THE
ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

3 JANUARY, 1947
- SIXPENCE -

You don't need that range of plugs? **Ho yes I do!** *But one of these two takes any size of screw.* **Any size screw? You're barmy, me boy!** *Well, any size from 3 to 16. And fit any hole, too.* **Fit any hole! Do they go round corners as well?** *They fill any hole, however badly jumped.* **I don't believe a word of it.** *Very well, go on stocking a vast range of plugs then.* **I will! I will!** *OK, I hope they fall on you.*

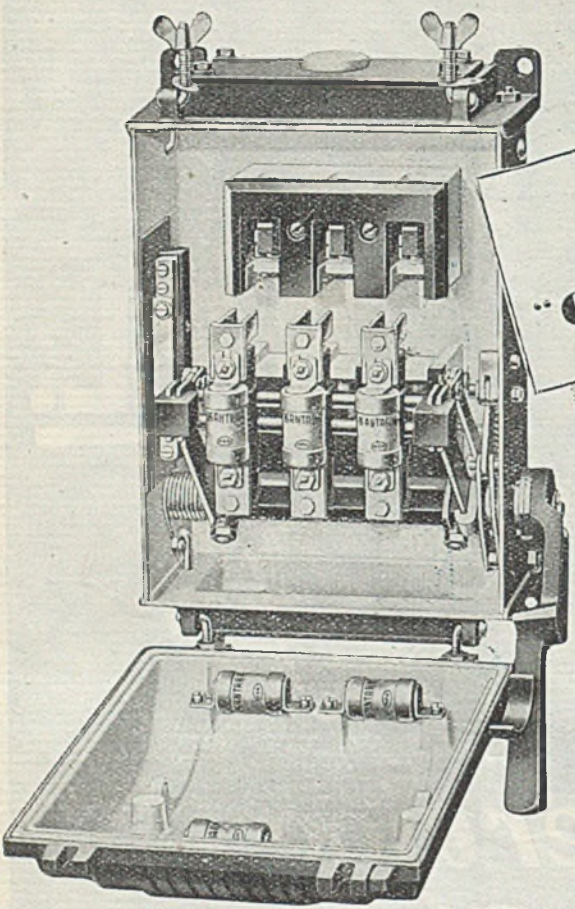
And remember this, because Philplugs fill the hole, no matter what kind of a hole you make, you can always make a firm fixture with Philplug Adaptas. And another thing, because you can use one of these 2 for any screw you get a perfect fixture every time — that's the beauty of Philplug Adaptas.

one of these 2 for any screw . . .

PHILPLUGS fill the hole

PHILPLUG PRODUCTS LIMITED · LANCELOT ROAD · WEMBLEY · MIDDLESEX TELEPHONE: WEMBLEY 0140

C.R.C.108



The NEW "Glasgow-Rex"

The Famous M.E.M Ironclad Switch Re-designed —with H.R.C. Fuses

M.E.M. designers have shown true leadership again. This new H.R.C. series is a triumph of compactness and adaptability. You can convert the standard switch to an H.R.C. fuse switch in a few moments. It is just as simple to convert a triple pole unit to triple pole and neutral. Here is a new kind of versatility in switchgear.

The "Glasgow-Rex" complies fully with Home Office regulations and the "Kantark" H.R.C. standard cartridge fuses are in accordance with B.S.S. 88/1939, A.C.4 and D.C.3. Appearance, workmanship and finish of these switches will win the admiration of engineers everywhere. Yet this high quality equipment is offered at reasonable prices. Only M.E.M. intensive specialisation could produce such value.

A descriptive list No. 278 is already available. It gives full details of the new "Glasgow-Rex" range, rated from 30-200 amps. Send for your copy now.

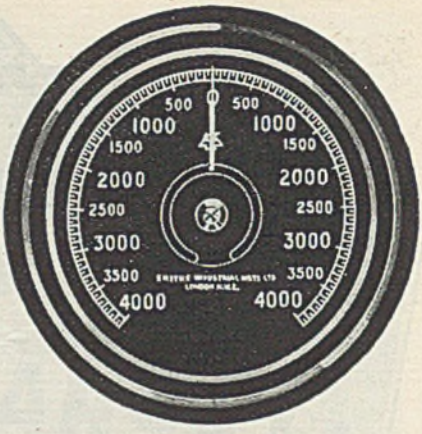
M·E·M

Switch, fuse and motor control gear, electric fires and localised lighting equipment

MIDLAND ELECTRIC MANUFACTURING CO. LTD., BIRMINGHAM, 11

BRANCHES IN LONDON & MANCHESTER

FOR ACCURATE INDICATION OF EVERY FORM OF SPEED



DESIGNED AND CALIBRATED FOR EVERY PURPOSE

Speed, which has always been prized by mankind, has become today a vital factor in industry — a factor which must be measured and controlled for its many purposes. For this measurement there are no more accurate instruments than A.T. Indicators, as these have a movement that stands up to the most gruelling conditions.

These instruments are available for practically every form of speed indication. Their unwavering reliability is made possible by a jewelled movement of simple design and robust construction; by individual attention at every stage of making, testing and calibrating.

A.T. Indicators can be waterproofed and tropicalised for marine and oversea duty, and can be calibrated to meet particular needs.

Available with dials from 1½" to 9" diam., and revolution counters with or without trip mechanism may be incorporated in instruments from 4" diam.

A.T.

A.T. INDICATORS

A product of

SMITHS

SMITHS INDUSTRIAL INSTRUMENTS LTD.

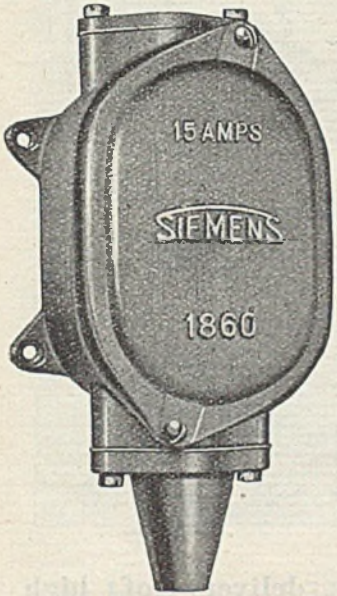
CRICKLEWOOD WORKS, LONDON, N.W.2

The Industrial Instruments Division of S. Smith & Sons (England) Ltd.

Associated Companies : A. T. Instruments Ltd., David Harcourt Ltd.

PUBLIC LIGHTING ENGINEERS

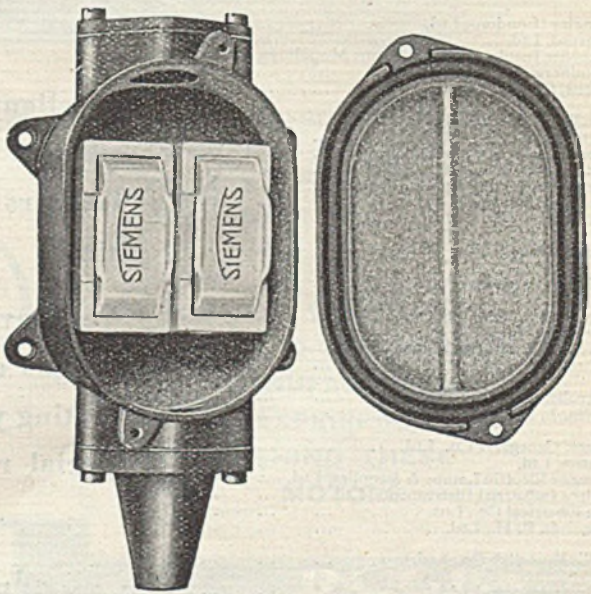
—Here is the Fuse Box for your Street Lighting Standards



SIEMENS

STREET LIGHTING FUSE BOX

15 Amp. 250 Volts D.P.
WEATHERPROOF



SPECIFICATION

Cast Iron Case with external fixing lugs for wall mounting—pole straps can be supplied for pole mounting.

Also suitable for mounting inside lamp standards.

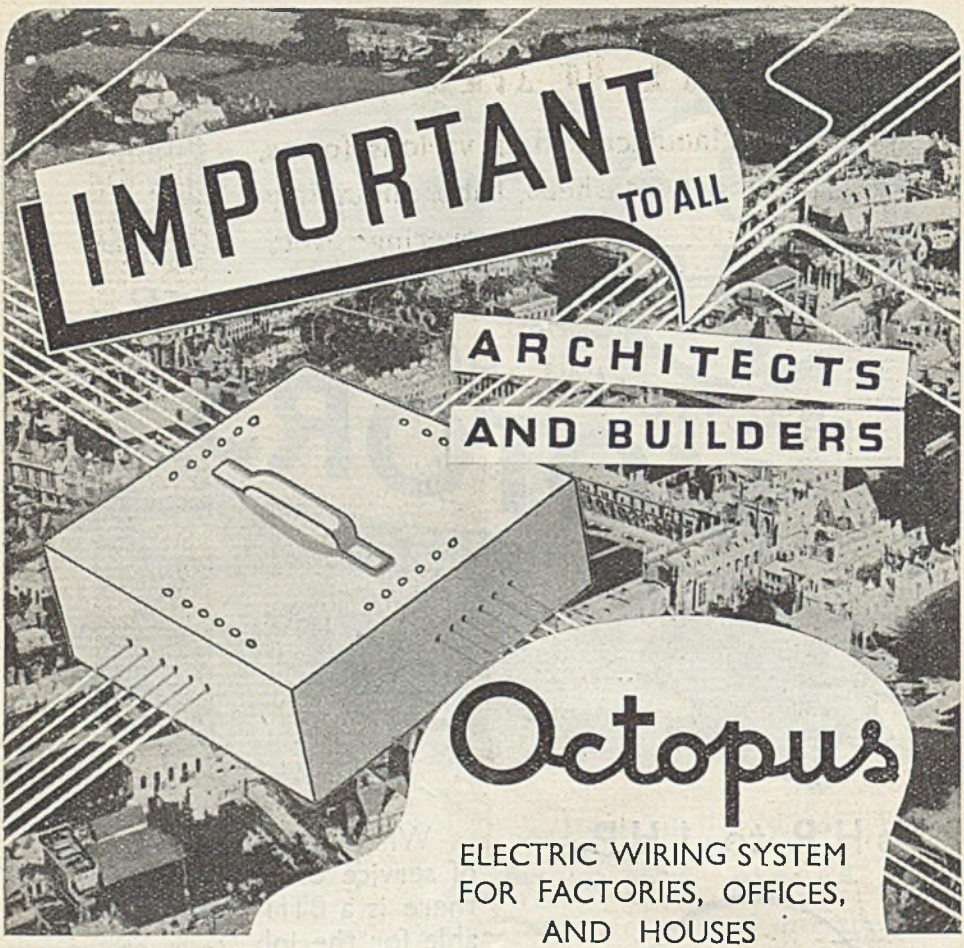
Detachable plates or glands can be fitted top and bottom as required.

Fuses can be either rewirable type or H.R.C.

LIST NO. Z.158 sent on application.

SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED
38/9 UPPER THAMES STREET, LONDON, E.C.4

INDEX TO ADVERTISERS IN THIS ISSUE



APPLICABLE TO ANY SYSTEM OF BUILDING

Octopus ensures

1. Speedier and more efficient installation.
2. Considerable economy in labour and installation costs.

Octopus has been officially approved by governing authorities.

Write for illustrated brochure to

PROVED AND PRODUCING PROPERTIES LIMITED, 5, Cheapside, London, E.C.2, or

HARTLEY ELECTROMOTIVES, LTD., 57, Victoria St., London, S.W.1

Sole Agents for Northern Ireland: JAMES McCREEDY, LTD., Private Road, Cregagh, Belfast.

UNTIL YOU'VE had experience of what correct lighting can do, you cannot fully appreciate how much a good lighting installation can save in hard cash.

Innumerable faults and errors which lead to waste of time and material can be traced to incorrect lighting. Many mishaps and accidents have their roots in the same cause, and it is now recognised that premature fatigue can be induced by poor light.

All this can be very easily corrected to the advantage of both the workers and the work, provided experienced advice is sought. BTH Lighting Engineers, with their detailed technical knowledge and long familiarity with lighting problems of all kinds, are equipped to provide sound counsel and practical suggestions to correct faulty lighting.

If you desire to avail yourself of their services, without obligation, you are invited to write to BTH Lighting Advisory Service, Bridle Path, Watford.

Telephone : Watford 7701/8.

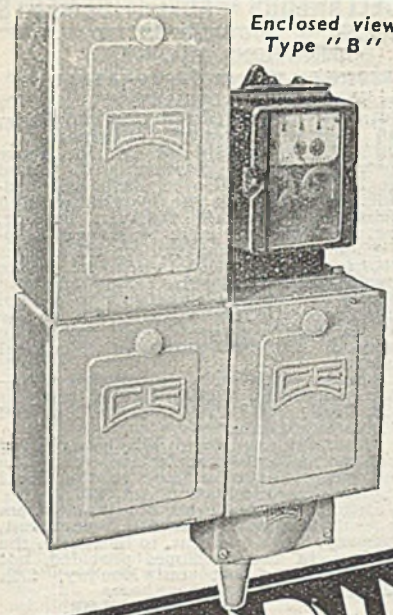
MAZDA Lamps

BTH

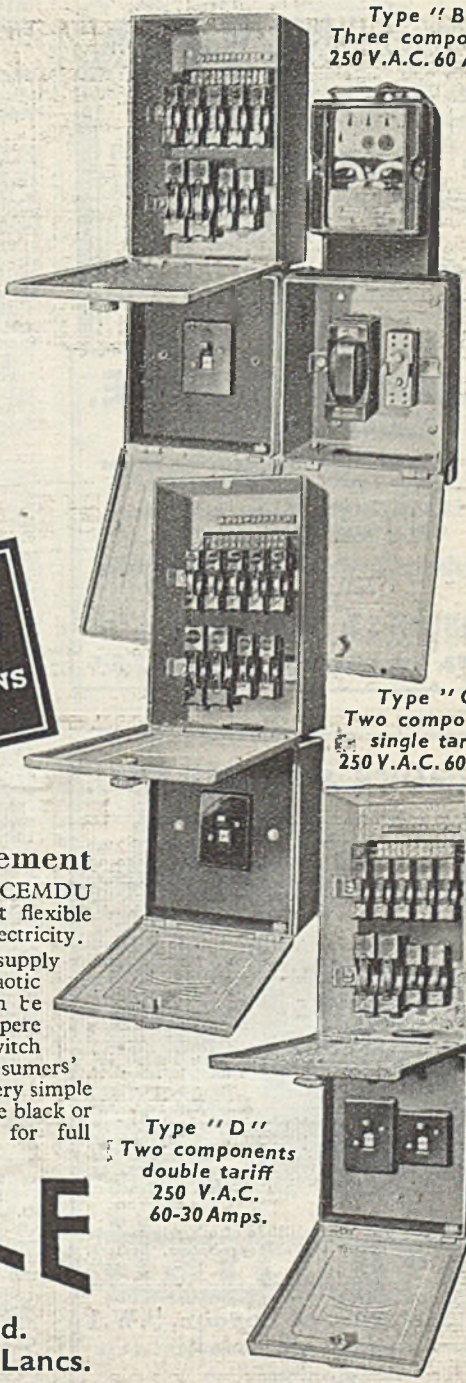
MAZDALUX Fittings

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

M4112



Enclosed view
Type "B"



Type "B"
Three components
250 V.A.C. 60 Amps.

Type "C"
Two components
single tariff
250 V.A.C. 60 Amps.

Type "D"
Two components
double tariff
250 V.A.C.
60-30 Amps.

CEMDU
CARLISLE ELECTRICAL MAINS DISTRIBUTION UNIT

Types for every requirement

Already in use by many supply authorities CEMDU is the up-to-date, trouble-free and most flexible system for the intake and distribution of electricity. Comprising one unit housing all domestic supply control CEMDU banishes the usual chaotic conditions at the incoming end. It can be placed in any position. Supplied 60 ampere or 60 and 30 ampere double pole Main Switch Control. Any meter can be fitted; consumers' fuses are rewirable and extensions are a very simple matter. CEMDU is supplied in attractive black or cream stove enamelled finish. Write for full particulars to the sole manufacturers.

CARLISLE ELECTRICAL
Manufacturing Co. Ltd.
Bentcliffe Works, Eccles, Lancs.

'Phones: Eccles 1691-2-3-4. Telegrams: "Carlectric" Eccles.

C4

MISCELLANEOUS ADVERTISEMENTS

SITUATIONS VACANT

STOKE-ON-TRENT CORPORATION.

ELECTRICITY DEPARTMENT.

Appointment of (a) Installation Engineer; (b) Assistant Installation Engineer.

APPLICATIONS are invited for the above appointments from persons with sound technical training and who have had considerable experience in the installation and maintenance of electric lighting, heating, cooking, etc., who are able to prepare complete schemes and estimates for all classes of electrical installation work in public buildings, schools, canteens, commercial and domestic premises, and competent to control staff and supervise the carrying out of the work. Applicants should be corporate members of the Institution of Electrical Engineers.

The salaries will be in accordance with—(a) Class H, Grade 4 (£666/682/698), and (b) Class H, Grade 6 (£571/586/601) of the National Joint Board Schedule.

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

Applications on the forms obtainable from the General Manager, Electricity Department, 31, Kingsway, Stoke-on-Trent, to be sent to the undersigned in the envelopes provided, not later than first post on Monday, 27th January, 1947.

HARRY TAYLOR,
Town Clerk.

Town Hall,
STOKE-ON-TRENT.

SHEFFIELD CORPORATION ELECTRICITY DEPARTMENT.

APPOINTMENT OF ASSISTANT POWER STATION SUPERINTENDENT.

APPLICATIONS are invited for the position of Assistant Power Station Superintendent at the Neepsend Generating Station of the above Undertaking.

Applicants must have had a thorough mechanical and electrical engineering training, preferably including experience in a manufacturing engineering works, and possess a degree or equivalent technical qualifications admitting to Corporate Membership of the Institution of Mechanical and/or Electrical Engineers. He must also have had experience in the operation and maintenance of a modern selected power station.

The salary will be in accordance with Class J, Grade 5, of the National Joint Board Scale (present value £651, rising to £682). Extensions are now in progress at this station which, when completed, will place the station in Class K.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and candidates must have previous Local Authority service carrying a transfer value within the meaning of the Act or otherwise be not more than 40 years of age. The successful candidate will be required to pass a medical examination.

Form of Application may be obtained from the undersigned, and is to be returned to me in an envelope marked "Assistant Power Station Superintendent" not later than 17th January, 1947, and accompanied by copies of not more than three recent testimonials.

Canvassing or any communication with a member of the Council either directly or indirectly is prohibited, and will be a disqualification.

(Signed) JOHN R. STRUTHERS,
General Manager and Engineer.

Commercial Street,
SHEFFIELD, 1.
27th December, 1946.

SITUATIONS VACANT

METROPOLITAN BOROUGH OF ISLINGTON.
ELECTRICITY DEPARTMENT.
Appointment of Engineering Draughtsman.

APPLICATIONS are invited for the position of Engineering Draughtsman on the permanent staff of the Council.

The salary and conditions of service, in accordance with the National Joint Board Schedule, will be from Grade 9A, £360 3s. per annum, to the maximum of Grade 8, £499 16s. per annum, in Class G, according to the qualifications and experience of the successful candidate.

The position offers scope for initiative in design connected with the development of a superimposed 33 kV transmission scheme, the reinforcement of the existing distribution system and future planning in connection with the standardisation of voltage and supply.

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

Candidates are required to disclose in writing whether, to their knowledge, they are related to any member or holder of any senior office under the Council. Canvassing either directly or indirectly will be a disqualification.

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

Application forms, which may be obtained from the Engineer and General Manager, Electricity Department, 341/3, Holloway Road, N.7, should be completed and returned to him endorsed "Engineering Draughtsman" by not later than noon on Friday, 10th January, 1947.

W. ERIC ADAMS,
Town Clerk.

Town Hall,
Upper Street, N.1.

WANTED.—Electrician, capable and experienced. Permanent, top wages.—W. R. Walker Ltd., 97, Mount Street, London, W.1. Tel. Gro. 1288.

SITUATIONS VACANT

METROPOLITAN BOROUGH OF FULHAM.

ELECTRICITY DEPARTMENT.

THE Council invites applications for the position of Assistant Contract Engineer in their electricity distribution department from candidates not over 35 years of age for supervision of electrical installation work during progress and on completion and measuring up for and providing data for the costing department. Education standard up to matriculation required, and possession of High National Certificate in electrical engineering; practical experience of domestic and industrial electrical installation work, and supervisory experience and ability to control and discipline men.

Salary in accordance with the National Joint Board Schedule, Class "G," Grade 9a, at present £360 3s. per annum.

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

Forms of application and conditions of appointment may be obtained on sending stamped addressed foolscap envelope to the undersigned, to whom completed applications must be returned not later than 12 noon on 28th January, 1947.

CYRIL F. THATCHER,
Town Clerk.

Town Hall,
FULHAM, S.W.6.
December, 1946.

METROPOLITAN BOROUGH OF FULHAM.

ELECTRICITY DEPARTMENT.

THE Council invites applications for the following positions in the Fulham Base Load Generating Station, Townmead Road, Fulham, S.W.6.

General Engineer, not over 40 years of age, education up to Inter. B.Sc. standard, with technical and practical experience in the erection and maintenance of heavy mechanical, electrical and steam raising plant, preferably with experience of Base Load Power Station work, experience in acting as site engineer or clerk of works, and with practical knowledge of mechanical fitting and/or electrical testing and steam raising plant.

Salary in accordance with the National Joint Board Schedule Class "L," Grade 8, at present £624 15s. per annum.

It is anticipated that the station will be reclassified in 1947 to Class "M," when the commencing salary would be £666 15s. per annum.

