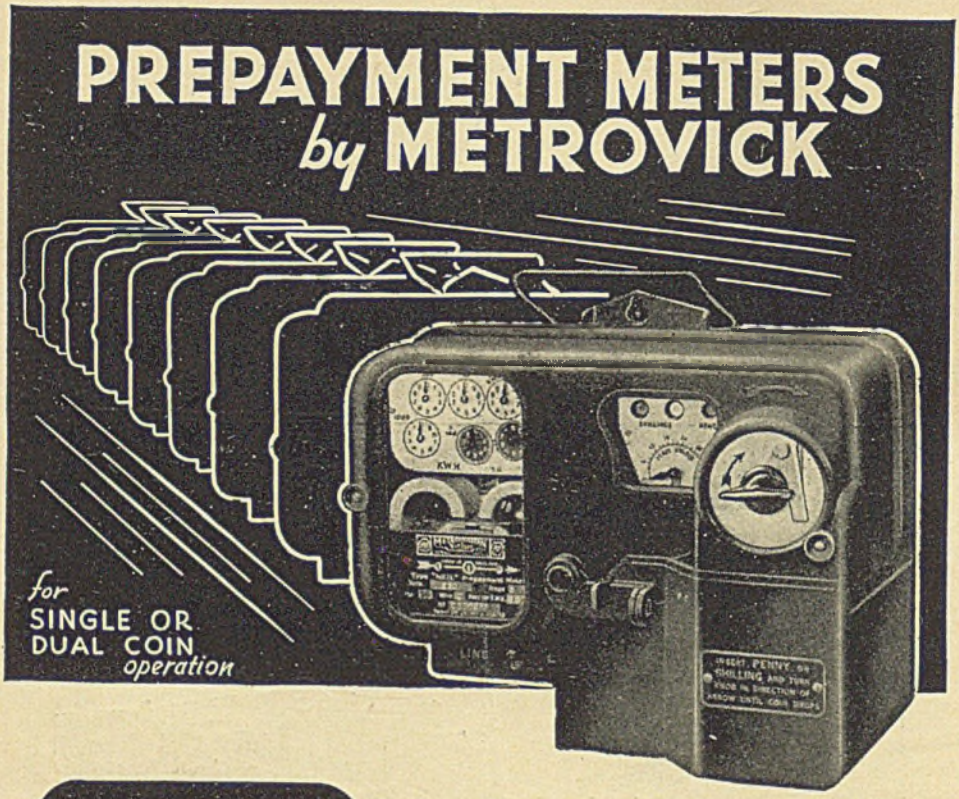
THE

ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

2 MAY, 1947
SIXPENCE

PREPAYMENT METERS *by* METROVICK



TYPE NEIL METER

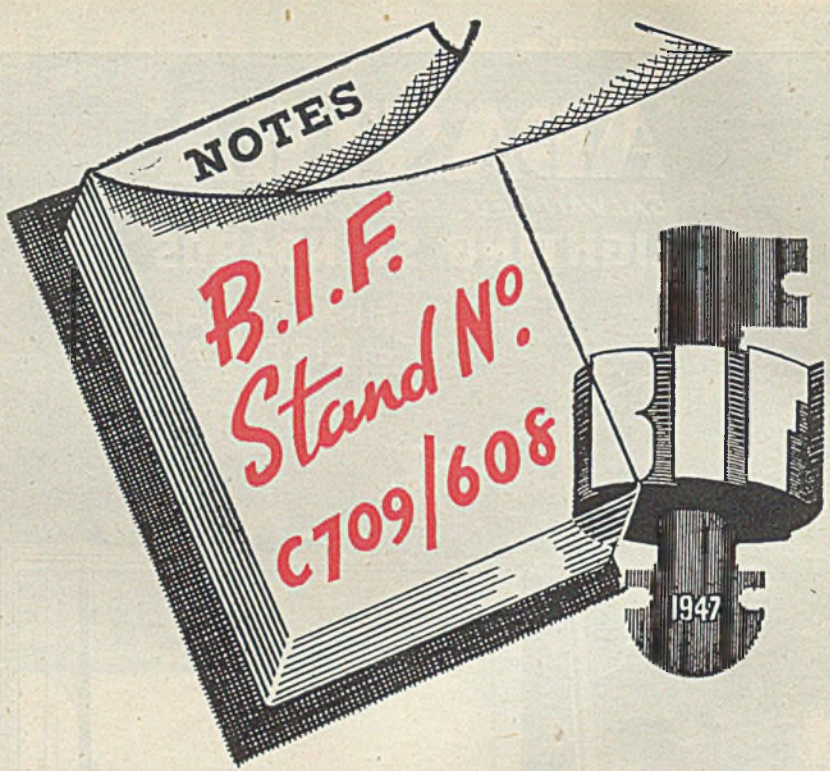
- Complies fully with B.S.I. Spec. No. 37 and with requirements of Electricity Supply (Meters) Act 1936.
- Trouble-free service and low maintenance costs ensured by absence of complicated mechanisms.
- Foolproof coin receiver prevents illegal practices, cannot be jammed, and protects mechanism from dust.
- Your interests completely safeguarded by independent sealing of terminal blocks, cover and coin box.
- A fully insulated cover and case house this 8½ lb. lightweight meter.

See our Stand C 510 at BIF Birmingham, May 5th — 16th showing two films daily: "A glimpse of Metrovick" and a film on Radar.

AEI — Associated Electrical Industries Ltd.

METROPOLITAN Vickers ELECTRICAL CO., LTD.
TRAFFORD PARK ··· MANCHESTER 17.

