingham, are contemplating adding a Refrigerator Department in the very near future. Will any manufacturer interested in us taking their agency please communicate. 6254

CATALOGUES. We are engaged in compiling our Wholesale Catalogue of Domestic, Industrial and Commercial Electrical Equipment and shall be pleased to receive, from manufacturers, details of contemplated new lines which are suitable for distribution by an exclusively electrical wholesale house. Particulars to—Box 730, c/o The Electrical Review.

LARGE Electrical Contractors wish to consider for their old-established export business, agencies for domestic and medical power driven appliances.—Box 737, c/o The Electrical Review.

MANUFACTURERS' Agents, covering the whole of Great Britain and Colonies, are desirous of contacting manufacturers with a view to sole selling rights (either commission or buying), post-war arrangements considered. —Box 23, c/o The Electrical Review.

MANUFACTURERS' Agents, with travelling staff, central office, small stock room, etc., good sound connection amongst electrical wholesalers, supply authorities, works, etc., in Midlands, require additional agency on commission with office expense allowance.—Box 698, c/o The Electrical Review.

MANUFACTURERS of electro-magnetic relays require an Agent for each of the following areas: Home Counties, South Coast, West of England, South Wales, Northern Ireland, Eire. Must be technically qualified and have connections in the industrial and supply companies field. Give full details, stating territory covered and agencies held.—Box 710, c/o The Electrical Review.

MANUFACTURING Electrical Engineers supplying marine electrical motors, generators, alternators, rotary converters, etc, would appoint an Agent for Shipbuilders and Marine Engineers if a suitable proposition was made.—Box 644, c/o The Electrical Review.

MANUFACTURING Electrical Engineers with a complete range of motors, generators, alternators, rotary converters, etc., from ¼ to 100 kW, A.C. and D.C., will appoint Agents in most areas if suitable propositions are received.—Box 643, c/o The Electrical Review.

PROMINENT old-established West of England agent, with advantageous facilities, representing famous firms and trading constantly with the leading buyers and supply authorities, can accept additional agency for line of merit. Write with confidence.—Box 678, c/o The Electrical Review.

WELDING Electrodes. Wholesale electrical distributors with genuine connection amongst shipbuilders, engineering and industrial concerns, desires Scottish Agency for welding electrodes, etc. Apply in the first instance to—Box 686, c/o The Electrical Review.

WELL-known Scottish wholesale electrical distributors, with large warehouse, offices, showroom, etc., desire to represent, in Scotland, first-class company manufacturing Domestic and Cooking Appliances. Large and influential connection. Particulars in first instance to—Box 685, c/o The Electrical Review.

BUSINESSES FOR SALE AND WANTED

ELECTRICAL Contracting Business in Nottingham or Leicester. Advertiser wishes to purchase either controlling interest or complete business. Replies will be treated in strictest confidence.—Box 6302, c/o The Electrical Review.

BUSINESS OPPORTUNITIES

WANTED to buy, small or medium-size works well equipped for light metal and plating work. London area preferred. Suitable production taken over.—Box 738, c/o The Electrical Review.

MISCELLANEOUS

LESLIE Dixon & Co. for Dynamos, Motors, Switchgear, Chargers and Telephones.—214, Queenstown Road, Battersea, S.W.8. Telephone, Macaulay 2159. Nearest Rly. Sta.: Queen's Road, Battersea (S.R.). 18

BATTERY manufacturers (dry cells), well-established concern of repute, with good machinery and plant, would consider amalgamation with powerful manufacturers of other electrical articles. Excellent facilities for expansion to increase post-war business. Machinery and plant easily movable if necessary. Negotiations with principals only. Reply to—Box 706, c/o The Electrical Review.

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

PHOTOGRAPHY. A photograph says more than a thousand words. Realistic photographs for catalogues, brochures and general reproduction purposes for present and after-the-war uses. Records made of present work, premises, etc.—Miles & Kaye Ltd., Industrial Photographers, 100, Southampton Row, London, W.C.1. Telephone, HOLborn 6858. Established over 50 years. 723

POST-war planning. Enquiries are to be issued for large quantities of brass turned parts, terminals, heating elements, cut-outs, rubber-covered cable and rotary type switches, etc., suitable for electrically heated domestic wash-boilers. Specialist manufacturers desirous of tendering are requested to apply in the first instance to—Box 6292, c/o The Electrical Review.

EDUCATIONAL NOTICES

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

Index to Advertisers

(*Continued on page* 78)

Index to Advertisers

(*Continued from page* 76)

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

Printed in Great Britain at THE CHAPEL RIVER PRESS, Andover, Hants, and published by ELECTRICAL REVIEW, LIMITED, at Dorset House, Stamford Street, London, S.E.1.

—and the roots go deep . . .

Firm and enduring, the great tree stands, its roots spreading deeper and wider through the long years of steady growth.

So, too, have great industrial organisations like that of Philips grown and developed. The many Philips achievements and the high reputation of their products are rooted in persistent research, highly-qualified engineering personnel, modern and efficient factories and long-accumulated knowledge and experience of the application of electricity to the needs of the modern world.

PHILIPS

LAMPS ★ RADIO ★ X-RAY

COMMUNICATIONS EQUIPMENT

AND ALLIED ELECTRICAL PRODUCTS

PHILIPS LAMPS LTD., CENTURY HOUSE, SHAFTESBURY AVENUE, LONDON, W.C.2 (87P)