Assistant Electrical Planning Engineer, not over 40 years of age, education up to Inter. B.Sc. standard, with technical and practical experience in the maintenance, testing and operation of electrical plant, preferably in the types of plant associated with a Base Load Power Station, and proved ability in organisation and planning of work.

Salary in accordance with the National Joint Board Schedule, Class "L," Grade 9a, at present £468 6s. per annum.

It is anticipated that the station will be reclassified in 1947 to Class "M," when the commencing salary would be £501 18s. per annum.

Assistant Instrument Engineer, not over 25 years of age, with sound technical training and education up to Int. B.Sc. standard, at least three years' practical experience with a manufacturing firm of instruments of the type used in a power station and at least two years' experience in servicing and calibrating such instruments more particularly analytical, temperature, and flow types for gas, water and steam, and capable of supervising mechanics on repair work and of diagnosing faults.

Salary in accordance with the National

Joint Board Schedule, Class "L," Grade 10b, at present £374 17s. per annum.

It is anticipated that the station will be reclassified in 1947 to Class "M," when the commencing salary would be £400 1s. per annum.

Electrical Tester, not over 35 years of age, education up to Inter. B.Sc. standard, at least five years' experience of working on H.T. and E.H.T. circuits and in testing of electrical apparatus, including all types of generators, relay and protection systems, switchgear, feeders and cables, and capable of carrying out maintenance and operation testing of all types of electrical apparatus associated with a large base load power station, from the diagnosis of faults to the calibration of relays on all voltages from 400 to 66 KV.

Salary in accordance with the National Joint Board Schedule, Class "L," Grade 9a, at present £468 6s. per annum.

It is anticipated that the station will be reclassified in 1947 to Class "M," when the commencing salary would be £501 18s. per annum.

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

Forms of application and conditions of appointment may be obtained on sending stamped addressed foolscap envelope to the undersigned, to whom completed applications must be returned not later than 12 noon on 28th January, 1947.

CYRIL F. THATCHER,
Town Clerk.

Town Hall,
FULHAM, S.W.6.
December, 1946.

METROPOLITAN BOROUGH OF FULHAM.
ELECTRICITY DEPARTMENT.

APPLICATIONS are invited from candidates not more than 40 years of age for two positions of Temporary Draughtsman (one Architectural and one Mechanical) in connection with the Council's Base Load electricity generating station and distribution department. Applicants must have had respectively five years' practical experience of architectural and mechanical draughtsmanship, sound technical training and education up to Inter. B.Sc. or equivalent, and be capable of carrying out their own calculations and of preparing working drawings from site measurements.

Salary up to £10 per week according to age and qualifications, plus cost of living bonus.

The successful candidates will be required to pass a medical examination.

Forms of application and conditions of appointment may be obtained on sending stamped addressed foolscap envelope to the undersigned, to whom completed applications must be returned not later than 12 noon on 28th January, 1947.

CYRIL F. THATCHER,
Town Clerk.

Town Hall,
FULHAM, S.W.6.
December, 1946.

ALBRIGHT AND WILSON LTD. invite applications for their Technical Sales staff in the South Eastern area in connection with development of the uses of Dow Corning Silicone products. Applicants should preferably hold a science degree or its equivalent, and be between the ages of 23 and 33. Details of experience and qualifications should be sent to 49, Park Lane, London, W.1.

INSPECTOR, A.I.D., required. Capable of taking charge of department. Knowledge of plastics desirable. Able to check tools and test laminated material for insulating qualities. 5-day week. Salary £6 to £7 per week, according to experience.—Box No. LTF, "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

SITUATIONS VACANT

COUNTY BOROUGH OF BLACKBURN.

APPLICATIONS are invited from Corporate members of the Institution of Electrical Engineers for the position of CHIEF ENGINEERING ASSISTANT in the Electricity Undertaking. The conditions of employment will be as prescribed by the National Joint Board, and the salary will be in accordance with Grade 2, Class H, at present £806 per annum. An additional sum will be paid to the person appointed at the discretion of the Council, as a temporary measure, in respect of extensions to the Power Station, which will extend over the next three years. The appointment will be subject to the provisions of the Local Government Superannuation Act. 1937.

Applicants must have had a sound training, possess good technical qualifications, and have a wide experience in the construction, maintenance and operation of the various sections of modern supply undertakings operating Selected Power Stations. Applications from engineers who have gained an extensive knowledge in the design and constructions of Power Stations will be specially considered.

Applications, stating full details of training, experience and qualifications, together with copies of three recent testimonials, to be delivered to R. H. HARRAL, Esq., M.I.E.E., Engineer and Manager, Electricity Offices, Jubilee Street, Blackburn, in an envelope endorsed "Chief Engineering Assistant," by 18th January, 1947.

CHAS. S. ROBINSON,
Town Clerk.

MANCHESTER MUNICIPAL COLLEGE OF TECHNOLOGY.

(Faculty of Technology in the University of Manchester.)

APPOINTMENT OF ASSISTANT LECTURER IN ELECTRICAL ENGINEERING.

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

Importance is attached to practical works experience in electrical engineering.

Salary: £420 per annum, rising by annual increments of £20 to £500 per annum. Commencing salary according to qualifications.

Conditions of appointment and form of application may be obtained from The Registrar, College of Technology, Manchester, 1. The last day for the receipt of applications is FRIDAY, 31st JANUARY, 1947.

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

J. E. MYERS,
Principal of the College.

COIL Winding Foreman required by The Phœnix Telephone and Electric Works Ltd. at their works at The Hyde, Hendon, London, N.W.9. Must be experienced in all types of coils used in the manufacture of telecommunication equipment. Apply in writing, giving full particulars and salary required.

FIRST-CLASS Electrician wanted, used to installation work. Permanent post for right man. Apply— R. J. Kemp and Co. Ltd., Coalville, near Leicester.

SITUATION FILLED

BOROUGH OF FINCHLEY.—Assistant Distribution Engineer, Senior Demonstrator, Deputy Distribution Engineer, Consumers' Engineer. These positions have been filled. All applicants are thanked.

REPAIRS

COOKERS.—We can give good deliveries of Sheet Metal Vitreous Enamelled Electric Cooker parts.—JOHN KING & SON (ENAMELLERS), LTD., PYRO WORKS, CHESTERFIELD. Phone: 5305.

FOR SALE

ABOUT FIRES.—1 kW and 2 kW Pencil Reflector Type. Polished aluminium, 47s. 6d. and 65s. Trade invited.—Adams, 114, Stroud Road, Shirley, Warks.

DOMESTIC Plant, 100-v. set, 54 cells, all good order. Inspection.—Henley House, Chelsham, Upper Warlingham, Surrey.

OSMOR 5-valve Superhet, 3-wave band A.C. D.C. RECEIVER. Exceptionally good sensitivity and reproduction. Attractive cabinets. Early delivery. Price £18 18s. Write for illus. leaflets.—Morgan Osborne, Ltd., Southview Road, Warlingham, Surrey.

OSMOR Radio Heart equals complete first-class 5-valve Superhet, positively only small condensers and resistances to find. Super-efficient components. Building instructions, £5 16s. Cabinets. Trade invited.—Morgan Osborne, Ltd., Southview Road, Upper Warlingham 2560, Surrey.

5-H.P. Motors, second-hand, totally enclosed, half-hour rated, 3 000 r.p.m., 400 v., 3-phase, 50 cycles, A.C.; also 3-h.p. Motors, reconditioned by makers, as above but protected type and continuously rated. Immediate delivery.—Carter and Co. (Nelson) Limited, Engineers, Nelson, Lancs.

10-K.W. Unit Heaters, 3-phase, 400 volts. Immediate delivery.—Carter and Co. (Nelson) Ltd., Engineers, Nelson, Lancs.

ELECTRIC MOTORS.—1/3 h.p. 3 000 r.p.m. D.C. 110 V. Also 220 V Stock Delivery. £6 15s. each.—John E. Steel, Clyde Mills, Bingley, Yorks.

"ADDRESSING the Public."—A handbook devoted exclusively to the fundamentals of good public address technique and the problems of your P.A. department.—Obtainable at 3s. 6d. (post free) from the Acoustical Manufacturing Co., Ltd. (Dept. B.2), Huntingdon.

VACUUM Cleaners available in limited quantities, and all types of Repairs carried out for all makes of Vacuum Cleaners.—Crown Appliances Ltd., 90, Wellesley Road, Croydon. Cro. 6515.

FOR SALE.—Nisson Huts 36 ft. by 16 ft., also Wooden Sectional Buildings, all sizes.—Sykes, Tenterfields, Ovenden, Halifax. Tele. Halifax 5802.

A SUPERIOR streamlined TOASTER in one piece die cast aluminium with attractive mirror finish. Price 39s. 6d. subject. Immediate delivery. Sample 31s. Cash with order. —Metropolitan Distribution, Ltd., Truro.

TRANSFORMER for sale, "Welders" to BSS 171/1936 4 kVA 1 phase 50 Type AN. 400/230-0-90 Volts. Excellent condition. £50, Carriage Paid.—Apply J. Thorn and Sons, Ltd., Brampton Road, Bexleyheath, Kent. Bexleyheath 305.

ALL Types of ELECTRICAL and CONTRACTORS PLANT, Pumps, Boilers, Engines, etc., in stock.—G. E. WHITTAKER, Wellington Mill, Bolton Road, Blackburn. Tel: 7232.

MERCURY SWITCHES, all types. For details of immediate delivery, apply Quicksilver Tube Mfg. Co., The Grays, High Street, Harlington, Middlesex.

RUBBER STAMPS.—Every description. For office, shop and factory. With the usual pre-war cushion backed holders and polished handles.—W. L. Boughton, 53, Kenley Road, Merton, London, S.W.19.

WEE MEGGERS 500 V, £12 5s. 6d. Record 500 V test sets, £11. New. Carriage paid.—Robins' Electrics, 222, West End Lane, N.W.6. HAM 0879.

360 FT. Bill Overhead BUSBAR, 4-bar 3-phase and neutral, 250 amp. per phase type OB4, together with 42 T.P. and N. 30 amp. Plug-in Fuseboxes, type OF.30 and 7 incoming Cable Boxes with S5 Glands, type OC1. These items are new and unused, and are offered for £435 the lot.—United Insulator Co., Ltd., Oakcroft Road, Tolworth, Surrey. Elmbridge 5241.

WANTED

ABOUT Fluorescent Tubes, top prices paid. Any quantity, 10 in. and 12 in. pencil elements. Any electrical surplus, etc. Write —Adams, 114, Stroud Road, Shirley, Warks.

WANTED, shells for fully shrouding Scott type 76A laminations.—The Majestic Winding Co., 180, Windham Road, Bournemouth.

FLUORESCENT Lamps (tubes) 5 ft. 12 urgently required. Good prices paid.—Box No. LTG, "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

AN unlimited number of modern A.C. motors urgently required for essential work. Highest cash prices paid for suitable units. We also want all types of motors for conversion and rewinding. Send details to Sales Dept., A. P. Watson, 104, Upper Brook Street, Manchester, 13.

BRASS STRIP—¼ by 022. Any quantity. Also Brass Rod.—Veret Ltd., Graham Road, Bexleyheath 2364.

ARMATURE Winding and Taping machine wanted.—V.A.C. Ltd., 80, Cranbrook Road, Ilford, Essex. Valentine 3222.

A.C. Motors all sizes and voltages. Best prices offered.—John Phillips and Co. Electrics, 31, Fortune Green Road, W. Hampstead. Telephone: Hampstead 8132.

LAMINATIONS.—Large types required in reasonable quantities. T's and U's. Also 75's and 4A's.—Cornercroft, Fallibroome Road, Macclesfield.

VITREOUS base metal top push button switches required.—Runbaken Electrical Products, 71, Oxford Road, Manchester.

ENAMELLED wire wanted, 21, 21½, 23½, 24, 43 and 44 gauge. Good price paid, any quantity.—Runbaken Electrical Products, 71, Oxford Road, Manchester.

A.C. MOTORS, 1-100 h.p., 500-1,500 r.p.m. Any make fitted with ball and roller type bearings. Must be good machines, such as you yourselves would buy. Alternatively motors for rewinding will be considered.—Oldfield Engineering Co., Ltd., 96, East Ordsall Lane, Salford, 5.

WANTED.—ROTARY CONVERTORS, any size.—Universal, 221, City Road, London, E.C.1.

WORK WANTED

THE Electrical Branch of Messrs. Parsons and Sons, 8-10, Kings Road, Swanage, Dorset, will be re-opened in January, 1947, on the return from the Forces of their Mr. J. W. Parsons, A.M.I.E.E., who will be pleased to receive manufacturers' and suppliers' catalogues.

CAPACITY available for coil winding, impregnating, engraving and light machine work.—Castlenau Instruments Ltd., 50, Glentham Road, S.W.13.

VACUUM Cleaners.—Rewinders to the trade since 1930. A trial will convince you we are specialists in this class of work.—V.A.C. Ltd., 80, Cranbrook Road, Ilford, Essex. Valentine 3222.

HARTLEPOOLS Machine Shop for any small machinery castings in iron, orders of 50 thousand to one million wanted. Enquiries to—T. Moore, 61, Crathorne Crescent, Middlesbrough.

ARMATURE Winding: Vacuum Cleaners, etc., single or quantities.—Vac, 80, Cranbrook Road, Ilford.

FOR REWINDING ELECTRIC MOTORS. Fractional, up to 100 h.p. Transformers, Chokes, etc., contact Electrical Construction Company, Ltd., Seymour Wharf, Totnes, Devon. 'Phone: 3282.

VACUUM CLEANER REWINDING SERVICE, commutators and Bearings. Prompt delivery and full guarantee.—Thomas Anderson, 117, Bowes Street, Blyth, Northumberland. 'Phone: Blyth 405.

WORK WANTED

BUSINESS OPPORTUNITIES

MISCELLANEOUS

AGENCIES

PATENT AGENTS

AUCTIONEERS AND VALUERS

THE
ELECTRICIAN
ESTABLISHED 1861

Bouverie House - 154 Fleet Street - London EC 4

Telegrams: "BENBROTRIC FLEET LONDON" *Telephone*: CENTRAL 3212 (*12 lines*)

Editor: STANLEY G. RATTEE, A.M.I.E.E. *Publisher and Manager*: JOHN VESTEY

Number 3579 3 JANUARY 1947 *Vol* CXXXVIII *No* 1

CONTENTS

MIDLANDS OFFICE:
Daimler House, Paradise Street, Birmingham
Telephone: Midlands 0784—5

GLASGOW OFFICE:
116, Hope Street, Glasgow, C.2
Telephone: Central 3970

The offices of THE ELECTRICIAN *are closed on Saturdays in accordance with the "Five-day Week" plan adopted by Benn Brothers, Ltd.*

SINGLE COPY (FRIDAY) - - - 6d
ANNUAL SUBSCRIPTION
HOME AND OVERSEAS - - - 30s

Factory Survey

THE productive capacity of the country has been operating for so long under restriction where factory maintenance is concerned, that the deterioration which has set in since 1939 has in many cases influenced output to a marked degree. To-day, when industry is reverting to peace-time production in conditions which should be fast improving and incorporating the lessons which the war taught us with respect to increased lighting efficiencies, materials handling and so on, what do we find? The Chief Inspector of Factories points out in his report for 1945—the year when industry abandoned its battledress and black-out—that at that time the need was for a general spring clean, and though a full year has passed since the period reviewed, conditions are, we submit, much the same as they were, due to the difficulty of obtaining materials and labour against the housing and export drives.

The observation of the Chief Inspector that our workshops are, in many cases, in need of a clean-up will be endorsed by most. Before any substantial progress in the right direction can be made, however, the dead hand of control will require to be lifted, and the priority machine operated with more regard to the fact that before the goods we need can be made in adequate numbers, the factories must themselves be put in order so that the present flow of manufactured products may be increased to a volume more related to the demand.

The circumstances which brought about the drab conditions of to-day were created by official direction, and while such direction continues to deny industry the first essential of making good the lee-way lost, the output of our productive capacity will remain at a volume inadequate for the country's needs. More machine tools for home consumption, wider electrification of our works, better lighting conditions for industrial operatives are the accepted means of increasing the output per man hour without undue strain upon labour, and the sooner the electrical industry is permitted to give more attention to such matters, the quicker will be the flow of goods to meet the demand; the more rapid will be our return to peace-time industrial conditions; and greater will be the overall willingness to work.

The People's Choice

ANY attempt on the part of the Ministry of Fuel to divide the domestic load equally between gas and electricity is likely to meet with little success if the public have any say in the matter, in that the evidence favouring electricity for domestic purposes is overwhelming. At Portsmouth, for instance, a survey taken from ten per cent. of the total list of applicants for council houses showed that 70 per cent., or 466 tenants, preferred electricity for both cooking and washing, and 16.7 per cent., or 111 tenants, preferred other fuels. Of the remainder, 11.9 per cent. preferred electricity for cooking or washing alone and 1.4 per cent. showed no preference. Such popularity has been in evidence for some time and coupled with it is the tenants' own testimony of the low operational cost attaching to the all-electric idea. At Bangor, for example, 50 prefabricated all-electric bungalows are being run at an average cost of 3s. 6½d. per week, 100 temporary all-electric houses at Crewe, 2s. 6d. per week, while 19 similar houses at Ulverston cost on average for current consumed 3s. 8d. per week. Enthusiasm for electrical facilities also comes from West India House, Stepney, London, with its 31 flats wired for all services, from Islington and from many provincial towns. How the Ministry of Fuel will attain its stated desire to balance the domestic load while still permitting freedom of choice is beyond our conception, and if the public have their way it will be impossible of attainment.

The Coal Danger

THE transfer of the coal mines to national ownership coincides with the greatest chaos in the history of that industry, and how great are the dangers was made clear at the conference at Manchester on Monday. Many manufacturers are so low in coal stocks that they cannot plan for more than a few days ahead; electricity supply authorities are in some cases advocating an increase in the cut laid down in S.R. and O. 2 087; others are suggesting heavy reductions in street and shop lighting. With the constant threat of fog or snow to interfere with transport services and the aggravation of poor quality and unsuitable fuels to add to the difficulties, the outlook is bleak and can only be made otherwise by a better appreciation of the position by the Ministers who direct our affairs. There has for months been too much beating of the air, too much official denial of the truth which industry has seen fit to tell, and the time is long overdue for the authorities to talk less of shortened working hours in the coal mines and more of the ways and means of providing the additional man-power needed. Above all, there must be more coal now, and for all time henceforth.

Overseas Trade

THE value of exports of United Kingdom goods in November last, amounted to £92.1 million, which exceeded the October total by £1.2 million. Allowing for the rise in prices since 1939, these exports were by volume 17 per cent. greater than in 1938. Imports in November at £124.4 million exceeded the average for the third quarter of 1946 by 14 per cent. and were the highest, both in volume and value since the end of the war. As pointed out in last week's issue, a contributory factor of the increased export total was the effort of the electrical industry, which was responsible for a record sum for the month of more than four times the figure for the same month of 1945 and over three times the monthly average of 1938. Electrical imports for November were valued at £231 316, compared with £121 136 in 1945 and £324 016 for

the monthly average of 1938. These figures show that the balance of electrical exports over imports for the month was £5 795 317. So far as exports by volume are concerned shipments of electrical machinery amounted to 5 224 tons, as against 4 893 tons in October, an increase which will have had an appreciable effect upon the general export total.

Electrical Exports' Upward Trend

THE upward trend in the value of electrical exports as outlined above, reached, in November, the record sum of £6 026 633 and for the eleven months the total was £47 617 279, compared with £24 372 967 for the corresponding period of 1945 and £29 955 278 for eleven-twelfths of 1938. The Union of South Africa and British India were among our best customers in November and large purchases were also made by Australia, New Zealand, and other British countries. Substantial shipments went to the Argentine, and among other foreign buyers the Soviet Union, who had not figured so prominently in the Board of Trade returns since the war, is shown as having accepted during the month, electrical goods and apparatus to the value of £169 212, generators worth £254 293 and other electrical machinery valued at £311 270. This is encouraging evidence of the part that the industry is playing in the national export drive and since the present rate of progress will no doubt be considerably increased before the inflated post-war demand is satisfied, our goodwill in world trade should be even better established before the sellers' market becomes less open.

A B.I.F. Opportunity

A PANEL of architects has been set up by the Board of Trade to co-ordinate general layout and prepare stand designs in the London Section of the B.I.F. to be held at Olympia and Earls Court next May, and an opportunity is thus presented for the promoters to stage an exhibition with appointments really worthy of British industry. Too long has the B.I.F. borne the appearance of a hurriedly thought out display so far as surroundings are concerned, and one has only to recall the austere premises at Castle Bromwich to realise how great could be the improvements. With modern lighting technique brought to bear upon the general lay-out of both the London and Birmingham Sections, the B.I.F. could be made as outstanding in its atmosphere as were the pre-war Continental fairs, and as welcoming in its appearance as the Ideal Home and Radiolympia once were.

Well Deserved Criticism

THE Birmingham Section will also need improvement in the arrangements for official luncheons, for the conditions pre-war were far from impressive. Assembled under a network of roof-supporting girders, visitors were cramped, often cold, and expected to adapt themselves to a level of artificial lighting totally inadequate for the occasion. Whether the shortcomings of pre-war fairs can be laid at the feet of an architects' panel, we do not know, but since the Board of Trade have announced that the layout of this year's fair is to be the responsibility of such a body, it is hoped that the electrical industry will be consulted in matters which directly concern it, and in sufficient time for any recommendations to be put into effect. A modern fair should be modern in its appointments and in keeping with the latest developments of the manufacturers supporting it; a modern fair should reflect in its surroundings, and apart from the items on exhibitors' stands, the comfort, convenience and warmth that electricity offers. The coke braziers which cluttered the aisles at the Birmingham fair pre-war should never again be permitted to provoke the criticism they so well deserved.