G/E 701

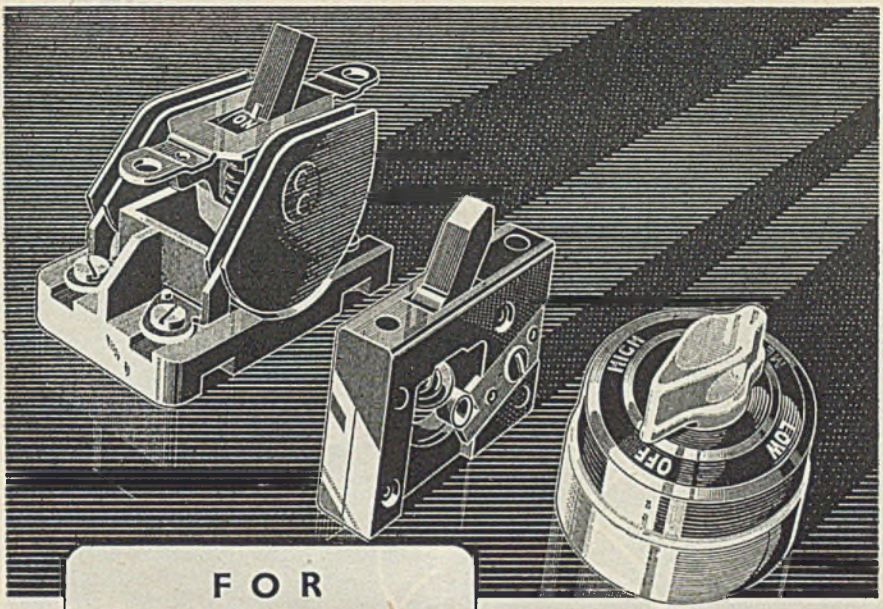


You will need every minute and unflagging energy to see all the exhibits you're interested in at the Castle Bromwich B.I.F. This year nearly 1,000 exhibitors will be present. May we suggest, therefore, that to save time and energy you make a note NOW to visit **Stand C 709/608** Phone No. **FAIR 128** where B.I. Callender's are showing:

Electric Cables and Joint Boxes
Crane Collector Equipment
Capacitors for Power Factor Improvement
Automatic Electric Resistance Welders
High Frequency Heater
and
A *Working Demonstration* of the Squeeze Strip Magnetic Moulding Machine

B.I. Callender's

BRITISH INSULATED CALLENDER'S CABLES LIMITED



FOR DOMESTIC APPLIANCE CONTROL

Arrow offers the largest range of Precision Built Switches for every specific need in the industrial and domestic field.

Tumbler switches from 1 to 60 amp. rating, and rotary switches in all circuit combinations from 5 to 35 amps. 250 volts.

Arrow Switches are quick make and break. They have been carefully designed and manufactured to give long trouble-free service.

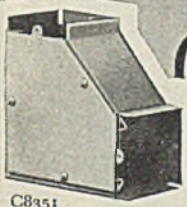
ARROW

ARROW ELECTRIC SWITCHES LIMITED, HANGER LANE, LONDON, W.5

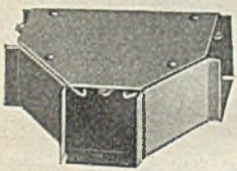
G.E.C.

STEEL

CABLE TRUNKING SYSTEM



C8351
Right angle Type A



C8355 Tee piece

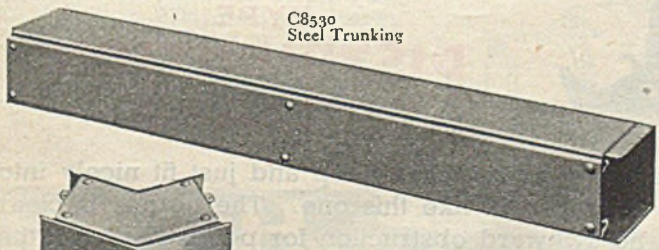
C8352
Right Angle Type B

The use of G.E.C. steel cable trunking in connection with heavy cable has many advantages and enables a considerable economy to be made when substituted for multiple conduit runs.

Another big advantage of cable trunking is that when extra circuits are needed after completion of a contract, they are simply and easily provided by removing covers and inserting the extra cables.

Important features include :

- Maximum accessibility with neatness and simplicity.
- Exceptional strength and rigidity.
- Perfectly smooth interior with no projecting screws to damage the cable.
- All cover plates are flush fitting.
- Sleeves are an integral part of each unit, making the use of separate couplers unnecessary.