New Year Honours

THE electrical industry figured in the New Year Honours List, published on Wednesday, to an extent unusually low. This, no doubt, is due to the credit paid to its personnel during the war years, when so many of its achievements received recognition by the award of honours to many of its leaders. Any disappointment, however, will be alleviated by the naming in the List of such well known personalities as are recorded on p. 16. To all these gentlemen, readers will join us in extending hearty congratulations.

Allocation of Coal

Conference in N.W. Region—Manufacturers' Fears

AN emergency meeting on Monday of the North-Western Regional Board for Industry, after considering the critical situation caused by the coal shortage, decided unanimously that no advantage could be secured by spasmodic and temporary cuts applied to sections of industry, and that a general reduction of consumption should be imposed nationally in such a way as to cause the least injury to the industrial economy of the nation.

The board is to urge the Ministry of Fuel and Power to consult employers' organisations and trade unions with a view to allocating overall production of coal " in the percentages the Ministry considers appropriate to each industry or trade or factory," on the understanding that such reduced allocations can be fully met.

A DRASTIC SUGGESTION

The chairman, Mr. George Gibson, said the board considered it essential that industry should know exactly what coal supplies it would get in the future. Percentage cuts had been made hitherto, but even the reduced allocation had not been met. It would be better for an industry to suffer, say, a 30 per cent. cut in coal allocation and be assured of fuel and regular deliveries at the reduced amount than be nominally cut by 5 per cent. and yet receive spasmodically only 70 per cent. of the allocation. With the situation as it was coal production could not meet the range of cuts proposed in S. R. & O. 2087; details of which were given in THE ELECTRICIAN last week.

The board also considered that a 50 per cent. cut for street and shop lighting should be applied nationally and that early consideration should be given to arrangements for stocking up during the summer months to meet the situation next winter.

While the acute crisis existed the board had arranged for the fuel allocation committee to meet daily to allocate available supplies to those users whose needs were imperative. Cuts would be imposed according to a list of priorities, but the scarcity of coal was such that even some of the " reasonably priority trades " would find themselves short. Efforts were being made to keep electricity undertakings supplied, but their reserves were low. The loss of coal production over Christmas had accentuated the immediate problem.

Manufacturers are becoming increasingly anxious over the possibility of reduced fuel supplies, especially if hard weather sets in.

Among the bigger concerns, the fuel position naturally varies but, it is reported, that at the G.E.C. works at Witton, where some 10 000 workers resumed on Monday, the situation is somewhat anxious, as the company allowed 500 tons of coal to be transferred to the I.C.I. works in order to help them out of a greater difficulty.

It is also reported that because of the shortage of steel the factory of Hoover Ltd., at Cambuslang, Glasgow, is being closed to-day, Friday, and tomorrow, Saturday. The factory is mainly engaged on the production of fractional horse-power motors.

Concern has also been expressed at the coal situation prevailing at the Hayes works of E.M.I., Ltd., where some 10 000 people are employed.

With coal stocks at Belfast power station reduced to less than two weeks' supply, Belfast Electricity Committee appointed on Monday a deputation to interview the Northern Ireland Minister of Commerce on the position. Mr. W. J. Girvan, city electrical engineer, has asked the Police Commissioner whether he will approve a cut in street lighting.

The Ministry of Fuel stated on Tuesday that a striking feature of Christmas week was the heavy consumption of coal for electricity, in spite of the reduction in industrial demand. In the week ended December 28, 596 000 tons of coal were consumed in electrical generation—an increase of 38.3 per cent. over the consumption in Christmas week, 1945. The rise is specially significant as indicating the very great expansion in domestic demand.

Sheffield Peak Demand

WE are informed by Mr. John R. Struthers, general manager and engineer, Sheffield electricity department, that on December 17, the maximum load on the generating stations was 272 800 kW, the units generated for the day being 4 914 600. The estimated units sold to consumers were 3 553 000 and units exported to the grid were 878 100. The grid export maximum demand for the day was 52 600 kW. These figures were surpassed on December 21, when the maximum load was 274 900 kW, units generated being 4 951 600. Of these, an estimated 3 501 000 units were sold to consumers and 967 500 exported to the grid. The grid export maximum demand was 60 100 kW.

THREE-DIMENSIONAL LIGHTING

by FRANCIS G. W. TREE, A.M.I.E.E.

ALTHOUGH it is axiomatic that the usual purpose of lighting is to provide a medium by which one can see, in practice it often falls short of what is necessary for proper visibility. Artificial lighting is usually designed on a basis of plane illumination, even though various specific needs indicate third-dimensional requirements. In the illumination of display posters, building exteriors and interiors, where the light is required mainly on a specific plane or given level, the primary consideration concerns superficial area. In most other applications, however, attention must be paid to the problem of illumination throughout cubic area.

The consequence of an extreme form of plane illumination is apparent from a consideration of lighting as it exists in many streets. Fig. 1 gives an impression of the silhouette effect which results from a beam of light with rays impinging from behind the person. However good such light may be on a given horizontal plane, its effects at certain angles are those of extreme contrast. Instead of being seen in natural form, persons and objects are portrayed as animated phantoms or shadows.

The illusion of depth can be increased in painted scenery with suitable lighting, without causing untoward distortion or shadow. But, when certain lighting is directed on three-dimensional objects, the avoidance of unnatural effects calls for more than plane illumination. Fig. 2 is intended to show a cube subjected to overhead lighting from a single source. This provides adequate horizontal plane illumination, but conceals in dense shadows the sides of the cube. Such lighting, applied to streets, may be the cause of persons colliding with unseen objects and sidestepping those which do not exist. As a variation of overhead lighting, Fig. 3 illustrates a cube lighted from three directions, and giving the illusion of a box suspended in black space. In this instance, the object is revealed in more or less cube-like form, but it lacks the appearance of depth and natural shape. In these and other ways, persons and objects exist under a cascade of artificial

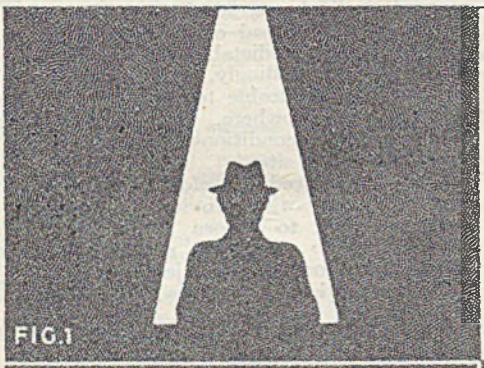


FIG. 1

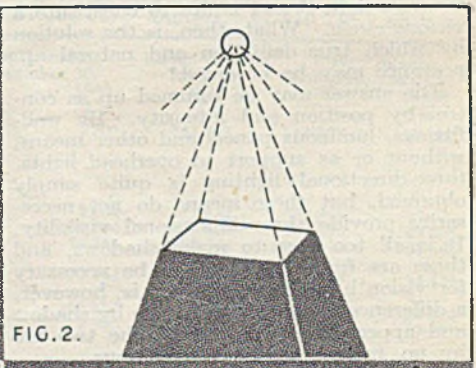


FIG. 2.

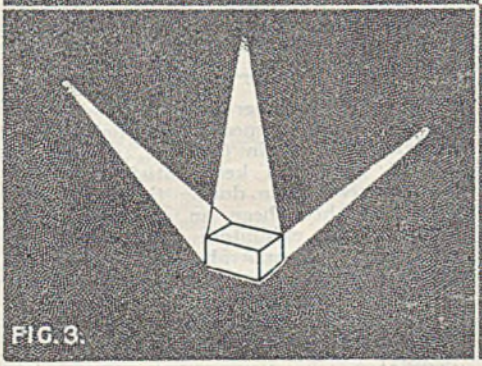


FIG. 3.

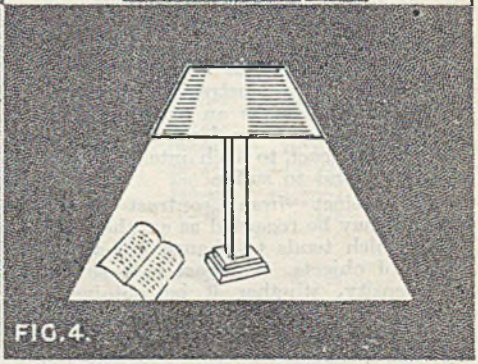


FIG. 4.

light, solely because the æsthetic need is made secondary to purely optical considerations.

These effects of distortion and contrast can be lessened, in many cases, by reflected light, but the low reflection factor of surrounding premises will not permit compensation for faulty light control. If lighting of the kind shown in the first three figures is compared with that from a clear northern sky, it is apparent that overhead lighting of these elementary types has many defects. In fact, the relative closeness of earthbound objects to points of high-intensity artificial light makes it impossible to reveal them in their natural form, unless the light is correctly directed and distributed in more than one direction.

A VICIOUS CIRCLE

By providing an extensive distribution of light, indirect lighting is, in this respect, superior to direct light. This in itself, however, does not provide a solution to the major problem. A multiplicity of light sources, in fact, not only fails to meet the requirements, but may add to the false impressions given by faulty lighting. It is, unfortunately, common to make use of wall or other low mounted lights, when main overhead sources are inadequate. This, surely, is a case of " getting a light to see a light " and is apt to constitute a vicious circle. What, then, is the solution by which true definition and natural appearance may be obtained?

The answer may be summed up as control by position and intensity. By wall-fittings, luminous panels and other means, without or as support to overhead lights, three-directional lighting is quite simply obtained, but these means do not necessarily provide three-dimensional visibility. It is all too easy to make shadows, and these are frequently held to be necessary for vision by contrast. There is, however, a difference between appearance by shadow and appearance by contrast; the two are by no means identical conditions.

As an example, a table lamp standing on a horizontal surface is shown in Fig. 4, it being assumed that no other source of light exists. An illustration like this is even to-day given as an example of good local lighting, yet, so long as the eye is required to react to such intense contrast, sight is bound to suffer.

As distinct from contrast as such, shadow may be regarded as another dimension, which tends to change the apparent shape of objects. Contrast is a condition of intensity, whether it be obtained by colours or otherwise: shadow, on the other hand, is a resultant of angle and light obstruction. Proper contrast, therefore, can provide a three-dimensional appearance without altering form and definition. Contrast, like shadow, is directly proportional to the light power in a given direction and inversely so to the power of surrounding light. The difference is that shadow, being governed by incident light, is detached and cast, whereas pure contrast is " attached " to the object concerned.

Well planned theatrical stage lighting provides an illustration of this difference between shadow and contrast, and emphasises the importance of giving depth in lighting. In normal rooms, the relative closeness of the light source and objects restricts the shadows to minor proportions, but on stages of average size, shadows assume a great importance and are generally unwanted.

Wrongly arranged lighting may make an entire stage appear either as flat as a white-washed wall or as shadowy as a forest. Thus, the primary lessons indicated by good stage lighting may be equally applied in other respects. There must be symmetry in distribution, but not essentially uniformity in intensity. Distribution should enable light to contact all parts within a given space, and the intensity at each point should be such as to define the nature of the part concerned. Such an ideal is, admittedly, more easily attained on the stage, where conditions are predictable and lighting can be arranged accordingly, but the underlying principle is applicable to homes, factories, streets and elsewhere, even though the more variable conditions may necessitate experiment on site.

The major need, therefore, is to arrange the light sources to provide the necessary coverage and to choose their individual intensities to give the requisite three-dimensional form to the objects illuminated. This contention is, perhaps, something of a departure from the rule which requires uniform intensity, but no formulæ can be adequate if they fail to provide lighting which makes the true shape of things readily apparent.

Colonel G. Gardner-McLean, presiding at the ninth annual meeting of the Scottish Building Centre, in Glasgow, on December 24, expressed keen satisfaction with the progress made during the year. Not only had there been an encouraging increase in the exhibitors and exhibits, he said, but there was also a gratifying improvement in the number of visitors, especially during the last three months, while technical inquiries were considerably higher than at any time in the centre's history.

ELECTRICAL OVERSEAS TRADE

VALUE OF NOVEMBER EXPORTS CONSTITUTED A NEW RECORD

DURING November the value of electrical exports rose to the record sum of £6 026 633, which was more than four times the figure for November, 1945, and over three times the monthly average of 1938. The total for October was £5 624 099. The balance of exports over imports for November was £5 795 317. The aggregate weight of electrical machinery shipped was 5 688 tons, as against a monthly average of 3 790 in 1938; wireless sets numbered 47 699, compared with 1 215 in November, 1945, and a monthly average of 7 053 in 1938, whilst valves numbered 522 067, contrasted with 56 094 in November, 1945, and a monthly average of 183 826 in 1938. The value of wireless apparatus sent overseas was £970 805, the comparative figures for 1945 and 1938 being £75 997 and £149 593, respectively; and the figures for telegraph and telephone apparatus were £541 581 (November), £191 097 and £242 716, respectively. Electric light bulbs numbered 2 463 410, value £100 296, in November, as against 1 482 496, value £60 218, in November, 1945, and 1 638 099, value £49 440, the monthly average in 1938. The number of portable accumulators accepted by overseas buyers rose from 17 822, value £32 487, in November, 1945, to 54 441, value £127 552, in November last, and house service meters from 4 371, value £8 651, in November, 1945, to 23 443, value £63 897, last November. In 1938 the monthly average was 13 778 meters, value £15 791. The value of submarine cables shipped rose from £14 134 in November, 1945, to £133 277 in November last; other telegraph and telephone wires and cables from £78 804 to £203 118; rubber insulated electric wires and cables from £61 001 to £312 019; and with insulation other than rubber, from £110 698 to £351 462.

For the eleven months ended November 30 the total value of electrical exports was £47 617 279, and of imports £681 667, showing a credit balance of £46 935 612. Over the comparative period of 1945 the exports were valued at £24 372 967, and the imports £21 630 491, leaving a balance of £2 742 476. Other comparative values for the eleven months are shown as follows: Electrical goods and apparatus, £34 008 548, as against £12 165 101 in 1945; generators, £3 486 578, against £1 336 097; motors, £2 510 748, against

Imports	Monthly average 1938	Month ended November 30 1945	Month ended November 30 1946	Eleven-twelfths of year 1938	Eleven months ended November 30 1945	Eleven months ended November 30 1946
	£	£	£	£	£	£
Electric wires and cables, insulated	31 246	51	3 209	343 703	1 113 887	22 580
Wireless apparatus—						
Receiving sets and receiver chassis, complete, other than radio-gramophones, excluding valves	10 148	8 483	5 661	111 623	323 955	97 02
Valves, complete	10 893	3 705	54 084	119 820	823 258	145 985
All other descriptions	54 119	19 211	94 261	595 304	11 054 647	4 057 651
Telegraph and telephone apparatus, other than wireless	9 243	5 366	2 152	101 678	731 963	34 524
Carbons, electric, complete—						
Furnace	4 054	2 722	12 812	44 594	7 474	26 834
Other electric carbons	2 301	16 372	2 915	25 311	118 140	67 577
Electric lighting appliances, accessories and fittings, and parts thereof, not elsewhere specified—						
Bulbs, complete, ready for use...	10 265	32	490	112 910	188 967	7 406
All other descriptions	38 662	274	1 976	425 287	253 330	13 735
Batteries, primary (complete, and parts other than carbons) ...	3 549	1 426	1 983	39 042	266 841	6 710
Electrical instruments (other than telegraphic or telephonic) ...	32 057	1 771	11 876	352 630	228 895	78 145
X-ray apparatus and vacuum tubes	9 734	7 760	11 298	107 077	310 601	155 749
Total of all other articles	42 630	35 038	11 783	468 927	3 174 432	129 723
Motors	26 033	3 893	3 069	286 366	107 150	56 937
All other electrical machinery ...	14 455	349	4 025	159 005	2 492 724	44 640
Vacuum cleaners, complete ...	7 519	44	50	82 706	178	1 018
Other portable mechanical appliances, electrically operated, not elsewhere specified, including parts	17 108	1 027	1 308	188 183	82 584	22 880
Welding machinery, (including welding electrodes), other than tube making	—	13 612	7 364	—	351 465	112 543
Total	324 016	121 136	231 316	3 564 165	21 630 491	681 667

£1 415 371; other electrical machinery, £5 478 259, against £6 838 404; vacuum cleaners, £879 328, against £48 691; other portable mechanical appliances electrically operated, £430 696, against £57 575; and welding machinery, £823 122, against £511 728. Wireless receiving sets increased in number from 11 781 in eleven-twelfths of 1945 to 309 911 in the eleven months of 1946, and valves from 1 661 279 to 4 251 679. Transmitting apparatus increased in value from £346 674 to £924 755. Electric lamps shipped rose in number from 17 457 424 to 32 001 183, accumulators from 225 710 to 613 148, house service meters from 48 566 to 200 163, generators from 4 424 tons to 11 873 tons, motors from 6 197 tons to 10 221 tons, and vacuum cleaners from 63 tons to 1 133 tons.

The tabulated figures given herewith show the relative values of the imports and exports for November and for the eleven months of the year contrasted with comparative periods of 1945 and 1938.

Exports	Monthly average 1938 £	Month ended November 30 1945 £	Month ended November 30 1946 £	Eleven-twelfths of year 1938 £	Eleven months ended November 30 1945 £	Eleven months ended November 30 1946 £
Submarine telegraph and telephone wires and cables	17 289	14 134	133 277	190 184	338 351	678 733
Other than submarine	71 803	78 804	203 118	789 835	938 169	2 514 690
Rubber insulated electric wires and cables	117 533	61 001	312 019	1 292 871	1 381 385	2 631 896
Insulation other than rubber	153 256	110 698	351 462	1 685 821	1 286 649	4 127 319
Wireless apparatus	149 593	75 997	970 805	1 645 524	1 637 159	6 424 071
Of which—						
Receiving sets and receiver chassis, complete, other than radio-gramophones, excluding valves	36 755	12 950	477 407	404 310	127 857	2 947 109
Transmitting apparatus, excluding valves	28 296	15 743	129 222	311 262	346 674	924 755
Valves, complete	41 272	18 476	258 706	453 998	716 007	1 400 331
Telegraph and telephone apparatus, other than wireless	242 716	191 097	541 581	2 669 881	2 230 041	4 674 452
Electric lighting appliances, accessories and fittings, and parts thereof, not elsewhere specified—						
Bulbs, complete, ready for use	49,440	60 218	100 296	543,843	744 942	1 194 339
All other descriptions	48 565	68 259	221 635	534 218	467 341	1 869 152
Batteries, and/or cells, primary, complete	13 572	22 059	63 468	149 290	151 338	506 926
Accumulators—						
Portable (including accumulators for motor vehicles)	28 874	32 487	127 552	317 611	351 847	1 234 912
Stationary	19 773	1 722	13 953	217 500	30 420	150 775
Parts and accessories	—	16 291	54 087	—	165 347	513 744
Electrical cooking and heating apparatus (including industrial)	30 664	15 978	156 578	337 301	216 760	1 131 658
Electrical instruments (other than telegraphic and telephonic)—						
Commercial (including ammeters, volt-meters, &c., and parts thereof)	15 878	13 896	111 270	174 658	280 300	580 723
House service meters, complete	15 791	8 651	63 897	173 704	106 017	476 573
All other descriptions	9 612	10 028	67 342	105 738	108 062	449 850
X-ray apparatus and vacuum tubes and parts thereof	4 881	14 044	83 521	53 691	144 815	660 148
Insulating materials, not elsewhere specified	19 343	19 715	132 652	212 779	292 531	1 125 534
Generators	157 150	105 865	529 937	1 728 655	1 336 097	3 486 578
Motors	145 045	72 089	278 380	1 595 498	1 415 371	2 510 748
Converting machinery	101 304	119	11 119	1 114 350	11 345	129 922
Transformers for lighting, heating and power, including coils		66 035	165 888		1 140 253	1 811 978
Rectifiers for power-house use	3 463	1 673	14 974	38 096	51 698	105 246
Starting and controlling gear for electric motors	50 866	24 078	178 856	559 526	339 973	846 226
Switch gear and switchboards (other than telegraph and telephone)	184 533	80 727	405 559	2 029 869	1 941 633	2 380 108
Electrical machinery, not elsewhere specified	15 497	5 575	13 573	170 464	3 353 502	204 779
Vacuum cleaners and parts	26 662	13 942	164 716	293 279	48 691	879 328
All other portable mechanical appliances, electrically operated, not elsewhere specified, including parts thereof	10 394	12 094	63 257	114 337	57 575	430 696
Welding machinery, other than tube making machinery and welding electrodes	—	63 509	108 686	—	511 728	823 122
Total	1 814 114	1 336 203	6 026 633	29 955 278	24 372 967	47 617 279

Correspondence

The Editor welcomes the free expression in these columns of genuine opinions on matters of public interest, although he disclaims responsibility alike for the opinions themselves and the manner of their expression

Leblanc Advancer

[To the Editor.]

Sir,—With regard to the "Answers to Technical Questions," in The Electrician of December 13, 1946, I was surprised that E. O. T. did not include simple

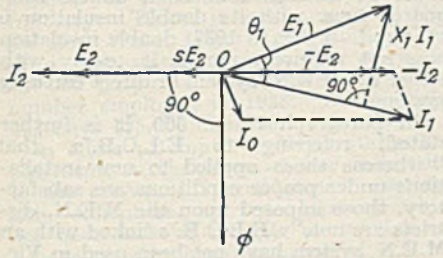


Fig. 1

I_2 = rotor load curren E_2 = standstill rotor e.m.f., S = fractional slip, ϕ = flux cutting rotor, I_0 = stator light running current, θ_1 = stator power-factor angle, I_2 = stator current on load, X_1 = stator reactance. E_1 = supply voltage to stator. *Note*: $SE_2 = R_2I_2$ = actual internal rotor voltage.

vector diagrams. His explanation of the behaviour of the Leblanc advancer as reactance (neglecting the small effect of resistance), with a maximum value at standstill, diminishing to zero at a speed corresponding to that of the rotating field, and becoming negative (that is, of the nature of capacitance), at hypersynchronous speeds, is, of course, quite true and qualitatively satisfactory.