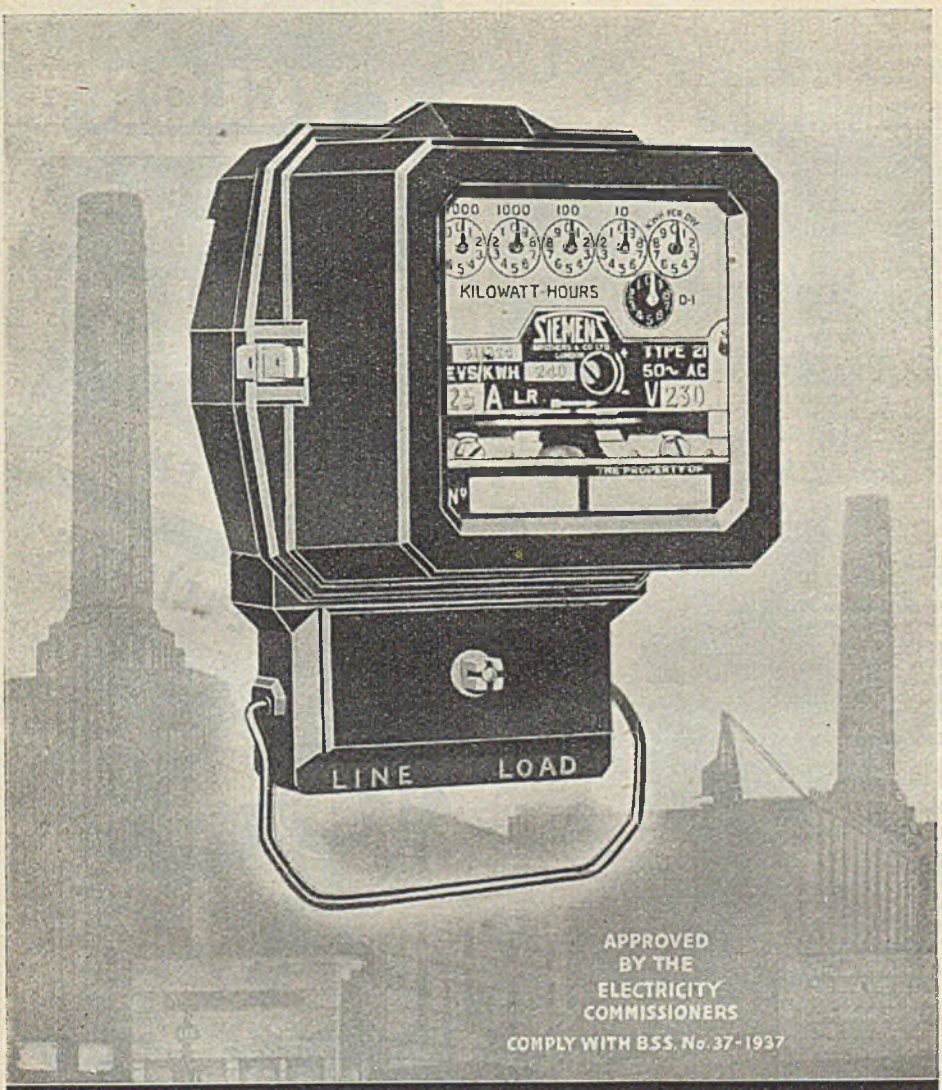


C8530
Steel Trunking

C8354
45° Bends

C8356
Stop Ends

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London W.C.2



APPROVED
BY THE
ELECTRICITY
COMMISSIONERS
COMPLY WITH B.S.S. No. 37-1937

SIEMENS

SINGLE-PHASE ALL-INSULATED

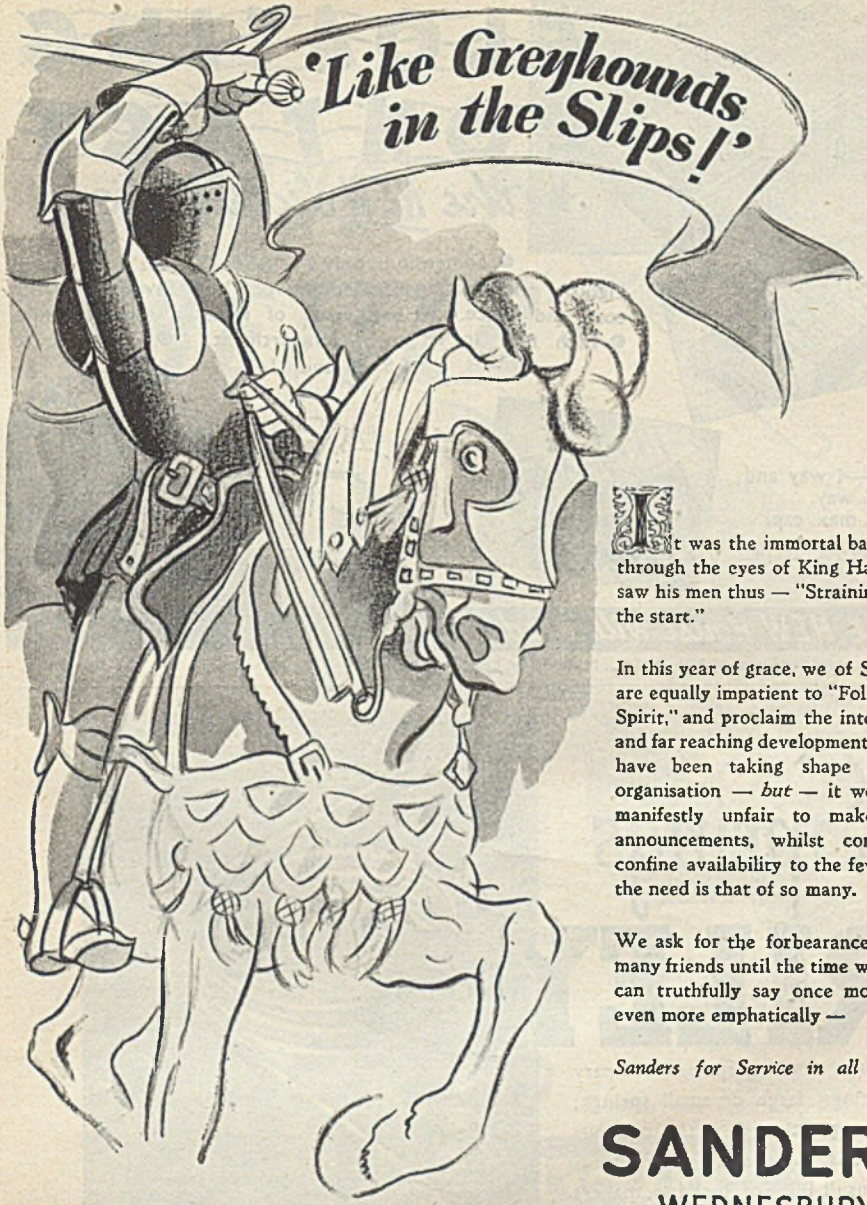
ELECTRICITY METERS

TYPE 21

Advt. of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38/39 Upper Thames Street, London, E.C.4

Branches at Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield,

INDEX TO ADVERTISERS IN THIS ISSUE



It was the immortal bard who, through the eyes of King Harry V., saw his men thus — "Straining upon the start."

In this year of grace, we of Sanders, are equally impatient to "Follow our Spirit," and proclaim the interesting and far reaching developments which have been taking shape in our organisation — *but* — it would be manifestly unfair to make such announcements, whilst conditions confine availability to the few when the need is that of so many.

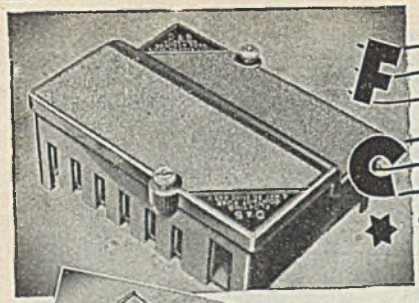
We ask for the forbearance of our many friends until the time when we can truthfully say once more and even more emphatically —

Sanders for Service in all Senses.

SANDERS
WEDNESBURY

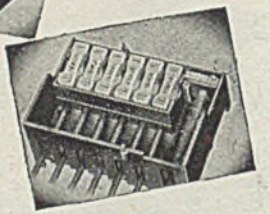
MAKERS OF GOOD SWITCHGEAR FOR OVER FIFTY YEARS

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.



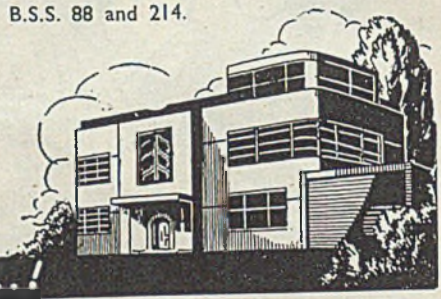
FLOATING CONTACT

the NEW distribution



● Dimensions only 7⅝" × 6½" × 4¼". ● Power Lighting and Heating "under one roof." ● Saving in wiring cost and space. ● Each row of fuses a separate unit. ● Each fuse in its own compartment. ● Conforms to B.S.S. 88 and 214.

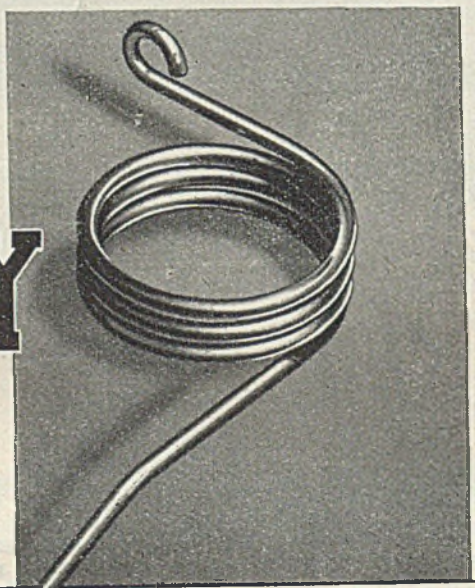
2 sizes—4 way and 6 way.
30 A. max. cap.
Write for F.C. leaflet



The NEW House will need it . . !

Announcement of Dorman & Smith Ltd., Manchester, London, Glasgow. EIF 46

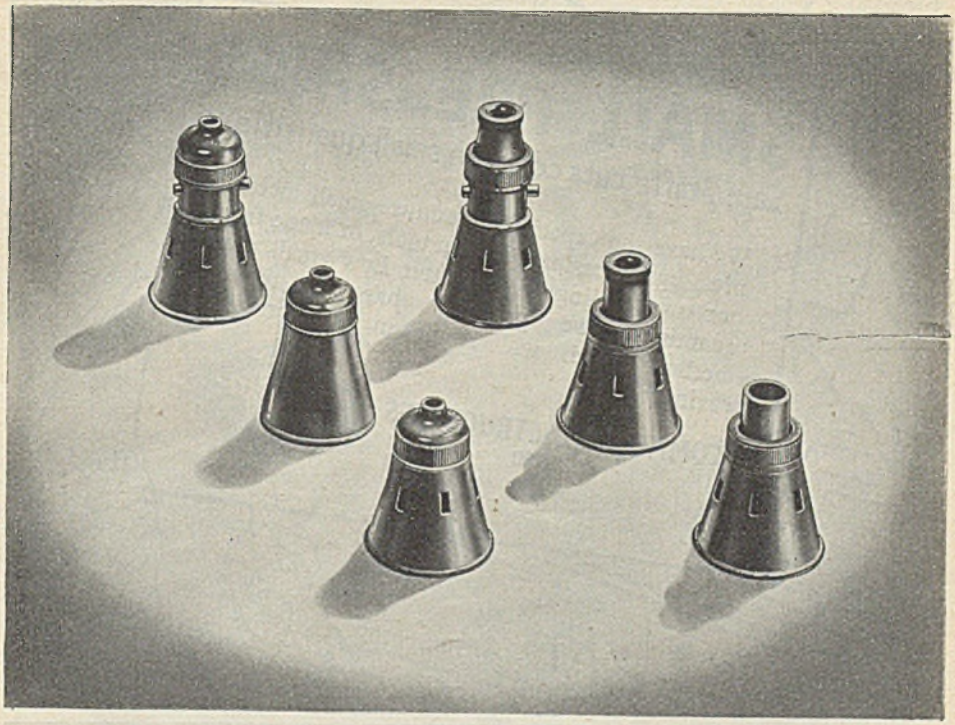
Springs BY RILEY



Queer looking springs, ordinary springs, large or small springs; springs tipped with precious metals, whatever your needs consult Riley of Rochdale, makers of quality springs and technical leaders since 1821.