The vector diagram, is however, particularly useful and necessary to students and holds good for the commercial power-factor-compensated induction motor. It also helps in deciding the necessary size of the advancer for use with a particular motor and can also be readily adapted to explain the operation of the variable speed commutator motor such as the Schrage type—after correcting for the phase shift of the brush voltage due to the different relative brush position in this machine as compared with the power-factor-compensated motor.

Neglecting rotor reactance under running conditions and also the comparatively small stator resistance, the simple vector diagram for the ordinary induction motor with a 1:1 ratio is as Fig. 1.

The rotor output is E_2 (1—S) × I_2 since the rotor power factor is unity.

Considering the Leblanc advancer at the moment when the A section (Fig. 2) has maximum current, it will be seen that the flux set up is in the position shown, so with clockwise rotations of flux and advancer, and with the advancer speed greater than that of the flux, dynamic e.m.f.s. are generated between brushes at brush current frequency. At this moment, the right-hand rule shows this e.m.f. to have negative and positive maxima at P and Q respectively (Fig. 3).

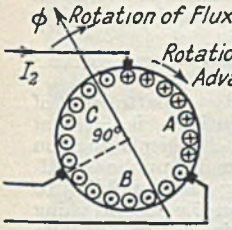


Fig. 2

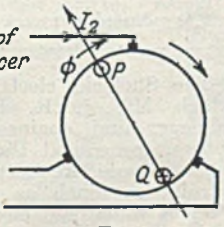


Fig. 3

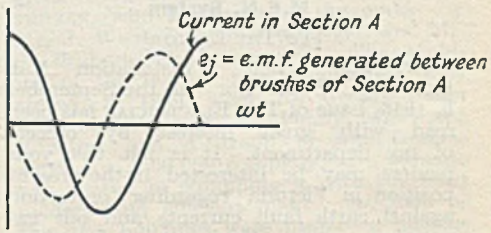


Fig. 4

Section A of the advancer will receive its maximum negative e.m.f., 90 electrical degrees later and reference to Fig. 4 shows that this e.m.f. *leads* 90° on the current in the section.

Thus the induction motor rotor must now have a component to supply R_2I_2 and also a component $-E_j$ to neutralise the

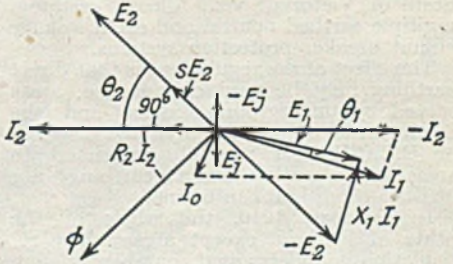


Fig. 5

effect of E_j. The simple diagram for an induction motor with Leblanc advancer now becomes

θ_2 is now very small and can be made zero, the internal rotor e.m.f. SE_2 is now $\sqrt{(R_2I_2)^2 + E_j^2}$, the rotor output $= E_2(1-S) \times I_2 \times \cos\theta_2$ and the size of the advancer will be $\frac{E_2 \times I_2}{1\,000}$ kVA. It should be remembered that for the same mechanical torque output as in the case of simple motor in Fig. 1, the current I_2 and the slip will be larger in the compensated motor.

Yours faithfully,
J. F. YATES, M.Sc., M.I.E.E.,
Head of Electrical Engineering Dept.
Royal Technical College, Salford.

M.E.N. System

[To THE EDITOR]

Sir,—The article "Installation Matters" by "Supervisor" in the September 6, 1946, issue of THE ELECTRICIAN has been read with great interest by officers of my department. It is felt that your readers may be interested in the present position in Victoria regarding protection against earth fault currents and our experience since the last information apparently obtained by "Supervisor."

While it is true that an M.E.N. system was tried in small areas in this State in 1934, and earth leakage circuit breaker protection was introduced in 1936, regulations which were gazetted in July, 1940, permit, under the appropriate prescribed conditions, three systems of earthing in the State of Victoria, viz., direct earthing, multiple earthed neutral and earth leakage circuit breaker protection systems.

The effect of the regulations is that direct earthing may be used only in a.c. areas served by underground cables and the small areas of d.c. supply, and the use of E.L.C.B.'s is virtually restricted to areas where neither direct earthing nor M.E.N. conditions can be met.

In October, 1940, the whole of the State of Victoria, except areas where reticulation is underground, or where system of supply is d.c., was declared as being an area in which the standard system would be M.E.N. Conversion of existing installations has naturally been held up due to the war, but installations in all new substation areas have been automatically connected to the M.E.N. system since that date.

Dissecting the article in detail it is noted that in paragraph 8, p. 660, mention is made of a "curious" regulation of the State Electricity Commission of Victoria that "prohibits the earthing of conduit on the supply side of the consumer's main switch," as from July 1, 1937. Apparently the reason for this regulation was not made clear to the writer of the article because, except with the use of an E.L.C.B., conduit was and is required to be earthed on the supply side of the consumer's main switch. It will be apparent that, where an E.L.C.B. is installed on the main switchboard, should a fault occur on the supply side of the breaker and the conduit be linked to the earthing system, the opening of the breaker will not remove the fault. Accordingly, the mains conduit must be isolated and as a double safeguard, t.r.s. with its double insulation is required. Prior to 1937, double insulation was not required, nor is it to-day with either the M.E.N. system or direct earthing systems.

In paragraph 11, p. 660, it is further stated, referring to E.L.C.B.'s, that "whereas those applied to new installations under proper conditions are satisfactory, those imposed upon the M.E.N. districts are not." E.L.C.B.'s linked with an M.E.N. system have not been used in Victoria nor, so far as we are aware, in Australia. As mentioned previously, M.E.N. is the preferred system in most of Victoria and only where the stringent conditions set down for an M.E.N. system cannot be met will E.L.C.B.'s be installed. So far, no occasion has arisen in which it has been necessary to instal an E.L.C.B. in an M.E.N. area, but if any are installed in such an area, no earthing connection will be made to the neutral conductor.

Yours faithfully,
W. H. CONNOLLY,
Engineer and Manager
Electricity Supply Department.
State Electricity Commission of Victoria.

[*Further views from Australia on the subject of M.E.N. will be published next week.*—ED.]

The Sheffield electricity department, of which Mr. J. R. Struthers is general manager and engineer, is displaying on 'buses, trams and the main public buildings a poster requesting the public to refrain, as much as possible, from using electric radiators, electric water heaters and other heavy current consuming devices between the hours of 8 a.m. and noon and 3.30 p.m. and 5.30 p.m.; and to be as economical as possible in the use of electric light during those times. Up to the present, it states, complete black-outs in the domestic areas in Sheffield have been avoided by the most generous co-operation of the industrialists who have adjusted their production programmes and also shed load at inconvenience and expense, and of employees of certain works who have adjusted their hours to keep off the heavy load periods.

Cable Making in Wales

Encouraging Employment in the "Special Areas"

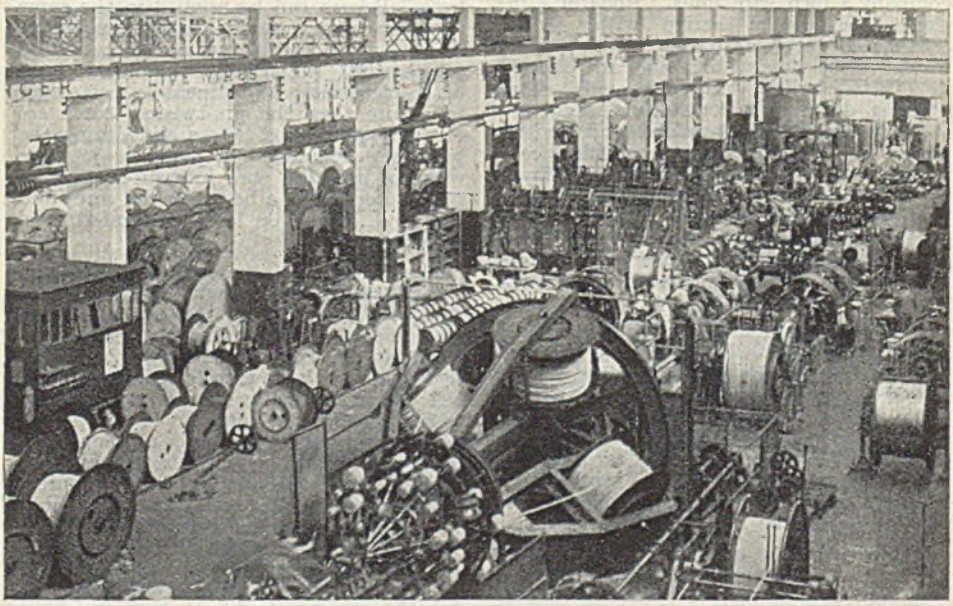
AS the year ended, the future of Welsh industry aroused new interest. The Welsh Industries Fair is now open at the Royal Horticultural Hall, while, in Cardiff, shortly before Christmas, there concluded the first of the quarterly conferences of the new Regional Board for Industry. There, it was announced that the new Welsh factory programme aims, as a first stage, at providing work for 157 000 people in Wales in excess of the number employed in 1938. South Wales will have 125 000 of these.

In these attempts to bring stable employment, in the form of new industries, to the pre-war "special areas," considerable difficulties—not the least of which has been lack of suitable accommodation—have already been encountered. A fair number of workers have already left the area since munitions production slowed down, but that the rapid influx of still more new industries into South Wales is a matter of some urgency is shown by the present unemployment figures, which stand, for the whole of Wales, at 56 000. A year's effort has, however, created jobs for 37 000 men and 22 000 women displaced from the war industries in South Wales alone.

This tendency to chronic unemployment in Wales is, of course, no new phenomenom, and in 1936, in pre-planning days, it had already been tackled by a number of industrialists. One of the largest and most successful of the early efforts to take work into the Welsh valleys was made by Aberdare Cables, Ltd., whose factory, on December 21, was visited by the First Lord of the Admiralty, Viscount Hall, who was Member for the constituency for many years, and by local Councillors.

A brief history of the company was given to a representative of THE ELECTRICIAN, who accompanied the party, by Mr. J. Wignell, general manager, and Mr. S. Probert, chief engineer. The building of the factory was undertaken, they stated, in 1936, when Sir George Usher (chairman), Mr. F. G. Penny (managing director) and a group of industrialists started a £500 000 company. No expense was spared in equipping it with the most modern and efficient plant. As soon as the first buildings were usable, a nucleus of experts in cable production was introduced, and training of local workers, many of them unfamiliar with factory methods, was begun.

To-day, Mr. Probert said, the products



Interior view of part of the Aberdare cable works

of the company were enjoying a high reputation both in this country and abroad. Its present strength and full order book certainly demonstrates the foresight of the essentially private enterprise that committed large amounts of capital in what was generally regarded at the time, as a venture involving some element of risk.

General view of the loading bays

Mr. Probert helped to give an impression of the scope of the factory and the work now being carried out. The main cable building is constructed of concrete, steel and glass and measures 450 ft. by 225 ft., with concrete roads surrounding it and railway sidings on two sides. Electricity supply is taken from the local authority at 11 kV, three-phase, through two 1 000 kVA transformers.

The manufacture of wire begins in the company's own wire mills. Rods of ½ in. electrolytic copper arrive with surface coatings of copper oxide, resulting from the previous hot rolling, and are cleaned in a bath of dilute sulphuric acid. After washing down and neutralising, they are then electrically butt-welded and continuously fed into wire-drawing machines containing a series of dies in tandem. From each die, the wire passes around a horizontally mounted drum. These are set accurately in line and each must revolve at a higher speed than the preceeding one to take up the elongation of the drawn wire.

The drums run in a tank filled with a suitable drawing solution, which is also pressure-fed to the die entrances. The last hole, however, draws dry on to the block. The heavy-wire machines, which are designed for a different reduction on each die, employ dies of a hard metal. The finer machines, which work with constant reduction values, employ commercial diamonds.

Work-hardening and annealing is now necessary to improve the electrical conductivity of the copper. This is carried out with a " dry annealing " plant, where the wire is treated in a thermostatically controlled electric furnace in conjunction with plant producing a dry and inert gas for the sealed chamber containing the wire. Nitrogen is used for this, obtained from cracking down ammonia, and no discolouration of the wire during the heating process occurs. The process of wire winding consists of winding the coils of annealed wire on the stranding machine bobbins by a semi-automatic process.

Machines are available capable of stranding any number of wires from 3 to 127, and the larger machines are fitted with pre-twisting devices. With the larger types, the bobbins of wire are carried in revolving carriages so that they rotate about the axis and lay the wires around the central core-wire. In the smaller machines, however, the bobbins are suspended along the inside of a revolving steel cyclinder. The wire from one bobbin runs through the centre of the cylinder, while the wires from the others run to its periphery and are thus twisted around the centre wire by the rotation of the cylinder.

INSULATION PROCESSES

The next stage is insulating. The taping machines are fitted with from 16 to 72 heads of the tangential and variable speed type. Papers can be applied in the same direction or reversed in regular sequence. The insulated conductors are next twisted together in " laying-up machines," fitted with micrometer adjustment to each flyer to ensure that the pre-twisted cores are correctly positioned before and during the process. Paddings of paper or jute are wormed into the core interstices, further papers applied as a belt over the cores and the cable wound on large perforated steel cylinders.

The belted cable is next put into preheating ovens and brought up to temperature (slightly over 100° C.) and the moisture liberated during this process is continuously driven from the oven interiors. The cables are next transferred to centrally and circumferentially heated impregnating vessels, where a battery of vacuum pumps maintains a very high degree of vacuum to remove the last traces of moisture and air. At the end of this vacuum period, impregnating compound is admitted. For both h.t. and l.t. cables, impregnation is carried out at a pressure of 80 lb. sq. in. The impregnating compound itself, for which the main base is pure petroleum oil and refined gum resin, is blended and passed

through filtering, dehydrating and degasifying plant prior to the impregnation chambers.

After impregnation, the cables are ready for the application of the lead sheathing. Presses are installed capable of covering cables up to 4 in. diameter. The die boxes are electrically heated and thermostatically controlled. The "twin pot" method is used to ensure that the press cylinders are fed only with uncontaminated lead, which is obtained by first melting the lead in an open pot where all the dross rises to the top, and can be readily removed. From near the bottom of this pot, a pipe conveys the uncontaminated lead to a second and lower pot, which is sealed to prevent oxidation, and where the temperature is controlled. Lead is fed as required to the presses from the second pot only, to ensure that the resulting sheath shall be free from impurities.

Finally, the cable goes through an armouring machine. Bitumen compound is applied to the sheath and over each layer of the beddings, armouring and serving, and the completed cable is finally whitewashed overall. The beddings usually consist of two bitumenised papers and a layer of bitumenised jute yarn, although two layers of such yarn in reverse directions can be applied if desired. Next follows the armouring, of either two layers of steel tape, or one or two layers of galvanised steel wires, and overall are applied servings of one or two layers of bitumenised jute yarn or two layers of bitumenised hessian tape.

For unarmoured cables, lead alloy is usually substituted for the pure lead sheath, and the servings consist of two papers, one close-woven cotton tape and hessian tape, all bitumenised and coated with bitumen compound over each layer.

LABORATORY AND OTHER TESTS

Rigid laboratory tests are given to all cables before they leave the works. The electrical tests, which are made after sheathing and again in the final stages, cover high voltage, inductive capacity and insulation- and conductor-resistance tests. The type tests, made on representative cables, include bending and breakdown tests, power-factor measurements and ionisation values. For cables above 11 kV, the power factor and ionisation tests are included with the routine tests on all cables.

At the conclusion of the visit, Mr. Probert said that developments planned for the near future included new equipment and buildings for an increased output of 11 kV and 33 kV cables, and also the manufacture of lighter types of control and similar cables. It is also intended to widen the range of the firm's products to include manufactured articles not necessarily connected with cable making. Some of these plans, however, are at present delayed by the difficulty in finding accommodation, locally, for the necessary supervisory staff.

The visitors, in the course of their tour, saw some of the new machinery being installed for light cable production, and also the proposed sites of the forthcoming extensions to the main building. Another important aspect of the work of the factory which was also pointed out was the manufacture of switchgear casings and precision components for the allied company, South Wales Switchgear, Ltd.

The Electric Idea

RESULTS of a survey carried out in Portsmouth, among 10 per cent. of the total list of applicants for council housing, show a strong preference for domestic electric services. The figures, now published by the E.D.A., are based on 665 replies received from 1 000 inquiries sent out. A total of 466 tenants, or 70 per cent., preferred electricity for both cooking and washing, while 5.3 per cent. and 6.6 per cent. had a preference for either electric cooking or washing, respectively. Only 111 of those replying chose other fuels for both cooking and washing, a percentage of 16.7, while 1.4 per cent. expressed no preference. This gives a majority of 81.9 per cent., or 546 tenants, desiring some form of electric service in addition to lighting.

Some interesting figures of the average cost of current in new all-electric houses are contained in an E.D.A. report. These range from 2s. 6d. per week, in Crewe, to 3s. 8d. per week, in Ulverston. In the new West India flats at Stepney, the standing charge for electricity is 6d. per week, and the hire charges for appliances are from 1d. per week, for an electric fire or iron, to 1s. 4d. per week for the cooker.

Estimates of costs in Islington, the fixed charge for a family of four people in a four-roomed house being 1s. per week, plus ¾d. per unit for current used, are 4s. 6d. per week, for lighting, ironing, wireless, cleaning and occasional heating, and 8s. 3d. per week for these services with water heating and cooking added. These figures include hire charges for cooker and water heater.

Details are also given of the all-electric kitchens now being fitted in R.A.F. married quarters at nine stations. The standard appliances include electric irons and cookers, while refrigerators and vacuum cleaners are to be added later. The inclusive rent of the quarters is 15s. 6d. per week.

Electrical Personalities

MR. LLEWELYN LEWIS, electrical engineer to the Holyhead U.D.C., has been appointed electrical engineer at Portland in succession to Mr. Ivor G. Evans who, as announced in our issue of November 29, has been appointed electrical engineer at Pontypridd.

MR. L. SATCHWELL, who founded the Rheostatic Co., Ltd., 25 years ago, has resigned his office as managing director, but will continue actively as chairman and advisory technical director. Mr. T. N. Flight and Mr. M. J. Gartside have been appointed joint managing directors; Mr. A. J. H. Stevens recently joined the board as works director.

We are always glad to receive from readers news of their social and business activities for publication in this page. Paragraphs should be as brief as possible.

MR. V. E. FISHER, of Worcester, has been appointed by the Torquay Electricity Committee as assistant district engineer.

MISS C. HASLETT, the E.A.W. director, broadcast on the peak load and the reasons for the electricity cuts in "Woman's Hour" in the Light Programme between 2-3 p.m., on Friday, December 27.

MR. W. N. C. CLINCH, chief engineer and general manager of the Northmet Power Co., has been appointed chairman of the Technical Committee of the London and Home Counties J.E.A.

ALD. H. G. COLEMAN has been nominated for re-election as the representative of the London and Home Counties J.E.A. upon the employers' side of the District Joint Council for the London (No. 10) Area.

SIR EDWARD WILSHAW, late chairman of Cable and Wireless, Ltd., bade farewell to 400 members of the London staff at a gathering in Electra House, Victoria Embankment, on Monday night, before his retirement, on January 1, under the nationalisation Act.

MR. E. S. WADDINGTON, of Philips Industrial (Philips Lamps, Ltd.), has recently been elected a vice-president of the Society of Engineers. He is also chairman of the Organisation Committee of the society, and has been a member of the Council for some years.

MR. F. A. FOX is relinquishing his position as chief metallurgist of Magnesium Elektron, Ltd., and is joining the staff of the British Welding Research Association this month. His main concern will be with the metallurgical work of the association; his title will be that of assistant director of research. Mr. Fox has been engaged in metallurgical research since 1934, in both the ferrous and non-ferrous fields. He has been responsible for many publications, dealing mainly with light alloys.

MR. H. H. PARTINGTON, general manager of a number of electricity supply companies in the Scottish Power Co., Ltd., group, is retiring this month, on reaching the age limit. Mr. J. J. Cargill succeeds him as general manager of the Grampian Electricity Supply Company, and Mr. A. W. Andrews as general manager of the Scottish Central Electric Power Company and Scottish Midlands Electricity Supply Ltd.

COUNC. M. A. BULLOCK, Counc. W. R. Croucher and Ald. Mrs. E. J. Gregory have been recommended for appointment as members of the Finance Committee of the London and Home Counties J.E.A. Other recommended appointments by the Authority are as follows: General Purposes Committee, Counc. J. O'Connor and Mr. F. N. Rendell-Baker; Technical Committee, Mr. C. Parker; Local Distribution Committee, Major H. Richardson.

COLONEL SIR A. STANLEY ANGWIN, late engineer-in-chief of the General Post Office, who became chairman of Cable and Wireless, Ltd., on January 1, when the State operation of the organisation commenced, will, the Postmaster-General announces, continue to handle the work of co-ordinating the interdepartmental preparation for the forthcoming International Conference dealing with the regulation of radio. Sir Stanley Angwin headed the United Kingdom delegation at the Moscow Telecommunications Conference.

MR. A. J. GILL, whose appointment as engineer-in-chief of the General Post Office on the retirement of Colonel Sir A. Stanley Angwin, was announced in our last issue, was born in 1889 at Stoke-Sub-Hamdon, Somerset. He had early engineering experience in the Yarrow ship-building yards and at the British Thomson-Houston Co.'s works at Rugby. In 1913 he entered the Post Office engineering department as assistant engineer by open competition, and was attached to the radio section. Mr. Gill was appointed executive engineer in charge of the radio experimental section at Dollis Hill in 1925, and became an assistant staff engineer in 1929. Three years later he was appointed staff-engineer of the radio branch, and in 1944 he

became deputy engineer-in-chief. Last summer Mr. Gill accompanied Mr. W. A. Burke, M.P., Assistant Postmaster-General, to the U.S.A. and Canada with the object of ascertaining what developments and improvements had taken place in the telecommunications systems there. Mr. Gill is a vice-president and member of the Council of the I.E.E.