ROBERT RILEY LTD.
MILKSTONE SPRING WORKS, ROCHDALE LANCS.

Telephone : ROCHDALE 2237-8 Telegrams : "RILOSPRING" ROCHDALE



The above illustration shows a group of NETTLE Pendant Lampholders. A consistently high standard of manufacture is maintained throughout the NETTLE range which includes a wide variety of domestic and industrial switches, lampholders, bell transformers, sockets and plugs, ceiling roses, handlamps, etc.

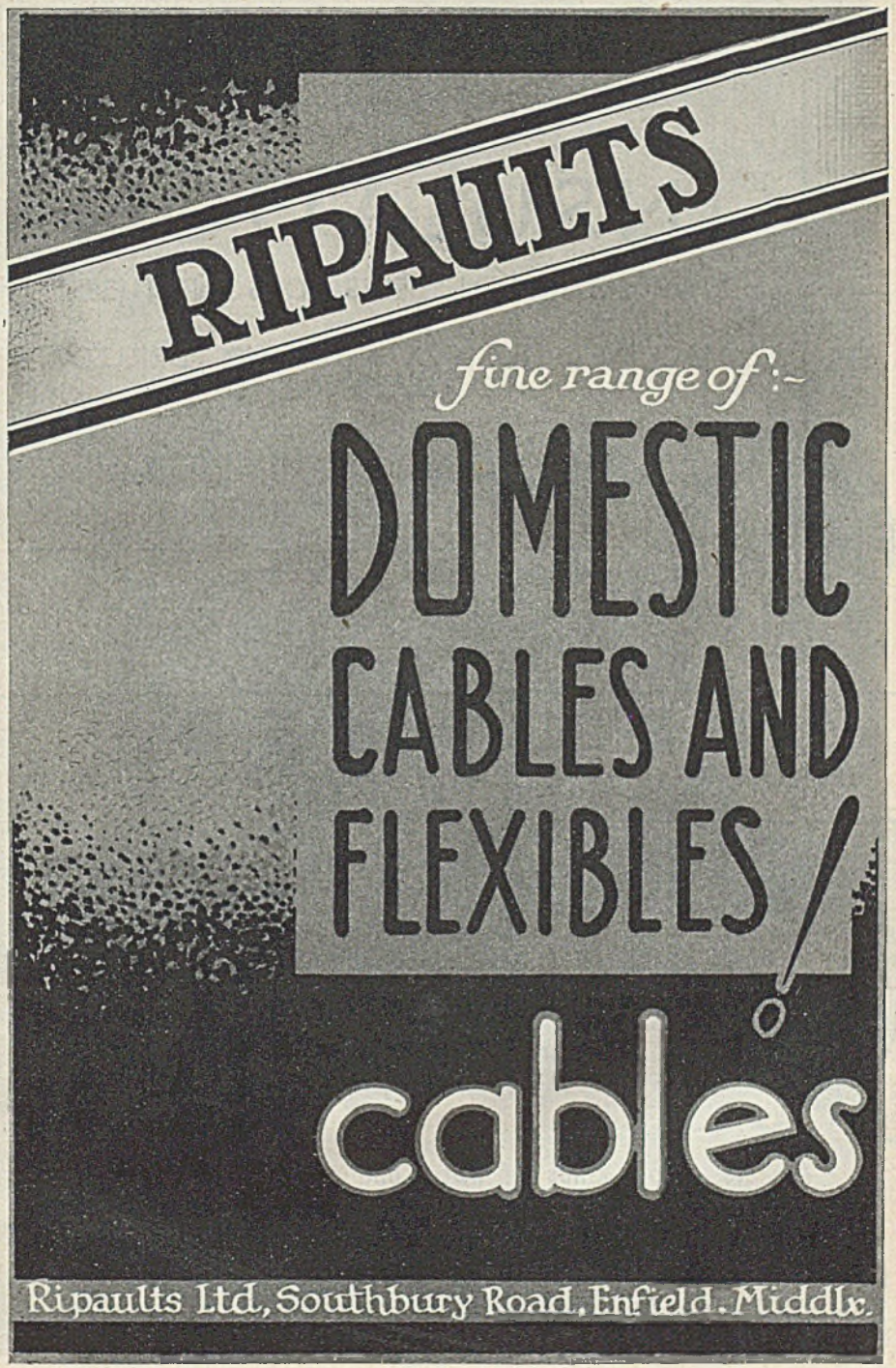
These accessories are designed for safety and easy wiring and are manufactured in accordance with the appropriate B.S.I. specification.