MR. BERNARD FISHER, technical assistant to the chief electrical engineer of Tube Investments (Group Services) Ltd., Birmingham, has been appointed power installation engineer in the Sheffield electricity department. Before going to Birmingham, Mr. Fisher was for four years assistant electrical engineer with the Chesterfield Tube Co., Ltd.

MR. J. L. WILLIAMS, chief accountant of the Isle of Wight Electric Light and Power Co., has been appointed assistant accountant of the S.W. and S. Electric Power Co., following the retirement of Mr. E. G. Williams.

MR. T. H. THORNEYCROFT has retired from the board of the Clyde Valley Electrical Power Co. and of its subsidiaries, the Lanarkshire Hydro-Electric Power Co., the Strathclyde Electricity Supply Co., and Clyde Valley Accessories, Ltd.

MR. H. WATSON-JONES, of the Metropolitan-Vickers Electrical Co., Ltd., has been appointed divisional chief electrical and mechanical engineer to the North-Western Divisional Coal Board with effect from January 1. Mr. Watson-Jones was born in 1899 and received his practical training with the Mersey Docks and Harbour Board and later at the Metropolitan-Vickers' Trafford Park works. In the intervening period he saw war service in the Navy and took his engineering degree course at Liverpool University. Subsequently he was employed by Metropolitan-Vickers as installation engineer (chiefly on industrial and power supply equipment), as liaison engineer in the United States, and as senior engineer in the general engineering department, where he was responsible for complete power supply and distribution schemes at home and overseas. In 1937 Mr. Watson-Jones was appointed general manager of the Birtley Co., Ltd., Co. Durham, manufacturing coal preparation and mechanical handling plant, but in 1939 he returned to Metropolitan-Vickers as head of the mining department. In this position, which he now holds, he has dealt with many comprehensive electrification schemes for collieries and mines, and has been responsible for the commercial and technical features of many large electric winder installations in South Africa and Australia as well as in this country. Mr. Watson-Jones has published many technical articles in engineering journals and has read papers, chiefly on colliery electrification, to various engineering institutions.

MR. H. WATSON-JONES

MR. R. G. DEVEY, chief electrical engineer for Lever Bros., Port Sunlight, has retired after 33 years' service with the company. He was responsible for the electrification of many of the premises belonging to associated companies in this country, on the Continent, in the Far East and in South America. He is succeeded as chief engineer by Mr. Evan John Evans, who has been deputy manager of the power department of Imperial Chemical Industries, Ltd., for the last twelve years.

MR. R. WEAVING retired on January 1 from his position of general manager of the British Electric Transformer Co., Ltd. (in association with Crompton Parkinson, Ltd.). He retains his seat on the board and his services will, therefore, still be available in an advisory capacity. Mr. Weaving is succeeded as general manager by Mr. E. T. R. Ball. Mr. Weaving joined Crompton Parkinson, Ltd., at Chelmsford in February, 1928, as transformer engineer, and went to the British Electric Transformer Co., Ltd., as chief engineer early in 1933, later being appointed general manager. He became a director in September, 1939. Mr. E. T. R. Ball joined Crompton Parkinson, Ltd., as a designer in March, 1928, and was transferred to Hayes in 1933 when the merger with Crompton Parkinson, Ltd., took place. He became a production manager in 1939.

MR. H. F. CARPENTER, clerk and manager of the West Midlands J.E.A., formally took over the presidency of the Chartered Institute of Secretaries on Wednesday, and as if to greet him was swinging over the pavement of George Street, alongside the Mansion House, London, the sign and coat-of-arms of the institute—almost the sole survivor of the destruction of the institute's hall and offices during the war. The same sign, swinging in London Wall, was the only cheering feature of the scene of desolation which greeted Mr. Leslie Gamage, the 1941 president, on his taking over on the morning after a memorable attack on the City of London. The crest of the sign is the secretary bird, the stuffed counterpart of which (a much-prized feature of

the hall's furnishings) was destroyed within the offices. The institute has now decided to " adopt " one of the two live secretary birds which recently arrived at the Zoo, and a plaque attached to its cage will in due course record the secretaries' acceptance of responsibility for its upkeep and the association of the secretary bird with the institute's coat-of-arms. Supporting Mr. Carpenter is Mr. C. R. Heathcock, managing director of the Midland Electric Corporation for Power Distribution, Ltd., who simultaneously took office as a new vice-president. One of Mr. Carpenter's first official functions will be to lecture on January 7 schoolboys and others interested in " Secretaryship as a Career " at Central Hall, London, where the Schoolboys' Exhibition is being held.

MR. H. HARRISON, mains engineer with Tynemouth Corporation, has been appointed deputy borough electrical engineer.

MR. A. E. THOMAS, of Walsall, has been appointed consumers' engineer and meter superintendent in the Chesterfield electricity department in succession to Mr. W. J. Jefferson who has taken up the appointment of deputy borough electrical engineer and manager at Leyton.

MR. F. H. BEASANT has been appointed manager of the traction division of Crompton Parkinson, Ltd., Chelmsford, in succession to Mr. H. G. McClean, who is taking up an important appointment in the U.S.A. Mr. Beasant, who has been deputy manager, received his engineering education at the University of Bristol, and was subsequently at Manchester and Sheffield on the staff of the traction department of the Metropolitan-Vickers Electrical Co., Ltd., following his M.V. apprenticeship. In 1936 he was in Warsaw engaged in the electrification of the Polish State Railways on behalf of Metropolitan-Vickers. From 1937 to the outbreak of war he was with the L.N.E.R. as senior technical assistant for electric rolling stock, being mainly concerned with the planning of the rolling stock for the Manchester-Sheffield and Liverpool Street-Shenfield electrification schemes. During part of the war Mr. Beasant was seconded to the Ministry of Supply and was manager (engineering) at the Royal Ordnance Factory, Spennymoor, County Durham. In recent months he has been devoting special attention to the newly developed C.P. Diesel-electric shunting locomotive now undergoing final trials.

Obituary

MR. ANDREW FRASER, suddenly, at Chadworth, Gloucestershire, on December 21, aged 79 years. He was a member of the I.E.E.

MR. THOMAS MORISON, a director of Swan, Hunter and Wigham Richardson, Ltd., and a Fellow of the North-East Coast Institution of Engineers and Shipbuilders, aged 67 years.

MR. ANDREW GORDON, principal of A. Gordon and Co., electrical engineers, Motherwell, on December 24.

MR. HENRY MALCOLM HUBBARD, formerly chairman of the Barcelona Traction, Light and Power Co., and vice-president of the Brazilian Traction, Light and Power Co., aged 80 years. He was on the boards of several other light and power companies.

MR. H. C. GODSMARK, general manager of Newcastle-on-Tyne transport and electricity undertaking since 1941, in Newcastle General Hospital, aged 50 years. He succeeded Mr. T. P. Easton, as manager of the undertaking. Mr. Godsmark had previously been general manager of the Huddersfield transport undertaking, and operating manager of the Joint Omnibus Committee of the L.M.S. and Huddersfield transport. He had also been deputy general manager of Nottingham transport undertaking and had served with Manchester Corporation and the old London County Council tramway system.

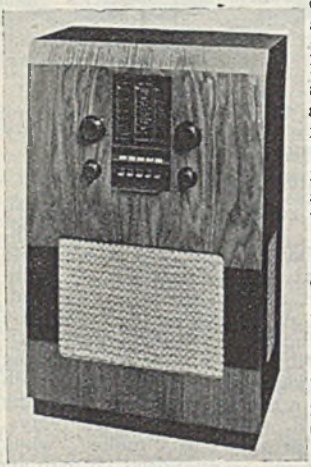
MR. W. W. PAINE, a solicitor by profession and for many years in the service of Lloyds Bank as general manager and as a director, on Christmas Day, aged 85 years. A convinced opponent of Socialism, he wholeheartedly supported the policy of deflation in the mid-1920's and considered that the policy of the equalisation of wealth by taxation could only result in an equalisation of poverty. An advocate of free trade, he nevertheless felt that as one of the three elements of production—brains, labour, and capital—labour had been artificially protected by legislation and by trade union restrictions, free trade was no longer a tenable doctrine.

The New Year's Honours List published on Wednesday, contained the following names of electrical interest:—Mr. C. E. H. Ferguson, an Associate Commissioner, Hydro-Electric Commission, Tasmania, who is made a C.M.G.; Mr. C. P. Lister, chairman and managing director of R. A. Lister and Co., Ltd., and Prof. Kerr Grant, Professor of Physics, University of Adelaide, South Australia, who are made knights bachelor; Mr. D. H. Alexander, principal, Municipal College of Technology, Belfast; Mr. A. Hillier, chairman and managing director, the Sperry Gyroscope Co., Ltd.; Mr. S. L. Hulme, deputy director of telecommunications, Ministry of Civil Aviation, all of whom get the O.B.E.; and Mr. H. Townsend, Director of Telecommunications, G.P.O., made a C.B.

Equipment and Appliances

Push-Button Console Model

Limited production is being undertaken by E. K. Cole, Ltd., of a new console (Ekco Model C.36). The receiver is a four valve, plus rectifier, superhet, with three wave-bands, five press buttons and manual tuning, in a flat-topped cabinet designed as a handsome piece of furniture as well as for high acoustic qualities. The 10 in. high flux-density speaker has three-way sound-diffusing, silk-covered apertures and box resonance, it is claimed, has been successfully avoided. Other features are the three-colour flood-lit glass tuning scale, rubber mounted tuning unit to minimise microphony, and improved short-wave performance, with the addition of television sound. The I.F. stages employ high "Q" iron-cored coils and a diode detector, and the output pentode has selective negative feed-back, and an undistorted audio output of two W. The press-button circuit gives instantaneous and reliable tuning on any five pre-selected stations. Station names are illuminated when button tuning is used, and alteration of pre-set stations can be easily carried out by the user. Tone control progresses from maximum top with bass boost in position 1 to normal bass and top-cut in position 4, with intermediate conditions at 2 and 3. In all switched positions correct tonal balance is maintained. An extension speaker and gramophone pick-up are provided. Power consumption is 60 W.



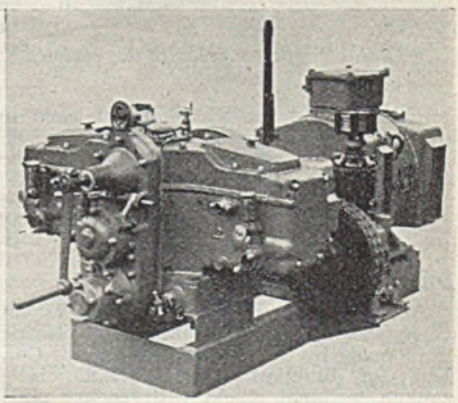
Ekco all-wave push-button receiver

Cooker Thermostats

The General Electric Co., Ltd., announce that all their domestic cookers are eventually to be fitted with "Ovenmaster" automatic oven control as a standard feature. Where possible, the D.C.6 thermostat is to be replaced by the D.C.29, which is smaller. In both arrangements, the thermostat is housed in a Bakelite moulded case with electrical connections brought out to external terminals to allow for easy connection in the cooker wiring chamber. The movement of the expanding member of the thermostat is conveyed to a quick make-and-break switch mechanism capable of controlling a load of 15 A at 200-250 V a.c. The setting knob of the control unit, which moves over a calibrated scale, is coupled to the thermostat through a connecting rod. The thermostat can be set to operate at any temperature, and the range is such that it is possible to carry out cooking operations which require temperatures of between 200° F. and 550° F. The open, easily readable scale is in accordance with a standard approved by the E.D.A., the working temperature range extending over about three-quarters of the circle.

Ships' Auxiliary Sets

Standard ships' auxiliary sets suitable for small motor vessels are being built by Oil Engines (Coventry) Ltd., of Wishaw, Scotland. The engine ratings range from 6.5 B.H.P. at 1 000 r.p.m. to 11.5 B.H.P. at 1 800 r.p.m., driving a compound-wound d.c. generator. A water-cooled Hymatic compressor, capable of delivering 7 cubic feet of free air per minute at a pressure of



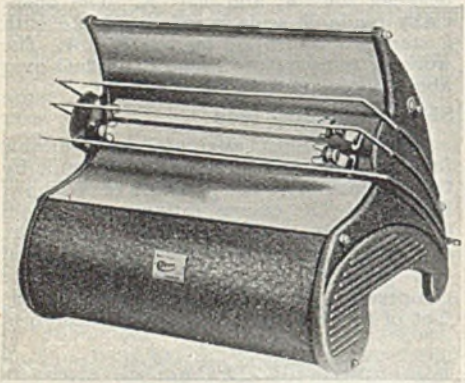
Combined engine, compressor and d.c. generator

350 lbs. sq. in. is driven by vee belting from a clutch pulley mounted on the connecting shaft between engine and generator. The dry plate clutch on this unit can easily be engaged and disengaged whilst the set is running. The whole unit is mounted on a baseplate of welded steel sections and weighs only about 885 lbs. complete. A raised starting handle, which rotates at half crankshaft speed, cold start

injectors, compression device and other controls are all within easy reach. Cooling water is circulated by a gear pump mounted integrally with the pressure lubrication pump on the engine.

Enclosed Element Fire

The " Classic " reflector-type fire is the latest production of Clayton, Lewis and Miller, Ltd., of Southend. Two 1 kW heating elements are encased in silicon tubes, a practice which, by excluding practically all foreign matter, is said to increase the running life. The three square-section safety bars are finished in bright cadonium plate and a switch, fitted on one side bracket, permits operation of one element only. The side brackets are made of cast

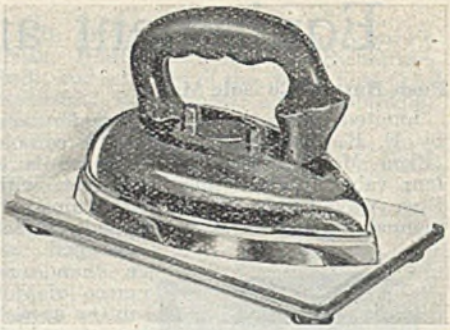


" Classic " reflector fire with two enclosed elements

aluminium and the whole fire finished in durable, non-chipping crinkle enamel, available in a range of colours. At the back is a small Bakelite carrying handle. Available for all normal supply voltages, the fire is provided with 6 ft. of 70/36 three-core circular braided flex.

Electric Iron and Stand

Amongst the several new features incorporated in the " Junction " electric iron, made by G. P. Chamberlain and Co., Ltd., of Junction Works, S.E.25, is a sunken terminal shield with socket pins, and a switch incorporated in the connector itself. A pressed steel stand, fitted with an asbestos pad and rubber feet, on which the iron can be placed when temporarily out of use, is provided. The sole-plate has a rounded back edge to prevent ruffling of the material, and bevelled sides permit easy work along buttons. The complete iron, which weighs approximately 5 lb., contains a 500 W heating element, available for a wide range of supply voltages. The moulded handle is of solid black heat-



" Junction " iron

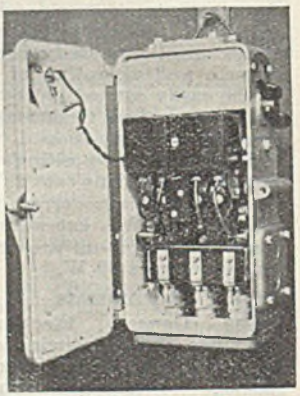
resisting Bakelite and the metal parts are given a chromium-plated finish.

Mercury Switch Relay

A magnetic relay, marketed by Hendry Relays, Ltd., of Bath Road, Slough, Bucks., is characterised by a complete absence of external moving parts. Enclosed within a solenoid is a vacuum-type mercury switch containing a soft-iron plunger, which, being located on the axis of the operating coil, forms the moving core of the magnetic circuit. The switch is retained in a vertical position by spring brass clips and, while on standard relays, the switch is arranged to " make " when the operating coil is energised, it can be made to " break " circuit if desired.

Textile Machinery Starter

A new 10 A, air-break, contactor-type starter for use on textile machinery, produced by Brookhirst Switchgear, Ltd., is illustrated below. All the wearing parts are reinforced to stand up to arduous and heavy duty and the components are compact and yet easily accessible. No-volt and overload protection is provided, and isolation is by means of an interlocked switch. The unit is suitable for local or remote push-button control, and a pilot lamp, indicating " motor running," can be fitted, if desired. A variety of entries for conduit piping are designed to suit varying site conditions and all circumstances.



Brookhirst contactor starter

Pulverised Fuel Firing

I.E.E. Discussion on the Problem of Unsuitable Coals

GENERAL agreement as to the suitability of pulverised-fuel boilers for present-day fuel, coupled with some doubts as to the effectiveness of the cyclone furnace, were expressed in the discussion at the joint meeting of the Institutes of Mechanical and Electrical Engineers, on December 19.

The paper by Mr. C. H. Sparks on "The Future of Pulverised-Coal Firing in Great Britain," which was summarised in our last issue, pointed out that the success attained in the burning of semi-bituminous and bituminous fuels had established pulverised-fuel-firing in dry-ash bottom furnaces as the preferred method of combustion. The tendency to divert a high proportion of the poorest quality coal to the new power stations, he said, should be viewed with alarm. Combustion rates had to be controlled to obviate slagging with the most unfavourable fuel, and this involved comparatively large furnaces.

Mr. Sparks concluded with a reference to the cyclone furnace and the advantages of overfeed firing with moving grates. Pulverised-fuel furnaces would always be in demand to dispose of dust fuel resulting from increased mechanisation of the mines, unless it was eventually found more profitable to upgrade it for other purposes.

MR. F. SHAKESHAFT (C.E.B.) said that the spreader stoker was being tried out on a fairly large scale in this country. The ever increasing electrical demand throughout the country indicated that the economic size of generating sets would be 50 to 60 MW running at 3 000 r.p.m. and on account of the difficult fuel situation which might persist for years, some of the stations were to be constructed in two or three sections, each comprising four boilers in two sets, the boiler ratings being chosen so that any three boilers would enable full load to be generated in two sets. A further number of medium size stations were also to be constructed on the unit principle, the size of the sets being 30 MW, the aim being to generate the maximum amount of power in the shortest possible time. It was the considered opinion of both station owners and manufacturers that pulverised-fuel-firing should be adopted as the boiler sizes were rather too large for stoker type plant having due regard to the difficult fuel situation. Notwithstanding the fall in calorific value of the coal supplied between 1939 and 1945, there had been a material increase in the supply of unwashed slacks and small coal. In 1944, about 50 per cent. of the total coal consumed in selected stations was supplied in this form. Four million tons were consumed in pulverised form and the remainder in stoker fired plants and, whilst the availability of stoker fired plants had materially suffered, the pulverised-fuel plants had been able to maintain both output capacity and reasonable availability. To ensure the economic disposal of pulverised-fuel fly ash, special care must be taken in siting new generating stations and in making extensions to existing generating plants. A number of new stations, therefore, were being located in proximity to low-lying land which might be effectively reclaimed by the disposal of the fly ash. Others had been located on estuaries where the disposal of the ash could take place at sea. Finally, he urged that a determined effort should be made by the coal authorities to deliver a uniform quality, and to deliver to power stations coal from the mines nearest to them. If that were not done, an uneconomic policy might result.

MR. J. MAYER (International Combustion, Ltd.) disagreed with the author that dust was the enemy of pulverised-fuel firing. On the contrary, he thought it was the salvation of pulverised-fuel-firing and the removal of the dust before it reached the atmosphere was fully justified. Pulverised-fuel had come through many severe tests during the past few years, and there were many power stations which had used fuel containing 18 per cent. moisture and 23 per cent. ash, and with the calorific value down to 8 000 B.Th.U. over long periods. There was a good deal of scope for pulverised-fuel to cope with any severe worsening of the average fuel values in this country. The cardinal difficulty of the slag tapping furnace was that it was unsuited to two-shift working, which had to be reckoned with as a very serious problem in future boiler design.

DR. A. PARKER (Fuel Research Station) said that what was wanted was a survey of the technical and economic possibilities of various fuels. The difficulty at the moment was to get coal of any kind, but a guarantee of approximately the same quality with every delivery was needed, even if it could not be the best quality. At the present moment he did not know what boiler designers were going to do,

because they did not know exactly what coal they were going to get with regard to ash. Washed smalls were a possibility. This meant taking water to the boiler plant, but at least it was a one-way traffic. One of the biggest disadvantages of pulverised-fuel was the large amount of fly ash and the difficulty of getting rid of it. One suggested method was to re-fire it into the combustion chamber, but certain troubles followed due to the high sulphur content. It might be that the spreader stoker could mitigate the trouble from bonded deposits, but at present we were without experience on that point.

MR. E. McCABE (South Wales Electric Power Co., Ltd.) remarked that the statement in the paper that stoker fired boilers, in which grit re-firing was employed local to the ash discharge end of the stoker, had remained free of deposit, should not be taken as a sweeping statement of fact. He had been associated with two designs of modern chain grate stoker fired boilers in which economiser deposits had been experienced in a most malignant form. He thought there was a tendency to exaggerate the importance of reducing the excess air to a minimum. With regard to the disposal of ash, would it be possible to return the ash to the pits to fill the spaces where the coal had been won?

MR. J. P. O'REILLY (John Thompson Watertube Boilers, Ltd.), said the author's statement as to the failure of attempts to burn pulverised coal in a confined space provoked controversy, in view of the many pulverised-fuel-fired Lancashire boilers operating successfully to-day, and burning very inferior coals. He asked the author's opinion on the following points. In dealing with high ash coals, at the high temperatures prevailing in the cyclone, was there a possibility of the fine ash entrained in the gas, adhering to the opening, or sides, of the throat, and ultimately restricting the passage of the gases ? If so, what method was adopted to remove this? Secondly, it would appear that a considerable amount of heat which was generated in the cyclone—which might be available for transmission by radiation to the heating surface—would be lost across the insulating layer of slag on the periphery of the cyclone.

MR. J. F. FIELD (Edinburgh electricity undertaking) doubted whether the alternatives put forward by the author would, as was implied, knock out pulverised-fuel in the future. He did not believe that the spreader stoker would be able to deal with any wider range of fuel than the ordinary stoker and whether the cyclone furnace would give any greater flexibility in the matter of ash content remained to be seen, although there was some possibility that it might. With known methods he did not think there was much chance of improving the raising of steam. We were burning over 30 million tons of coal annually for power generation, and it was necessary to have a research establishment worthy of the country.

MR. A. E. POWELL (Merz and McLellan) thought it was reasonable to argue that the consumption of coal for the generation of electricity would increase by as much as 20 million tons per annum, and the extent to which that would be off-set by reduced demand in other directions was problematical. In any case, increased demand for coal did not necessarily mean improved quality, and certainly the electricity supply industry had not lacked a substantial share of the worst coal that was obtainable. Therefore, it would be unwise to base future boiler designs on good quality coal. Personally, he thought the cyclone furnace would be a more serious competitor to pulverised-fuel-firing than the spreader stoker.

MR. W. N. C. CLINCH (Northmet Power Co., Ltd.), agreed that the author had endeavoured to show what was, in the future, the best means of burning coal to the best advantage, but he had not given any specific representations. It was possible to conserve coal by utilising the best heat cycle possible. The time must come when the old plants must disappear and then why not get rid of low pressure plants and use plant which might give a much higher thermal efficiency. They should bear in mind that having consumed in a furnace the coal which was used for the liberation of heat, there was the question of the ash disposal. We should not condemn the electrostatic precipitator nor the mechanical type; the two should be used together, and he did not agree with the author's conclusion that all the trouble came from powdered-fuel-fired plants.

MR. R. DAVIS said the author had assumed that the quality of coal would deteriorate and, with it, the advantages of pulverised-fuel firing. But why should the quality of coal deteriorate? Consumers must demand what they wanted. Nor did he agree with the author that pulverised-fuel-fired boilers suffered as regards availability. Further, the author had stated that semi-anthracite and semi-bituminous coals were difficult to fire in horizontal burners in a furnace of normal dimensions, but he assured the author that such fuels had been burned successfully in normal size furnaces for many years. It was evident, too, from the paper that the author's experience of certain designs of

boilers had led him to believe that a large proportion of excess air was necessary to prevent slagging and undue carbon losses. The fact was, however, that it was possible to work with a very small proportion of excess air without undue slagging. He also pointed out certain disadvantages of the cyclone type of furnace and mentioned its unsuitability for shift working, and running on partial load due to the freezing up of the molten slag. It was also unlikely that the cyclone furnace would be immune from corrosion troubles.

MR. H. E. BARRETT (Bristol electricity undertaking) said that everybody had been talking of a suitable coal size, but that was an ideal which was not likely to materialise for a long time. Therefore, it was better to design boilers to meet existing conditions. He knew one power station which had had 35 varieties recently, but they could not be burned well in pulverised-fuel-fired installations. Moreover, the size was too small for either the cyclone furnace or the spreader stoker and, he added, the author must think again.

MR. W. C. CARTER (John Thompson Watertube Boilers, Ltd.) said that more attention should have been given to the possibilities of fine pulverisation by means of steam and air pressurisation. If the main boiler unit was to be of a natural circulation type, the cyclone furnaces could be constructed to use Le Mont water walls as an adjunct to the main boiler, thus affording considerable simplification in the arrangement of the pressure parts. As regards spreader stokers, he asked for further information as to the distribution of coal in so far as grading along the length of the stoker was concerned, together with some idea of the likely percentage of grit emission from this type of unit; whether grit re-firing had been incorporated, and also some information on the general maintenance of the stoker.

DR. R. LESSING said the paper boiled down to the question of the quality of coal, a subject to which he had given considerable attention. He was in the happy position of being able to offer the perfect—or almost perfect—solution to the problem of fly ash. The trouble was the dust in the coal when mined, as distinct from the fines, and this was the material which contributed very largely to clinkering in stoker fired boilers and, at the same time, created most of the fly ash trouble. His proposition was that the dust should be taken out at the collieries, and by de-dusting or similar means it was possible to do it.

MR. T. TURNER thought an attempt should be made to burn something other than coal for power production purposes in order that the by-products, which were so valuable especially in the plastics industry, should not be thrown away. The metallurgical industries had for years used a perfectly dust-free gas from blast furnaces. He suggested that electric power producers and the gas industry should work more closely together because the ideal was to use coal whether in pulverised, crushed or any other form, in gas producers where the by-products would be recovered and then use the residue for the production of power.

The author agreed that there were some points he had not dealt with in detail in the paper but that was done purposely because he wanted the views of others. As to the comments on the spreader stoker, he said that if those who had criticised it would have a look at a certain small installation in Scotland with which he was associated, he could convince them that there was a great deal more in it than they believed. With regard to what had been said as to the unsuitability of small size coal for the spreader stoker or the cyclone furnace, he had omitted to point out that the coal used in the cyclone furnace described was only 4-mesh, which was very fine indeed, if considered as coal particles and not as dust. It was too fine to be put in the station yard, as it would fly about. Therefore, there would be no difficulty in handling the normal fines which came from the pit. The real difficulty about the cyclone furnace was that unless the ash had suitable characteristics, it would not slag, and if it was not possible to tap the ash out it would not be as satisfactory as was desired. It was also wrong to say that the cyclone was unsuitable for shift working; on the contrary it could be used successfully in that way because it could be lighted up in two or three minutes.

The first post-war passenger ship to be launched from a British shipyard, the T.E.V. "Hinemoa," built at Barrow-in-Furness, for the Union Steamship Co. of New Zealand, Ltd., for express passenger service between the two main islands of New Zealand, has been equipped with a modern radio-telephone station by Amalgamated Wireless (Australasia), Ltd. While on passage between Wellington and Lyttelton, passengers will be able to make calls to subscribers in most parts of the world. The installation comprises a 250 W m/f cw/mcw telegraph transmitter and a 500 W h/f radio-telephone transmitter with "scrambling" facilities. Three receivers cover the range 15 kc/s to 26 mc/s and a self-contained quenched-gap installation is provided for emergency operation.

Electrodepositors' Coming-of-Age

Twenty-One Years of Progress—Development Fund

THE 21st anniversary of the Electrodepositors' Technical Society was celebrated last month at the Northampton Polytechnic, London, when a large number of members and visitors were present at a Soirée. The proceedings continued later in the main lecture theatre, when Dr. S. Wernick, president, was in the chair, supported by Mr. Samuel Field, the society's first president, and most of the past-presidents, including in particular, Dr. R. S. Hutton, Mr. E. A. Ollard, Dr. H. J. T. Ellingham, Mr. A. W. Hothersall and Dr. J. R. I. Hepburn. Also present were Dr. G. E. Gardam (vice-president), Mr. F. L. James (hon. treasurer), and Major L. H. Peter (chief engineer of the Westinghouse Brake and Signal Co.).

EARLY DAYS

Opening the proceedings, Dr. S. Wernick said that it was difficult to chronicle all those connected with the initial formation of the society, but of the many people involved in the consultation and correspondence which necessarily occurred before the meeting could be held, four individuals who might be looked upon as the founders, were, Mr. Spiers, at that time secretary of the Faraday Society; Mr. Samuel Field, head of the Chemistry Department of the Northampton Polytechnic; Mr. W. E. Harris, who became the society's first hon. treasurer; and the late Mr. William James, father of the present hon. treasurer, Mr. F. L. James. The President read a number of messages of congratulation from sister societies, among them being messages from Prof. Hinshelwood, president of the Chemical Society; Dr. Roche Lynch, president of the Royal Institute of Chemistry; Mr. V. Z. de Ferranti, president of the Institution of Electrical Engineers; Mr. G. W. S. Marlow, secretary of the Faraday Society; Mr. F. K. Savage, president of the American Electroplaters' Society; Dr. Colin Fink, secretary of the American Electrochemical Society, and a number of Continental societies. Pride of place was given to an intimate letter from the society's first secretary, Mr. Harris, now resident in Canada.

Dr. Wernick then said that the Council had decided to institute a medal, which was to be known as the E.T.S. Medal, and which would be awarded at intervals, which might be annually or longer, to individuals whom it was considered had performed outstanding services in the field of electrodeposition. It had been decided by the Council that no more meritorious claim could be put forward for the first award than the name of its first president, Mr. Samuel Field.

Mr. Field, in reminiscent mood, recalled some of the early days of his teaching career and the crude way in which electroplating was taught in 1897.

Prof. R. S. Hutton, who succeeded Mr. Field as president in 1930, recalled that silver plating was already being practised twenty-five years ago when Smee Cells were used as a source of current.

Mr. A. W. Hothersall, in acknowledging the tribute to the "Woolwich School," reminded those present that the name of the society's third president, Mr. D. J. Macnaughton, would always be associated with the researches which were carried out at Woolwich, since they could very largely be attributed to his foresight in the first place. Mr. E. A. Ollard said that probably the biggest advance in the last twenty-one years was the fact that all plating shops of any size now had laboratories attached to them; a state of affairs which was unknown two decades ago. Dr. H. J. T. Ellingham, who had been president during most of the war years, said that the society had fully justified its existence as a separate technical organisation, and that its achievements would not have occurred had the society been a branch of some other chemical, physical, metallurgical or electrical body. Mr. B. J. R. Evans, one of the founders of the Midlands centre, also spoke.

A TOKEN AND A GIFT

Major L. H. Peter, speaking on behalf of the Westinghouse Brake and Signal Co., said that it was a source of gratification that in the field of current supply British rectifiers led the world. It was an interesting coincidence that it was almost exactly twenty-one years ago that his company had put down their first laboratory to carry out research work on rectifiers, and they had been interested in research and development in electrodeposition ever since. As a practical token of appreciation and hope that the society's work would continue and expand, Major Peter then handed to the President a cheque from the Westinghouse Brake and Signal Co. towards the publications and development fund. Dr. Wernick, accepting the cheque on behalf of the society, revealed that this was for 250 guineas, a generous start to the fund.

Factory Conditions Surveyed

The Effect of War Years on General Standards

IN his report for 1945, the Chief Inspector of Factories points out that, generally speaking, industrial premises badly need repair and refit to bring them back to their pre-war standard and are greatly in need of more light and colour to take them beyond that standard.

The report is the first to be signed by Mr. H. E. Chasteney since he took over the chief inspectorship from Sir Wilfred Garrett at the end of 1945, and among the observations made is that in the last war there was no such general and marked deterioration in the guarding of machinery as in the 1914-18 war, in spite of the difficulties caused by shortages of material and labour. Standards of dust and fume removal were on the whole well upheld. Lighting and amenities generally in war-time factories were of a high standard, but many of the improvements have yet to spread to peace-time industries and in all there is a great deal of deferred maintenance and repair work to plan and defects of equipment and structure which need overtaking.

The urgency for production during the war years and experience of black-out conditions drove home the importance of good lighting and raised the whole conception of what constitutes suitable illumination values.

LIGHT QUALITY

Greater attention is now being given to the " quality " of lighting, i.e., to those other attributes, besides the intensity of the light, which go towards good visibility and comfortable and pleasing conditions. In the revised Code of Practice for Good Lighting issued by the Illuminating Engineering Society, increased emphasis is placed on this aspect of the subject, which involves consideration of the distribution, direction and diffusion of the light, its colour, and the location and brightness of the light sources to avoid glare and excessive contrasts and shadows. In the past, " quality " has tended to be somewhat neglected in the urge for higher intensities, though it is of no less consequence in a lighting scheme. In particular, glare is a matter which is still often neglected either through inattention or lack of elementary knowledge of good lighting principles. Properly designed shades are available, and in view of the publicity which has been given to the subject the continued use of naked or improperly shaded lamps seems inexcusable.

There was during 1945 ample evidence of greater appreciation of the important part which heating plays in securing good working conditions. Among recent installations unit heaters of various types are being widely adopted, points urged in their favour being their flexibility, their ability to supply warm air in a relatively short time to parts of a large workroom where it is specially needed and the fact that they can be used for cooling in summer.

COUNTERING DRAUGHTS

The difficulty of maintaining a reasonable temperature and avoiding draughts where large doors are frequently opened has been solved at a number of works by blowing a curtain of hot air across the openings. At one factory, mechanism has been fitted by means of which the opening of the door automatically brings the system into operation.

There was, during 1945 a substantial decline in the number of both fatal and non-fatal accidents. The number of fatal accidents, 851, was little more than half the peak figure of 1 646 in 1941 and the lowest for 10 years.

The accident rate a thousand employed was 49 for men of 18 and over in 1945, compared with 37 in 1938, and 54 for boys under 18 compared with 46 in 1938. For women the figure was 20, compared with 10 in 1938, and for girls under 18 it was 18 compared with 14 in 1938.

One reason for the continued higher level of non-fatal accidents, says Mr. Chasteney, may be that the economic urge to return to work after injury is not now so powerful as formerly. Factory accidents at their present level represent a loss to industry of 20 000 workers throughout the year.

Ever since 1935, power-machinery accidents have represented a dwindling proportion of the total. They were 20.2 per cent. in 1935 and 14.9 per cent. in 1945.

The new report contains special sections dealing with electrical and other risks, and in reviewing the Chief Inspector's observations, attention is drawn to the fact that the report of the Senior Electrical Inspector was abstracted in THE ELECTRICIAN of September 13 last year. In the present report, Mr. H. W. Swann sum-

marises his earlier observations and points out, among other things, that of the causes of electrical accidents, ignorance and negligence remain responsible for a high proportion and, notwithstanding industrial safety propaganda, many persons remain unaware that apparently trivial variations in the circumstances of shock may make all the difference between a light tingle at the finger tips and a fatality. Against ignorance, carelessness and negligence, the first lines of attack must always be education and supervision. Electrical apparatus enters so fully into the life of the modern citizen that some general education in this connection seems essential if the risks are to be widely appreciated. The point seems to be receiving increasing recognition by way of electrical training schemes which have been introduced both by supply undertakers and some groups of factories.

There is, however, another and less widely recognised factor which seems to be peculiarly associated with work on electrical equipment and which manifests itself as a form of mental aberration, affecting even the experienced and conscientious.

Portable apparatus with its flexible cable continues to be responsible for a considerable proportion of electrical accidents (207 in 1945). It seems probable that there will be increasing use of electric hand-tools on building work, and shock, under conditions which obtain at building sites, may be serious, because persons may be thrown from scaffolding, or be standing on wet ground. Good earthing is difficult to achieve and maintain, and the flexibles are especially liable to damage. For many years the Electrical Branch has consistently urged that in such circumstances the mains voltage should be reduced to about 100 V by the use of a transformer which can be arranged to supply a group of apparatus, the centre point of the secondary winding being earthed. This has been found quite practicable, and it is hoped that building firms will adopt this way of working for light tools and handlamps.

Copies of the report may be obtained from the Stationery Office, price 2s.

Sydney Undertaking Annual Report

THE report for 1945, published by the Sydney County Council electricity undertaking, shows, for the first time in the undertaking's history, a deficit, amounting to £A12 837. This is accounted for by losses in revenue suffered during periods when electricity was restricted, and by considerable increases in the costs of fuel and other materials.

The total quantity of current generated, at 1 016 911 600 units, decreased by 2.582 per cent. on the previous year's figure. Sales during the year, amounting to 901 977 843 kWh, were made up of bulk and industrial high voltage supply, 22.8 per cent.; low voltage commercial and industrial, 41.5 per cent.; domestic, 31.133 per cent.; street-lighting, 1.903 per cent.; net sales to generating authorities, 2.64 per cent. The total sales increased by 8 511 320 units during the year.

The average prices received per kWh for different purposes were as follows: Bulk supply, 0.667d.; h.v. industrial supply, 0.689d.; low voltage industrial supply, 1.035d.; commercial, 1.673d.; domestic, 1.280d.; and, for all purposes, 1.098d. This latter figure represents an increase in average price of 0.011d. during the year.

The total quantity of coal consumed was 620 515 tons, at an average cost of £A1 6s. 8.76d. per ton, or 0.221d. per kWh sold, an increase of 0.01d. per kWh over the previous year. The load factor over the entire system was 45.7 per cent., compared with 49.2 per cent. in 1944. Individual load factors for the three generating stations in use were: Bunnerong "A," 30.6 per cent.; Bunnergong "B," 64.7 per cent.; and Pyrmont (used only during peak demand periods), 2.1 per cent. The maximum load on the system was 256 200 kW and the maximum kWh generated for 24 hours, 4 232 700.

Power station performance figures were 1.62 lbs. coal per kWh, at Bunnerong "A," and 1.18 lbs. for the "B" station, the average gross B.Th.U. per lb. of coal being 11 350. The thermal efficiency of the two plants was 17.57 and 24.13 per cent. respectively.

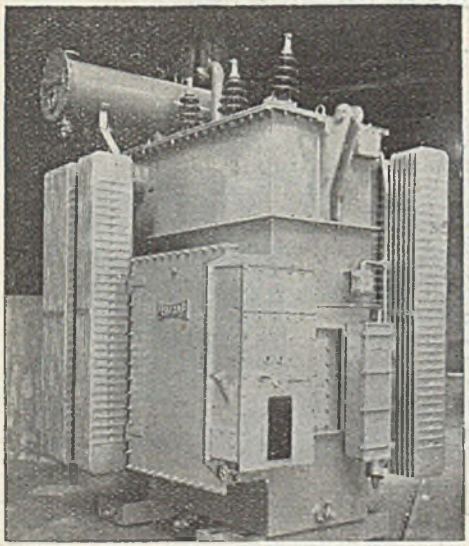
During the year, 1 887 new consumers were connected, making a total of 278 351, of whom 39 306 were in the city itself. Of this total, 242 034 were supplied at the residential rate.

Forthcoming installations of equipment include a 50 000 kW turbo-generator, to be manufactured by the Metropolitan-Vickers Electrical Co., Ltd., and a duplicate steam generating unit, including a boiler of 430 000 lb./hr. maximum rating, to be manufactured by International Combustion (Australasia) Pty., Ltd. These are expected to be ready to meet the winter load of 1949.

What Manufacturers are Doing—II

Large Power Transformers, Control Gear and Test Equipment

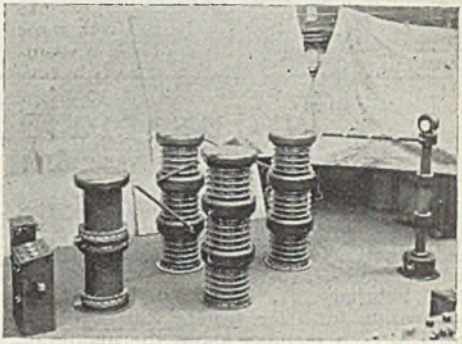
THE manufacturer of large power transformers by Ferranti, Ltd., during 1946 included four 65 000 kVA, three-phase transformers ratio 240/110 kV, with dual cooling ON/OFB, for Finland. The high tension windings were fully insulated with pressure tests equivalent to 264 kV. These transformers were, it is claimed, the first three-phase transformers of 200 kV, or over, to be manufactured in this country. Other transformers in course of construction include a 70 000 kVA 132/33/12 kV, three-phase transformer for the new Hams Hall power station of the Birmingham Corporation, two 28 000 kVA 88/13.2/6.6 kV, self-cooled transformers for South Africa and a 30 000 kVA bank of 110 kV transformers for New Zealand with 20 per cent. on-load tap-changing gear. The high voltage winding together with the on-load tap-changing gear is fully insulated. Orders received included four 54 000 kVA transformers of 134/11.8 kV, with on-load tap-changing gear for 20 per cent. range for the Ipswich Corporation, together with numerous orders for transformers of 30 000 kVA and below. Transformers delivered



A 2 000 kVA 33 kV three-phase transformer fitted with on-load tap-change gear of the contactor type

and taken over included some of 60 000 and 45 000 kVA at 132 kV, with 20 per cent. on-load tap-changing gear for the C.E.B.

The " stress control " method of design introduced by the company to give increased strength against lightning surges has been further developed and the range of voltage and kVA ratings to which it can be applied has been extended.



A 400 000 V portable cable testing equipment with metal rectifiers

Further progress has been made in the radio frequency field of industrial heating.

Developments in the astatic relay range include relays for current control and for resistance or impedance control. More recently a direct current relay working on the same principle has been produced for maintaining a constant d.c. voltage by controlling a moving coil voltage regulator on the a.c. side of the rectifiers.

The development of high voltage electrostatic metal rectifiers for precipitation work, of self-contained shock-proof construction in which transformer, rectifier and control gear are included, has been extended. Another recent development is the substitution of a moving coil voltage regulator for the on-load tap-change gear in power transformers, eliminating all switches, contactors, choke coils, etc. The patented " self-coupling " method of parallel operation of transformers with on-load tap-change gear has been further developed. New directional and reverse power relays are now in satisfactory service for controlling voltage regulators and transformers with on-load tap-change gear operating in inter-connectors and ring mains. Mercury switches sufficiently powerful to operate contactors and driving or regulating devices without intermediary auxiliary relays are incorporated.

A new type of on-load tap-change gear suitable for high voltage transformers with insulated neutrals for voltages up to 140 kV has been put into production. In the medium range of power ratings, the contactor type of gear developed some years ago has been re-designed to incorporate modern improvements.