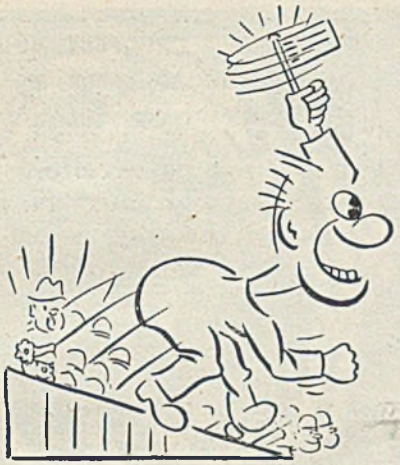
Your enquiries will receive our careful attention.

B.I.F.
SEE OUR EXHIBIT
STAND NO.
C 109

NETTLE

VICTOR H. IDDON LTD. HARPER RD. WYTHENSHAWE. M/CR.


RIPAULTS
fine range of :-
DOMESTIC
CABLES AND
FLEXIBLES
cables
Ripaults Ltd, Southbury Road, Enfield. Middlx.



GOOD OLD

CHARLTON!

. . . and the Cup comes here at last.

We bask in their reflected glory . . .

. . . and contemplate with smug

satisfaction the success that is

achieved by that

"little more" in Quality.

JOHNSON & PHILLIPS LIMITED

Electrical Engineers and
Cablemakers

Established in **CHARLTON** since 1875

The Mark that means that "little more" in Quality

MISCELLANEOUS ADVERTISEMENTS

TENDERS

STATE ELECTRICITY COMMISSION OF VICTORIA,
22-32, WILLIAM STREET, MELBOURNE, AUSTRALIA.

TENDERS are invited for Porcelain Disc Insulators for 220 kV Transmission Lines, in accordance with specification No. 46-47/159.

Full particulars available from Agent-General for Victoria, Victoria House, Melbourne Place, The Strand, London, W.C.2.

Tenders accompanied by preliminary deposit of £25, and endorsed "Specification No. 46-47/159," are returnable at the Commission's office, 22-32, William Street, Melbourne, by 11 a.m. on Wednesday, 4th June, 1947.

The Commission does not bind itself to accept the lowest or any tender.

W. C. PRICE,
Secretary.

SITUATIONS VACANT

METROPOLITAN BOROUGH OF ISLINGTON.
ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the position of Relief Charge Engineer at a salary in accordance with Class G, Grade 8a, of the National Joint Board Schedule, at present £458 17s.-£471 9s. per annum.

Applications, giving full details of experience, age, training and qualifications, accompanied by copies of recent testimonials, should be completed and returned to the Engineer and General Manager, Electricity Department, 341/343, Holloway Road, N.7, endorsed "Relief Charge Engineer" not later than noon on 16th May, 1947.

The appointment, which is permanent, will be subject to the provisions of the Local Government Superannuation Acts, 1937 and 1939, and to a satisfactory 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 arrangements whatsoever for the provision of housing accommodation for the successful candidate.

W. ERIC ADAMS,
Town Clerk.
Town Hall,
Upper Street, N.1.

DENBIGHSHIRE EDUCATION COMMITTEE.
DENBIGHSHIRE TECHNICAL COLLEGE, WREXHAM.

APPLICATIONS are invited for the post of Teacher of Drawing and Engineering Subjects at the above College (mainly in the Junior Technical School). Minimum qualifications—Degree in Engineering, or Higher National Certificate with five years industrial experience after the age of 21. The person appointed will be required to commence duties on the 1st September, 1947.

Salary according to the Burnham (Technical) Scale for Assistants.

Applications (no form), stating age, education, qualifications and experience, with dates, accompanied by copies of two testimonials and the names of two referees, should reach the undersigned on or before Saturday, 31st May, 1947.

EDWARD REES,
Director of Education.
Education Offices,
RUTHIN.
26th April, 1947.

SITUATIONS VACANT

METROPOLITAN BOROUGH OF ISLINGTON.
ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following permanent appointments:—

Technical Assistant.—Salary in accordance with Class G, Grade 7 of the National Joint Board Schedule, at present £518 14s.-£550 4s. per annum. Applicants should possess technical qualifications admitting to Corporate Membership of the Institution of Electrical Engineers and must have had a sound technical training and practical experience in the technical planning associated with the development of an Electricity Supply Undertaking. Preference would be given to applicants under 35 who hold a Degree in a British University.

Mains Assistant Engineer.—Salary in accordance with Class G, Grade 8, at present £490 7s.-£499 16s. per annum. Applicants should have experience in the laying, jointing and maintenance of E.H.T., H.T. and Low Tension Underground Mains and Static Substations. Applicants must be capable of taking stand-by duty in turn, and preference will be given to Corporate Members of the Institution of Electrical Engineers.

Mains Draughtsman.—Salary in accordance with Class G, Grade 9, at present £399-£414 15s. per annum. Preference will be given to Candidates having experience in the Drawing Office of an Electricity Undertaking. The person appointed will be responsible for the preparation of drawings and estimates required for the development of a large E.H.T., H.T. and Low Tension Distribution System. Some knowledge of building construction, with special reference to sub-stations and cable draw-pits, will be an advantage.

Junior Mains Engineer.—Salary in accordance with Class G, Grade 9a, at present £360 3s.-£375 18s. per annum. Applicants should have had a sound technical training, preferably with some experience on E.H.T., H.T. and Low Tension Underground Cable Systems. Consideration will, however, be given to those who have been unable to obtain the practical experience but have the necessary technical qualifications.

Junior Draughtsman.—Salary in accordance with Class G, Grade 9a, at present £360 3s. £375 18s. per annum. Preference will be given to candidates having had experience in the preparation of network diagrams and records covering mains, services and sub-stations.

Each of the above permanent appointments will be subject to the provisions of the Local Government Superannuation Acts, 1937 and 1939, and to a satisfactory 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 arrangements whatsoever for the provision of housing accommodation for the successful candidates.

Application forms for each of the above positions may be obtained from the Engineer and General Manager, Electricity Department, 341/343, Holloway Road, N.7, and should be completed and returned to him, endorsed appropriately, not later than noon on 16th May, 1947.

W. ERIC ADAMS,
Town Clerk.
Town Hall,
Upper Street, N.1.

VACANCIES for qualified electricians and mates. Only first class men used to all classes of wiring contracts need apply.—Write Box L.E.P., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4, or phone FLA 5695 for appointment.

SITUATIONS VACANT

BOROUGH OF LEYTON.

ELECTRICITY DEPARTMENT.

(a) **Cable Jointer.**
(b) **Plumber.**

(a) CABLE JOINTER.—Applications are invited for the position of Cable Jointer, and applicants must have had extensive experience in all types of Low Tension jointing, Feeder Pillars, Network Boxes, and general Low Tension distribution work. The present rate of wages is 2s. 6½d. per hour, making a total of £5 18s. 5½d. for a 47-hour week, which constitutes a normal week of work.

(b) PLUMBER.—Applications are invited for the position of Plumber, and applicants must be qualified plumbers, fully competent to carry out plumbing work on all types of domestic and commercial hot water systems, and should preferably have experience in the installation of electrical water heating apparatus. The present rate of wages is 2s. 7½d. per hour, making a total of £6 3s. 4½d. for a 47-hour week, which constitutes a normal week of work.

Applicants for the above positions must not be more than 40 years of age at the dates of appointment, which are subject to the Conditions of Service laid down from time to time by the Council, including membership of a Trade Union, and the District Council (No. 10), Greater London Area, Electricity Supply Industry, and to the provisions of the Local Government Superannuation Act, 1937. The successful candidates will be required to satisfy the Medical Officer of Health as to their medical fitness.

Applications, in candidates' own handwriting, stating age, qualifications, experience, particulars as to membership of a Trade Union, and when able to take up duties, accompanied by copies of not more than three testimonials, to be sent to the Borough Electrical Engineer and Manager, Electricity Offices, Cathall Road, Leytonstone, E.11, not later than first post on Saturday, 10th May, 1947.

Canvassing in any form will be a disqualification.

D. J. OSBORNE,
Town Clerk.

Town Hall,
LEYTON, E.10.
19th April, 1947.

CITY OF LEEDS ELECTRICITY DEPARTMENT.

APPOINTMENT OF ENGINEERING DRAUGHTSMAN.

APPLICATIONS are invited for the position of ENGINEERING DRAUGHTSMAN.

Applicants should be experienced draughtsman, with first-class knowledge of the design and lay-out of large modern power station plant, both electrical and mechanical. They should be familiar with the lay-out of cable and piping, and experience of civil engineering works will be an advantage. Higher National Certificate or an equivalent qualification is required.

The salary and conditions of employment will be in accordance with the N.J.B. Agreement, Class K, Grade 9a (at present £417 to £436 per annum).

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

Applications stating age and giving details of education, technical training and experience should be sent to the undersigned not later than 14th May, 1947. Canvassing in any form either directly or indirectly will be a disqualification.

F. NICHOLLS,
General Manager and City Electrical Engineer.

1, Whitehall Road.
LEEDS.

SITUATIONS VACANT

MUNICIPALITY OF SINGAPORE.

ELECTRICITY DEPARTMENT.

District Engineer.

THE Municipal Commissioners of Singapore invite applications for the appointment of District Engineer on the permanent staff of the Electricity Department, the appointment to be in the first instance on a three years' agreement.

Applicants should be between the ages of 30 and 40 and be Corporate Members of the Institution of Electrical Engineers and have had experience on Direct and Alternating Current systems, the laying and jointing of High and Low pressure armoured cables, the erection and maintenance of High Tension and Low Tension Overhead Lines, Switchboards, Transformers, Protection, etc.

Experience on the installation and maintenance of modern Street Lighting will be an advantage.

The selected candidate must pass a medical examination.

Salary:—$7 680, $8 160 and $8 640 per annum respectively for the three years of agreement, rising thereafter (if service be continued) to a maximum of $9 600 per annum, plus such Cost of Living Allowance as may be approved by the Municipal Commissioners. At present it is:—

(a) $10 plus 30 per cent. of salary for married officers, subject to a maximum of $160 per mensem.
(b) $10 plus 20 per cent. of salary for single officers, subject to a maximum of $110 per mensem.

The exchange value of the dollar is 2s. 4d. sterling. Free passage will be provided with half salary during the voyage to Singapore.

Eight months' leave with full pay is normally granted after four years' service. A Provident Fund is operated by the Municipal Commissioners.

Applications stating whether married or single, age, birthplace, details of education, qualifications, training and experience, accompanied by copies of three recent testimonials, must be lodged with Messrs. Peirce and Williams, No. 1, Victoria Street, London, S.W.1 (Agents to the Municipal Commissioners), not later than 16th June, 1947.

MUNICIPAL COMMISSIONERS OF GEORGE TOWN, PENANG.

MAINS ENGINEER.

APPLICATIONS are invited for the post of:—

One Mains Engineer.

Candidates should be Corporate Members of the Institution of Electrical Engineers.

Salary scale $450 - 25A - $750 with Efficiency Bar at $600.

Commencing salary $675.

Cost of living allowance $110 and $135 per month for single and married man, respectively.