The recent rapid developments in permanent magnet construction have increased the demand for powerful magnetising apparatus. The Ferranti equipment employs an ignitron with ignition controlled by a gas-filled strobotron, the control grid being connected to a peak wave transformer of adjustable phase. The latest development of this apparatus permits 200 000 A turns of excitation which is at present sufficient for existing demands, although still higher values are attainable.

A large and powerful surge generator for 1 200 000 V has been supplied recently for testing cables and allied insulation under artificial lightning surge conditions. In a 400 000 V portable cable testing equipment the usual thermionic valves have been replaced by metal rectifiers to give a more robust apparatus.

Industrial Information

I.E.E. Dinner and Reunion

The annual dinner and reunion of the Institution of Electrical Engineers will be held at the Connaught Rooms, Great Queen Street, London, W.C.2, on Thursday, February 27. Full details and an application form for tickets will be circulated to each member about the middle of January, and application for tickets should not be made until this form is received.

New Trolley 'Bus Induction Device

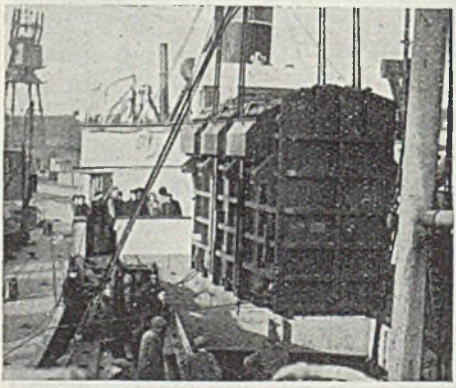
London Transport engineers are experimenting with an electric points induction device to enable trolley 'bus wire frogs at junctions and turning points to be set from the driver's cab and to do away with any necessity for the conductor to leave the platform. A time-delayed switch is installed in the driver's cab, and with this he is able to select the correct road and to retain full control of the 'bus whilst passing through busy junctions. Experimental equipment has been installed, and as soon as this is thoroughly tested further installations will be proceeded with.

B.T.-H. Jubilee Scholarships Scheme

The jubilee of the British Thomson-Houston Co., Ltd., was celebrated last month, and to commemorate the occasion the directors arranged for a number of financial grants to be awarded over the next three years to assist employees of at least ten years' service, in the education, or training, of their sons or daughters where the circumstances merit such additional assistance. It is not intended that the awards should be confined to engineering training, as the B.T-H. apprenticeship and fellowship schemes meet nearly all such requirements. In addition to university or technical college education, it is intended that assistance be given for other forms of training. Following the decision to initiate this scholarship scheme, a committee was appointed under the chairmanship of the company's Chief Electrical Engineer to consider applications. Of the total number of applications received, 28 per cent. were outside the scope of the scheme, 40 per cent. were deferred as no expenditure was involved during the present academic year, and 32 per cent. were considered for awards. In 20 per cent. of the cases, grants were made up to £100 each for 1946/47, and where expenditure is involved this year or the following year the granting of awards will be continued. Recipients of the grants are employed at various works and offices of the company.

Big Transformer for France

In connection with the development of the French electricity network to meet industrial demands, the British Electric Transformer Co., Ltd. (in association with Crompton Parkinson, Ltd.), have built a 50 MVA, 150/15.6 kV transformer for the London Mission of the French Ministry of



A 50 MVA 150/15.6 kV transformer for France being lowered into the hold of the S.S. "Pinchateau" at the Royal Albert Dock

Industrial Production. It is three-phase, 50 cycles, star/delta connected, and fitted with a twin "A" type cooler unit, and will be installed at the Vendin station of the Societe de Transport D'Energie Electrique de la Region du Nord. Special construction provides an end door in the tank to enable the carcase to be removed horizontally as there is insufficient head room in the site workshop for it to be lifted vertically. The carcase slides into the tank on rails, and is pulled in by a tackle passing through a door at the opposite end of the tank. The total weight of the whole unit is approximately 112 tons, and the carcase in the tank weighs 82 tons. This part was transported from the works at Hayes, Middlesex, to the Royal Albert Docks on a 35 ft. long 100-ton side-girder wagon, with two eight-wheeled bogies, propelled by two 45-ton haulage capacity, 100 H.P. Scammel tractors. To lift the 82-ton unit from the dockside to the hold of the S.S. "Penchateau," the Port of London Authority used their 150-ton "Mammoth" floating crane.

Whale Refinery Power Plant

The power supply in the whale refinery "Southern Harvester," which completed her trials earlier this year and is now at the Antarctic whaling grounds, is provided by six Diesel engine driven generators and one small steam driven set. These Diesel sets develop 1 680 kW—three at 400 kW, two at 200 kW and one at 80 kW. The engines, which are of the Mirrlees vertical single acting, trunk piston, four-stroke, airless injection, cold starting type, are direct coupled to generators of the Brush single pedestal pattern, open, canopy protected, drip-proof, compound wound design at 220 V d.c., suitable for parallel operation or independent running as required.

Commonwealth Scientific Office

The establishment of a British Commonwealth Scientific Office in London is one of the main recommendations to Governments disclosed in the report of the proceedings of the British Commonwealth Scientific Official Conference, just published by the Stationery Office. (Price 1s. 3d.) The conference followed on the Royal Society's Empire scientific conference last July. Its primary concern was to discuss scientific collaboration, which had grown up in the Commonwealth during the war, and to devise means of ensuring its continuance and improvement. Broadly, the proposal is that the various Dominion scientific missions and liaison officers in London should occupy adjoining offices in the same building to enable them to co-operate more easily in matters of common interest. The work would be carried out more rapidly and economically by the provision of certain common services, and it is suggested that the Department of Scientific and Industrial Research should be responsible for those common services, and that the B.C.S.O., London, should at first be housed in the same building as the D.S.I.R.

Social News

The General Electric Co.'s Dramatic Society presented "Cinderella," its first

A scene from the pantomime "Cinderella," performed by the G.E.C. Dramatic Society

pantomime since 1938, at Magnet House, Kingsway, in seven performances from December 16 to 21. This excellent production was entirely original, having been written by John Hurst, a member of the head office staff, who also composed all its amusingly topical songs. The pantomime bristled with pointed gags about the present state of the electrical industry and there was much good-natured "leg-pulling" of well-known G.E.C. personalities, while some of the artistic effects reached a high level. "Cinderella" was produced by Marian Naylor, and it would be invidious to pick out any of the large cast of 34 for particular praise when all did so well. Mention should, however, be made of the capable chorus whose fresh and sparkling singing and charming grouping was a delight. The proceeds, after payment of expenses, will be devoted to Dr. Barnardo's Homes.

Radio Interference Suppression

At a recent meeting of the group of experts of the International Special Committee on Radio Interference, known as C.I.S.P.R., held at the I.E.E. in London, the proceedings were opened by Sir Clifford Paterson, F.R.S., chairman of the British National Committee of the International Electrotechnical Commission, and Dr. S. Whitehead, director of the E.R.A., was elected chairman. After a full discussion of all the aspects of the problem of radio interference suppression, it was agreed that consideration should be given to the best

method of making measurements on items which give rise directly to interfering fields and that this matter should be discussed at the next meeting, the fullest information on the subject being gathered in the meantime. If matters are sufficiently advanced, a further meeting of the experts will be held in Zurich in September this year, to be followed by a meeting of the C.I.S.P.R. to discuss the wider aspects of the problem of radio interference suppression. The delegates were entertained at a luncheon given by the B.S.I. and at the invitation of the B.B.C. visited their studio to witness a demonstration of various forms of interference with television, together with an exhibition of standard measuring equipment showing the general complexity of the problem.

Diesel Engine Users' Association

In its report on heavy-oil engine working costs for the year 1944-45, the Working Costs Committee of the Diesel Engine Users' Association, states that the number of stations included in the report is 52, the same as last year. One of the tables shows that nine home stations with installations containing mechanical-injection type of engine only, generated a total of 9 419 804 units during the year, and the average total engine cost per unit for the year was 1.193d. The total fuel oil used was 2 720 tons, and lubricating oil, 7 655 gal. Nineteen home stations with installations containing air-blast and mechanical injection types of engines, generated a total of 16 100 126 units, and the average total engine cost per unit was 1.094d. The total fuel oil used was 4 420 tons, and lubricating oil, 15 770 gal. Another station, with installations containing dual-fuel type of engines, generated 1 182 962 units at a total engine cost per unit of 0.760d. Ten overseas stations generated 53 523 715 units at an average total engine cost per unit of 0.765d., and used 14 318 tons of fuel oil and 52 350 gal. of lubricating oil.

Notes for Contractors

In a circular letter, Mr. L. C. Penwill, director and secretary of the National Federated Electrical Association, informs members that the Fair Wage Clause in poster form has been printed and is available to members to enable them to comply with the terms of the House of Commons resolution that a contractor shall display a copy for the information of his workpeople in every factory, workshop or place used by him for the execution of a contract. Leaflet T.C. 47, giving details of the arrangements for the issue of the "industrial ten" clothing coupons for 1946-47, is available at local offices of the Ministry of Labour. Advance copies of Table A of the new income tax tables, in connection with the revised arrangements which come into force on April 1 will be supplied to members on application to the director and secretary, at Africa House, Kingsway, London, W.C.2.

Prices of Torch Batteries

The Board of Trade, in consultation with the Central Price Regulation Committee, have made an Order permitting increased maximum prices for certain types of home produced electric torch dry batteries. The Order came into force on December 23.

Illumination Design Courses

THE forty-seventh illumination design course, in the form of a refresher course for the electrical industry, arranged by the E.L.M.A. Lighting Service Bureau, will commence at 2, Savoy Hill, London, at 7 p.m. on Tuesday, January 21, and lectures will be given on consecutive Tuesday evenings for six weeks, ending on February 25. A similar course, arranged by the Mid-East England area office of the Lighting Service Bureau, will be held in the board room at the Electricity Department Offices, Whitehall Road, Leeds, beginning at 6.30 p.m. on Wednesday, January 22. The programmes are:

London:—January 21: "The Fundamental Principles of Lighting," by Mr. E. B. Sawyer; chairman—Mr. W. F. Moir, chairman of E.L.M.A. Council; discussion opener—Mr. J. S. Dow, president, Illuminating Engineering Society. January 28: "Illumination Design for Interiors," by Mr. C. J. King; chairman—Mr. F. E. C. Miller, vice-chairman of E.L.M.A. Council; discussion opener—Mr. V. W. Dale, general manager and secretary, the B.E.D.A. February 4: "The Development of Modern Lighting Practice," by Mr. A. D. S. Atkinson; chairman—Mr. N. V. Everton; discussion opener—Mr. W. J. Jones, director of the E.L.M.A. February 11: "Fluorescent Lamps," by Mr. N. I. B. Harrison; chairman—Mr. C. F. Dickson; discussion opener—Mr. A. Mansell. February 18: "Lighting for Effect," by Mr. T. O. Freeth; chairman—Mr. H. A. Lingard; discussion opener—Mr. A. J. Symes. February 25: "Lighting Applied to Production," by Mr. W. Robinson; chairman—Mr. W. H. Williams; discussion opener—Mr. H. C. Weston.

Leeds:—January 22: "The Fundamental Principles of Lighting," by Mr. E. B. Sawyer; chairman—Mr. A. J. Johnson; discussion opener—Dr. J. F. Warin. January 29: "The Development of Modern Lighting Practice," by Mr. A. D. S. Atkinson; discussion opener—Mr. R. A. H. Livett. February 5: "Illumination Design for Interiors," by Mr. J. W. Howell; discussion opener—Mr. E. A. Fowler. February 12: "Fluorescent Lamps," by Mr. C. R. Bicknell; discussion opener—Mr. F. Nicholls, city electrical engineer, Leeds. February 26: "Lighting for Effect," by Mr. T. O. Freeth; discussion opener—Mr. Norval R. Paxton. March 5: "Lighting Applied to Production," by Mr. W. Robinson; chairman—Mr. F. C. Tyrrell; discussion opener—Mr. Frank Hill.

Applications for tickets should be made as early as possible so that provisional reservations may be made.

Electricity Supply

Melton Mowbray.—The Electricity Commissioners are to be asked to grant an extension of time in which the Council can exercise the option of purchasing the undertaking of the Melton Mowbray Electric Light Co., Ltd.

Nottingham.—The recent explosion at North Wilford power station wrecked a 20 000 kW generator and damaged a 30 000 kW set. According to the City Electrical Engineer (Mr. M. Wadeson), repairs are likely to take six months.

Peel.—To carry out improvements at the Peel sub-station, cables and switchgear are to be brought from the Air Ministry by Blackpool Corporation at a cost of £17 944. Application is being made for powers to borrow the money.

Southport.—The Electricity Committee is to erect a sub-station in the Trafalgar Road area at a cost of £6 000, and sub-stations at Arundel Road and Carr Lane, at £2 609 and £3 386 respectively. The Committee is seeking sanction to borrow £14 000 for extensions in the Birkdale area.

Bankside.—The proposals of the City of London Electric Power Co., Ltd., to extend the Bankside generating station, are to be opposed by the L.C.C. and the Southwark Council. At an inquiry to be held at the Town Hall, Walworth, S.E., on January 14, by Mr. K. S. Dodd, on behalf of the Minister of Town and Country Planning, the two councils will maintain that the extension is incompatible with the redevelopment of the area.

Perthshire.—Shortage of wooden poles was blamed for the delay in electrifying rural areas, at a recent County Council meeting. It was pointed out that the Grampian Electricity Supply Company was experimenting with the manufacture of reinforced concrete poles, but these, for a long time to come, would be used only for high voltage cables. A resolution calling on the Government to assist in the supply of timber for poles was approved, and copies of it are being sent to the Secretary of State for Scotland, the Electricity Commissioners, and the Timber Control.

Huddersfield.—The total units generated during the year fell from 181 558 733 in 1945, to 180 455 445, while units imported fell from 50 573 000 to 41 150 500. The undertaking load factor was 38.3 per cent. and the overall thermal efficiency 17.58 per cent. Income for the year totalled £550 689 and expenditure came to £510 829. After payment of £7 870 for interest on loans, etc., and £21 080 for redemption fund and repayments, a net surplus of £10 909 remained, compared with £15 462 in the previous year. The appropriation in aid of rates was £17 873, equivalent to a rate of 2.22d. in the £. The Electrical Engineer reports that preliminary designs and plans have been prepared for the accommodation of new equipment to supersede the existing low pressure plant, which will include a 20 000 kW or 30 000 kW turbo-generator set, boilers and additional cooling.

London.—Application has been made by the London Power Co., Ltd., to the Electricity Commissioners for consent to the establishment of 66 kV and 22 kV transmission lines and auxiliary cables between Battersea generating station, Alpha Place distributing station and Brompton distributing station. The extensions are considered essential to deal with future load developments. Costs are estimated as follows: transmission mains, £260 000; switchgear and transforming equipment, £304 000; total, £564 000. The Finance and Technical Committees of the London and Home Counties J.E.A. have no objections to the proposal. The J.E.A. has also recommended that application be made for loan consents for £258 000, in respect of mains and services, sub-stations and equipment, cookers and other apparatus for hire, etc. The balance of the estimated capital expenditure for 1947, amounting to £80 000, will be the subject of application for specific loan sanctions, made up as follows: main transmission lines, £50 000; change-over, d.c. to a.c., £25 000; voltage standardisation, £5 000.

Scotland.—According to a Committee report, shortly to be presented to the English Council of Agriculture, Dumfries and Kirkcudbright, although both with less population per square mile than any English county, could be taken as a model so far as rural distribution is concerned. Of 1 321 Dumfriesshire agricultural holdings over 50 acres in extent, 760 were supplied with electricity, of which 370 used electrical milking machines, 540 operated electric motors and 130 were equipped with electric steam-raisers. Except in the more remote parts of the county, consumers were still connected free of capital charge, and a tariff of £1 per room for dwelling-houses and 30s. per room for farms, plus ¾d. per unit consumed, operated throughout the county. In Kirkcudbrightshire, 50 per cent. of the potential consumers were using electricity, and out of 1 000 farms in the county, 400 were using power. Two-part tariff charges were 18s. per room per annum for two rooms, and 14s. per additional room, plus ¾d. per unit, with the alternative of flat-rate charges. Farm outbuild-

ings were charged at 36s. per annum for 2 000 sq. ft., plus 14s. for each additional 1 000 sq. ft. No capital charge for installation is made.

Shoreditch.—After reviewing existing hire charges for domestic appliances, the Electricity Committee has recommended new rates, which have been approved by the Council. Quarterly hire charges for post-war appliances include: two-plate cooker, 14s.; three-pint kettle, 2s.; 10-gallon washboiler, 5s.; 1½-gallon storage heater, 5s. Increases in rentals for pre-war appliances include two-plate cooker, from 7s. to 9s. quarterly; three-pint kettle, from 1s. to 1s. 6d.; five-gallon storage heater, from 4s. 6d. to 5s. 6d. Where, previously, the hire charges for cookers covered the provision of an electric kettle, in future a separate hire charge will be made for kettles, which, until more are available, will be hired only to consumers also hiring a cooker.

Bedford.—An increase in expenditure on energy purchased from the C.E.B. is held mainly responsible for a decrease in gross profit of £23 776, revealed in the annual report of the electricity undertaking. The final result of the year's working is a deficiency of £975, as compared with a surplus, in the previous year, of £18 049. During the year, revenue expenditure increased by £40 804, against an increase of income of only £17 028. The comparative figures for the years 1944-45 and 1945-46 are: units generated, 32.07 millions, increased to 35.10 millions; maximum demand, 18 760 kW, rising to 19 200 kW; imports from C.E.B., 61.15 million units, falling to 57.62 millions units. The total of units sold rose from 80.36 millions, in 1944-45, to 81.48 in the present year. Commenting on the deficit, the Chief Engineer states that since 1939, supply costs have increased by 38 per cent., whilst the increase in tariffs has only been 10 per cent., in the case of domestic and lighting supplies, and 26 per cent., for industrial supplies. During the war, the undertaking also had the benefit of certain temporary loads, which have now been discontinued.

Welsh Fair in London

THE Welsh Industries Fair, coming from Cardiff, where it was held in the spring and autumn of 1946, was opened at the Royal Horticultural Hall, London, on Wednesday afternoon. The opening ceremony was performed by Viscount Portal, whose report to the Government on Welsh industry, in 1934, led to the passing of the Special Areas (Improvement and Development) Act.

Of the 83 firms exhibiting, only 16 are old-established in Wales, while 41 are entirely new firms and 13. older concerns which have moved their factories into Wales. One feature of the exhibition is that nearly all the articles on view are ready for immediate sale in this country.

There are several displays of electrical interest, and a stand sponsored by the E.D.A. has been erected in order to answer general technical questions. British Electric Meters, Ltd., who have recently moved from London to Bangor, N. Wales, are showing electric meters of several types, synchronous clocks and various domestic appliances. Their Bangor factory, built by the Government during the war, will ultimately employ 2 000 people.

Examples of electrically driven lightweight conveyors are shown by two manufacturers, Fisher and Ludlow, Ltd., and J. Collis and Sons, Ltd., the latter firm also exhibiting electric-hydraulic stacking trucks and other forms of mechanical handling equipment. Various domestic appliances, including thermal storage heaters, immersion heaters and rotary switches, may be seen on the stand of Santon, Ltd., of Newport, Mon., while L. A. Sampson and Co., Ltd., of Bridgend, in addition to examples of modern soft furnishing, are displaying indoor decorative lighting fixtures.

On the stand of South Wales Switchgear, Ltd., examples are shown both of the company's heavy engineering products and of their domestic appliances. The exhibits include an 11 kV, 200 kVA three-phase transformer, manufactured for U.N.R.R.A., heavy ring-mains switchgear and, on the domestic side, electric cookers, two of which have " simmer " controls, wash-boilers and washing machines. A small show-case, representing the allied company, Aberdare Cables, Ltd., demonstrates stages in the manufacture of 11 kV armoured cable.

Thorn Electrical Industries, Ltd., display the wide range of articles made in their converted ordnance factory at Hirwaun. With a centre-piece composed of fluorescent tubes, the products on view include " Mary Ann " irons and cleaners, incandescent lamps ranging from small pilot bulbs to a 3 kW masthead light made for the Admiralty, and there is also a full range of fluorescent tubes, in various sizes, and some new Perspex luminaires.

The exhibition will be open from 11 a.m. to 6 p.m. daily (not including Sunday) until January 7.

Electrical Inventions

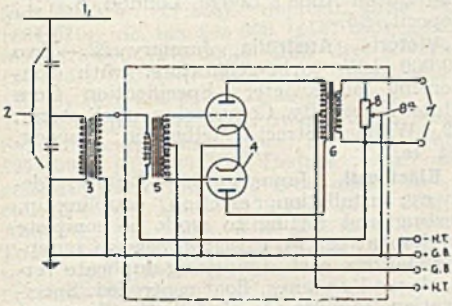
We give on this page abstracts of some recent electrical patents, which are prepared with the permission of the Controller of H.M. Stationery Office. These abstracts are written from the viewpoint of general interest and do not attempt to define the scope of the inventions, nor indicate in which features the novelty lies. Complete specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each inland or 1s. 1d. abroad.

Electronic H.T. Metering

The cost of instrument transformers for use on h.t. and e.h.t. systems can, it is claimed, be considerably reduced by the use of a negative feedback amplifier between the instrument transformer and the meter.

The circuit property relied on is that, if a large proportion of the amplifier output is returned, in opposition, to the input, then the effective gain and phase angle of the circuit will remain appreciably constant.

In the application illustrated, a voltage is tapped off from the a.c. line 1, by a



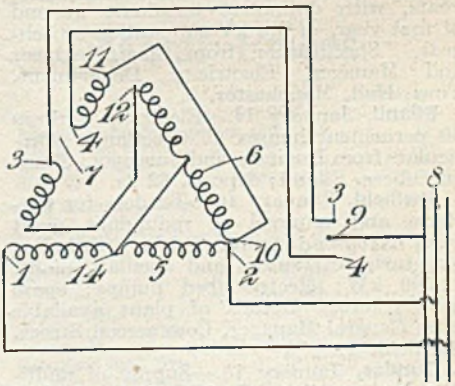
condenser-type potential divider 2. This voltage is applied, by a potential transformer 3, and the centre-tapped grid transformer 5, to the grids of a pair of triodes 4, arranged in "push-pull." A potential divider network 8, with a tapped portion 8a, returns part of the output into the primary winding of the grid transformer 5. The measuring instrument is connected across the secondary of the output transformer at terminals 7. That part of the circuit enclosed within the dotted box can be used, without modification, in conjunction with a resistive voltage divider, auto-transformer, or a current transformer. The effective gain of the circuit may be varied by alterations to the divider network 8, provided that the amplifier is not permitted to oscillate.

English Electric Co., Ltd., E. A. Howell and R. W. Newcombe. Application date, April 28, 1944. *No.* 581 846.

Reversible Three-Phase Machine

The specification describes a method of reversing, in a three-phase machine, the relationship between machine rotation and phase rotation. Each of the three-phase windings, 5, 6, and 7, is loaded and split into symmetrical halves. The ends of winding 5 are connected to supply points 1 and 2. One end 10 of the winding 6 is connected to one end 11 of the winding 7, and the other end 12 of winding 6 is connected to the other end 13 of the winding 7. The mid-point 14 of winding 5 is connected to the mid-point of 6. The two ends formed by the splitting of 7 are connected respectively to alternative supply points 3 and 4.

For running, the points 1 and 2 are connected to two of the three-phase busbars 8, the third bar being connected either to 3 or 4 by means of the selector switch



9. In operation, the vector sum of the voltages between points 14 and 12, and between 12 and 3, when point 3 is in circuit, is at right angles to the vector of the voltage between 1 and 2. The machine thus operates as a two-phase motor. When point 4 is in circuit, the direction of rotation is reversed. If, however, the machine is operated as a generator, the phase rotation can be reversed, by means of switch 9, without reversing the rotation of the generator.

S. Smith and Sons (England), Ltd., and F. W. Meredith. Application date, March 5, 1945. *No.* 582 039.

Contracts Open

WE give below the latest information regarding contracts for which tenders are invited. In the case of overseas contracts, particulars are to be had from the Board of Trade, Millbank, London, S.W.1 (corner Horseferry Road), unless otherwise stated:—

Dundee, January 10.—Supply of street lighting equipment. Specification from Public Lighting Engineer, 1, Lochee Road, Dundee.

Keighley, January 11.—Supply and delivery of street lighting posts and fittings for housing schemes at Brackon Bank and Woodhouse. Particulars from Town Clerk, Town Hall, Keighley.

Hastings, January 13.—Manufacture, supply and delivery of two 2 000 kVA Scott-connected transformers, and two switch kiosks. Specifications from Borough Electrical Engineer and Manager, 12 and 13, York Buildings, Hastings.

Kingston-upon-Thames, January 13.—Supply and delivery of self-interlocking type underground cable covers. Specification from Borough Electrical Engineer, 17, High Street, Kingston-upon-Thames.

Manchester, January 13.—Supply, delivery and erection, over period of two years, with option to terminate at end of first year, of 6.6 kV sub-station switchgear. Specification from Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2.

Elland, January 14.—Electrical work in 50 permanent houses at Greetland. Particulars from Engineer and Surveyor, Council Offices, Elland; deposit, £2 2s.

Sheffield, January 15.—Tenders for purchase and removal of redundant plant from Neepsend power station, including two turbo-alternators and ancillary plant, 12 500 kW; electric feed pumps; spare motors, etc. Details of plant available from General Manager, Commercial Street, Sheffield, 1.

Dundee, January 15.—Supply of multicore h.v. and l.v. p.i. cables. Particulars from City Electrical Engineer, Dudhope Crescent Road, Dundee.

Victoria, Australia, January 15.—Supply of 1 500 kW automatically controlled rectifier units, for Victoria Railways. Particulars from Agent-General for Victoria, Victoria House, Melbourne Place, London, W.C.2.

Newark, January 16. — Supply and delivery of p.i. and armoured cable, for electricity department. Particulars from Borough Electrical Engineer, Municipal Buildings, Baldertongate, Newark, Notts.

North of Scotland Hydro-Electric Board, January 20.—Supply, delivery and erection of h.t. and l.t. distribution lines. Tender documents from Mr. T. Lawrie, Secretary, 16, Rothesay Terrace, Edinburgh, 3; deposit, £1 1s.

Camberwell, January 20 — Supply of electric lamps for 12 months. Particulars from Engineer and Surveyor, Town Hall, Camberwell, S.E.15.

North of Scotland Hydro-Electric Board, January 21. — Construction, completion and maintenance of the Pitlochry dam and power station, Tummel-Garry hydro-electric project. Particulars from the Engineers, Sir Alexander Gibb and Partners, 39, Northumberland Street, Edinburgh, 3, and Queen Anne's Lodge, London, S.W.1; deposit, £5.

Victoria, Australia, January 22.—Two 50 000 kW turbo-generators, with condensing plant, etc. Specification from State Electricity Commission of Victoria, 22, William Street, Melbourne; deposit, £4 4s.

Blackwell, January 22.—Supply, delivery, installation, erection, coupling-up, testing and setting to work of complete equipment of two electrical sewage pumping stations, each comprising duplicate vertical spindle pumps, float controlled. Specification from Mr. A. H. Elliott, Chartered Civil Engineer, Dale Close, 100, Chesterfield Road, South, Mansfield, Notts; deposit, £2 2s.

Salford, January 23.—Supply of kitchen equipment and electrically heated food conveyors, for Hope Hospital. Details from Secretary-Steward, Hope Hospital, Eccles Road, Salford, 6.

Wandsworth, January 29.—Installation of refrigeration apparatus at Wandsworth Mortuary. Specification from Borough Engineer, Municipal Buildings, Wandsworth High Street, London, S.W.18.

New South Wales, April 29.—Design, manufacture, supply, delivery, erection and testing of two heavy-duty electrically-driven travelling cableways of 40 500 lb. hook load capacity; spans, 1 640 ft. increased to 1 800 ft. approximately towards later stage of constructional operations. Specification may be seen at New South Wales Government Offices, 125, Strand, London, W.C.2; deposit, one per cent. of tender price; security, five per cent. of tender price.

Gainsborough.—Supply and delivery of one outdoor 6.6 kV switch unit, consisting of one air-break isolator and two oil circuit-breakers. Specification from Engineer and Manager, Electricity Offices, Lord Street, Gainsborough.

Company News

STERLING INDUSTRIES, LTD.—Net prft. to March 31, £7 479 (£3 740). Brot. in. £9 363, income-tax £4 200 (£2 500); fwd., £12 642 (£9 363). Suspense acct.: ascertained losses on invests., etc., written off, less resvs., £1 011 003 (£1 007 554). Debt to sub. cos. £1 127 (£109 678).

RADIO RENTALS, LTD.—Trdg. prft. to Aug. 31, after charging amt. written off radio sets £55 585. To tax £12 750, lvg. net prft. £42 835. To blce. inc.-tax 1946-47 £5 000, tax equalisn. £15 000, pref. div. £2 888, ord. div. 25% (20%), fwd., £60 153 (£55 399).

PLESSEY CO., LTD.—Prft. for yr. to June 30, £320 547 (£348 802). To dirs.' fees £1 229 (£1 238), deprecn. £132 143 (£84 679), inc.-tax £95 000 (£157 000), gen. res. £25 000 (£75 000), pref. div. £7 219 (£6 875), fin. ord. div. 15%, mkg. 30% (20%), fwd. £50 013 (£31 307).

BAGHDAD LIGHT AND POWER CO., LTD.—Sale of curr. and other receipts 1945 £277 693 (£248 117). Deduct cost of generatn., distribution., gen. exes., fees, etc., lvg. net balce. £179 481 (£164 282). Add int., etc., mkg. £181 237 (£169 346). To deprecn. res. £25 003 (£24 400), to Brit. taxn. and Iraq Govt.'s sh. of prfts. £134 500 (£127 700), lvg. net balce. £21 733 (£17 246). To pref. div. £8 747 (same), to ord. div. 6% free of tax, £12 006 (5% free of tax, £10 005), fwd. £7 286 (£6 305).

BRITISH ELECTRIC RESISTANCE CO., LTD.—The directors have decided not to pay a dividend for the year ended July 31. For each of the six preceding years the distribution was 20% on the £50 000 capital. The profit is stated as approximately £17 000. For 1944-45 trading profits were £34 086. The reduction is attributed mainly to labour and transitory difficulties.

DICTOGRAPH TELEPHONES, LTD.—Speaking at the ordinary general meeting, Mr. P. V. Summer (chairman) said that the rate of production of the company's telephone equipment had been raised to a level approximately four times that of June, 1945, when Government control of telephone apparatus was terminated. The demand, however, still exceeded the rate of supply by a considerable margin. Subject to the continuance of adequate supplies, he said, they viewed with confidence the prospects of the company during the ensuing year. The policy laid down by the Government, stressing the importance of increased production to the life of the people and emphasising the need for the employment of labour-saving methods, could not react other than favourably upon the businesses of the Dictograph and Grampian Reproducers, Ltd.

AERIALITE, LTD.—Speaking at the annual general meeting, Mr. L. S. Hargreaves (chairman and managing director) said that the company was in every way producing to capacity. During the year, additions had been made to plant, and this would have the effect of a very considerable increase of turnover in the future. As they were mainly concerned in their manufacture with cable for lighting and power purposes, it would be seen, the chairman said, that the present building programme was very much in their favour, as was also the demand from the electrical appliances industries. They were still heavily committed with Government contracts and there seemed to be an almost unlimited market for their products. Many local authorities were now specifying their cables and in addition to this, their branded products, such as aerial wire and equipment, still commanded the largest sale in the country. Overseas business was expanding and, although they were certainly having some competition on prices from abroad, they still felt they would be able to hold a substantial amount of their export trade in the future.

Metal Prices

		Monday, December 30 Price	Inc.	Dec.
Copper—				
Best Selected (nom.)	per ton	£96 10 0	—	—
Electro Wire bars	„	£98 0 0	—	—
H.C. Wires, basis	„	£112 5 0	—	—
Sheet	„	£138 10 0	—	—
Bronze Electrical quality 1% Tin—				
Wire (Telephone) basis	per ton	£134 0 0	—	—
Brass (60/40)—				
Rod basis	„	10⅞d.	—	—
Wire	„	1s. 3⅛d.	—	—
Iron and Steel—				
Pig Iron (E. Const Hematite No. 1)	per ton	£8 19 0	—	—
Galvanised Steel Wire (Cable Armouring) basis 0.104 in.	„	£33 0 0		—
Mild Steel Tape (Cable Armouring) basis 0.04 in.)	„	£21 15 0	—	—
Lead Pig—				
English	„	£56 10 0	—	—
Foreign and Colonial	„	£55 0 0	—	—
Tin—				
Ingot (minimum of 99.9% purity)	„	£384 0 0		—
Wire, basis	per lb.	4s. 10¼d.		—
Aluminium Ingots	per ton	£72 15 0	—	—
Spelter	„	£55 0 0	—	—
Mercury (spot)	per bott.	£25 0 0	—	—

Prices of galvanised steel wire and steel tape supplied by C.M.A. Other metal prices supplied by B.I. Callender's Cables, Ltd. The latter prices are nominal only and do not include any allowances for tariff charges.

Commercial Information

Mortgages and Charges

NOTE.—*The Companies Act of* 1908 *provides that every mortgage or charge shall be registered within* 21 *days after its creation, and that every company shall, in its annual summary, specify the total amount of debt due from it in respect of mortgages or charges. The following mortgages and charges have been registered. The total debt prior to the present creation, as shown in the annual summary, is given—marked with an *—followed by the date of the summary, but such total may have been reduced.*

HANTS RELAY, LTD., London, E.C.—November 27, £2 000 mort., to Abbey National Bldg. Soc.; charged on 245, Copnor Road, Copnor, Portsmouth. *£13 285. May 29, 1946.

AD ASTRA RADIO AND ELECTRIC CO., LTD., London, W.C.—November 28, charge to Bedfordshire Bldg. Soc. securing £960 and any other money, etc.; charged on land with dwelling house thereon at Sharnbrook.

WEIR ELECTRICAL INSTRUMENT CO. LTD., Bradford-on-Avon.—November 21, £4 000 deb., to Branch Nominees, Ltd.; general charge. *——. January 24, 1946.

CAMPBELL AND ISHERWOOD, LTD., Bootle (Lancs.), electrical engineers.—Nov. 8, £10 000 (not ex.), mort., to Martins Bank, Ltd.; charged on 1, Raleigh Street, Bootle, together with plant, machinery, fixtures, etc. *£63 000. June 19, 1946.

Receiving Orders

JERVIS, Frederick John, 46, York Road, Woking, Surrey, radio engineer, having for the greater part of the past six months carried on business at 29b, Guildford Road, Woking, Surrey, under the name of "Surrey Radio and Electric Services." Court: Guildford. Date of filing petition: Dec. 6, 1946. Date of Receiving Order: December 6, 1946. Debtor's petition.

SPENCER, William Thomas, 376, Oldham Road, Newton Heath, Manchester, electrician. Court: Manchester. Date of filing petition: November 19, 1946. Date of Receiving Order: December 11, 1946. Creditor's petition. Act of bankruptcy proved in creditor's petition—Section 1-1 (G.), Bankruptcy Act, 1914.

Dividend

TOWNSEND, Albert Edward, 64, Phillips Street, Aston, Birmingham, in the county of Warwick, trading as G. L. Townsend at the same address, radio dealer. Court: Birmingham. Amount per £: 20s. and 4 per cent. statutory interest. First or final, or otherwise payable, January 8, 1947, at The Official Receiver's Office, Somerset House, 37, Temple Street, Birmingham, 2.

Orders Annulled

HEALEY, Martin, 26, Radley Square, Bulwell, and carrying on business at 51, Broomhill Road, Bulwell, Nottingham, radio dealer. Court: Nottingham. Receiving order dated February 21, 1938, rescinded. Order of adjudication dated February 21, 1938, annulled. Date of annulment or rescission: November 20, 1946. Grounds of annulment or rescission: Payments of debts in full.

Coming Events

Friday, January 3 (To-day)

ILLUMINATING ENGINEERING SOCIETY.—Birmingham. "Industrial Decoration," J. H. Nelson. *6 p.m.*

Monday, January 6

INSTITUTION OF POST OFFICE ELECTRICAL ENGINEERS.—London. "Provision of Line Communications for the Fighting Services," H. R. Harbottle. *5 p.m.*

I.E.E., S. MID. CENTRE.—Birmingham. "Development and Design of Colonial Telecommunications Systems and Plant," "General Planning and Organisation of Colonial Telecommunications Systems," C. Lawton and V. H. Winson. *6 p.m.*

I.E.E., MERSEY AND N. WALES CENTRE.—Liverpool, Royal Institution, Colquitt Street. "Engineering Principles Applied to Design of Domestic Water-Heating Installations of the Solid-Fuel/Electric Type," R. Grierson and Forbes Jackson. *6 p.m.*

Tuesday, January 7

I.E.E., N. WESTERN CENTRE.—Manchester. "Influence of Resistance Switching on the Design of High Voltage Oil Circuit-Breakers," H. E. Cox and T. W. Wilcox. *6 p.m.*

Wednesday, January 8

I.E.E., LONDON STUDENTS' SECTION.—"Radio Transmitting Valves," A. Mason. *7 p.m.*

I.E.E., N. EASTERN CENTRE.—Tees-Side Sub-Centre. "Electrical Control of Dangerous Machinery and Processes," W. Fordham Cooper.

I.E.E., S. MIDLANDS STUDENTS' SECTION.—Birmingham. "Electrical Control of A.C. Colliery Winders," R. H. Stewart. *6.45 p.m.*

Thursday, January 9

I.E.E., RUGBY SUB-CENTRE.—Address by Chairman. *6.45 p.m.*

Friday, January 10

INSTITUTE OF PHYSICS.—Manchester.—In the new Physics Theatre, the University. "Recent Developments of Calculating Machines in U.S.A.," Prof. D. R. Hartree. *7 p.m.*

INSTITUTE OF PHYSICS. — Birmingham, Imperial Hotel. "Nature of the Electric Spark," Prof. J. M. Meek.

He's arrived . .

. . . and now that he is here may we express our wish that he brings a welcome promise of new and expanding business for all our customers, both old and new. We for our part can assure you that we shall be ready to co-operate in your undertakings by supplying all that is best and most up to date in the Electrical and Radio field

The SUN ELECTRICAL Co. Ltd.

118-120 Charing Cross Road, London, W.C. 2

and at LEEDS, NEWCASTLE-ON-TYNE and SLOUGH

FOR EVERYTHING ELECTRICAL INCLUDING VENTILATION

Why it pays to specify "SANTON":-

3. A TYPE FOR EVERY PURPOSE

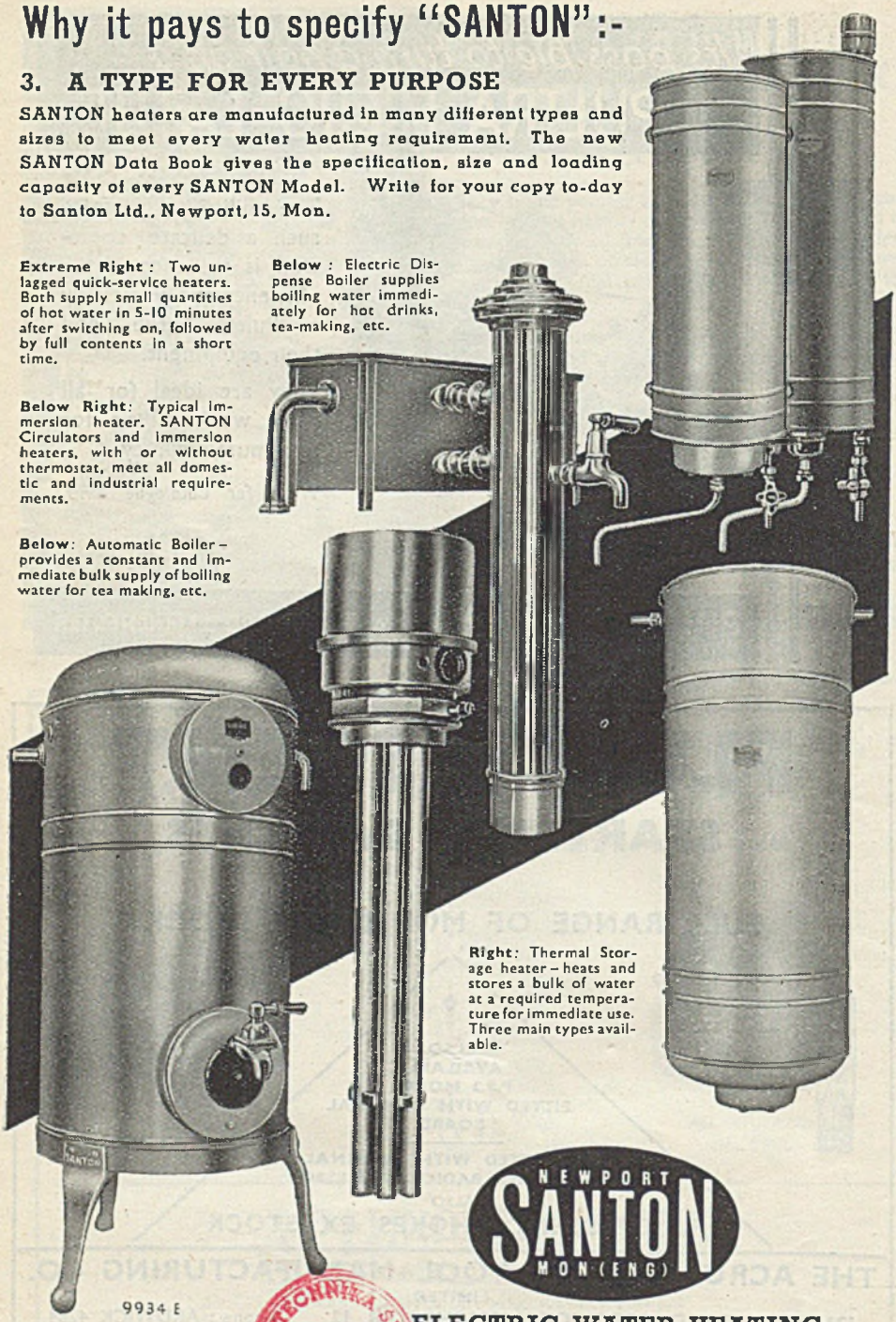
SANTON heaters are manufactured in many different types and sizes to meet every water heating requirement. The new SANTON Data Book gives the specification, size and loading capacity of every SANTON Model. Write for your copy to-day to Santon Ltd., Newport, 15, Mon.

Extreme Right: Two unlagged quick-service heaters. Both supply small quantities of hot water in 5-10 minutes after switching on, followed by full contents in a short time.

Below Right: Typical immersion heater. SANTON Circulators and immersion heaters, with or without thermostat, meet all domestic and industrial requirements.

Below: Automatic Boiler – provides a constant and immediate bulk supply of boiling water for tea making, etc.

Below: Electric Dispense Boiler supplies boiling water immediately for hot drinks, tea-making, etc.



Right: Thermal Storage heater – heats and stores a bulk of water at a required temperature for immediate use. Three main types available.

9934 E

NEWPORT SANTON MON (ENG)

ELECTRIC WATER HEATING

Trade Mark "SANTON"

Printed in Great Britain by STRAKER BROTHERS LTD., 194-200, Bishopsgate, E.C.2, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, London E.C.4. (Registered at the General Post Office. Entered as Second Class at the New York, U.S.A., Post Office.) – Friday, January 3, 1947