Age limit, 25-40.

The person appointed will be required to devote his whole time to the Department, and to perform such duties as may be allotted to him by the Municipal Electrical Engineer and Transport Manager.

It will be necessary for him to enter into an Agreement with the Commissioners, and to pass a medical examination and contribute to the Provident Fund.

Candidates must have a sound technical and practical training, and experience in E.H.T. (11 000 v.) and L.T. overhead and underground mains, switchgear transformers and protection equipment.

Applications endorsed "Mains Engineer" should be posted to Messrs. Preece, Cardew and Rider, 8, Queen Anne's Gate, Westminster, S.W.1, not later than Friday, May 16th.

SITUATIONS VACANT

SHEFFIELD CORPORATION ELECTRICITY DEPARTMENT.

APPOINTMENT OF MAINTENANCE ENGINEER.

APPLICATIONS are invited for the position of Maintenance Engineer at the Blackburn Meadows Generating Station of the above Undertaking.

Applicants must have had a thorough mechanical training in a large Engineering Works with practical workshop experience, and be in possession of a degree or technical qualification admitting to Corporate Membership of a recognised Professional Institution.

The successful candidate must also have had experience with the routine maintenance of Power Station plant, including high pressure boilers, turbo alternators and their associated auxiliaries, and be capable of organising such work and carrying it out with expedition.

The salary will be in accordance with Class L, Grade 6, of the National Joint Board Scale, present value £704 per annum rising to £736 per annum.

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 selected candidate will be required to pass a medical examination.

Form of Application may be obtained from the undersigned.

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

The latest date for the receipt of applications is 16th May, 1947.

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

Commercial Street,
SHEFFIELD, 1.

BEDFORD CORPORATION ELECTRICITY UNDERTAKING.

APPOINTMENT OF MAINS ASSISTANT.

APPLICATIONS are invited for the position of Mains Assistant. Candidates, whose age must not exceed 45 years, must be a Graduate or Corporate Member of the Institution of Electrical Engineers or other acceptable equivalent qualification, with practical experience in the laying, erection and maintenance of 33 kV, 11 kV and lower voltage underground and overhead cables and the associated sub-station equipment.

The commencing salary will be in accordance with Grade 7, Class "G," of the National Joint Board Schedule (at present £494 per annum), rising to Class "H" as from July 1st, 1947, salary £538 per annum. The appointment will be subject to the provisions of the Local Government and other Officers' Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications containing full details of age, qualifications and experience, accompanied by copies of three testimonials, to be forwarded to the undersigned not later than 12th May, 1947. Canvassing, either directly or indirectly, will disqualify the candidates.

A flat will be available to the successful candidate at a reasonable rent, if required.

P. G. CAMPLING,
Chief Engineer and General Manager.

Electricity Offices,
Prebend Street, BEDFORD.
April 24th, 1947.

SITUATIONS VACANT

MANCHESTER CORPORATION ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following appointments:—

FOUR JUNIOR ENGINEERS for training in Power Station Operation, at a salary in accordance with Class J, Grade 10b, of the N.J.B. Schedule (£316 p.a. to commence).

Applicants must have served an apprenticeship in engineering, and have technical qualifications equivalent to the Higher National Certificate in either electrical or mechanical engineering. Previous experience in power station work not essential. Must be prepared to do shift work if required. Age between 20 and 30.

The appointments are subject to the City Council Superannuation Scheme, and successful candidates will be required to pass a medical examination.

Applications stating age and full particulars of technical training and experience, together with copies of testimonials, to be endorsed "Junior Power Station Engineer," and addressed to the Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2; and be received not later than Friday, 23rd May, 1947.

Canvassing, directly or indirectly, will disqualify.

PHILIP B. DINGLE,
Town Clerk.

Town Hall,
MANCHESTER, 2.
25th April, 1947.

COUNTY BOROUGH OF PRESTON.

ELECTRICITY UNDERTAKING.

Switchboard Attendant.

APPLICATIONS are invited for the appointment of a SWITCHBOARD ATTENDANT for shift duties at Ribble Generating Station No. 2, Penwortham, Preston.

Applicants should preferably have had experience in the operation of switchgear and it is desirable that Technical education shall have reached at least Ordinary National Certificate standard.

The appointment is a permanent one, and will be subject to the provisions of the Local Government Superannuation Act, 1937. Conditions of service will be in accordance with those of the National Joint Industrial Council for the Electricity Supply Industry, the present rate of pay being 32.5d. per hour.

Applications, stating age, qualifications, and giving full particulars of training and experience, accompanied by not more than two recent testimonials, and endorsed "SWITCHBOARD ATTENDANT," should be forwarded so as to reach the undersigned not later than 17th May, 1947.

G. A. ROBERTSON,
M.Sc.Tech., M.I.E.E., M.I.Mech.E.,
Borough Electrical Engineer.

40 and 41 Lune Street,
PRESTON.
23rd April, 1947.

OVERHEAD Power Linesman required to carry out construction and maintenance of overhead power and service lines.

Rate of pay (2s. 5d. per hour) and conditions of employment in accordance with the N.J.I.C. Agreement. The appointment will be subject to the Local Government Superannuation Act, 1937, and to the passing of a medical examination. Applicants must be under 35 years of age unless they are already contributors to a Superannuation Scheme under the above Act. Canvassing will disqualify.

Apply to Chief Engineer and Manager, Electricity Department, Electric House, London Road, Southend-on-Sea.

EDUCATIONAL

UNIVERSITY OF LIVERPOOL.

FACULTY OF ENGINEERING.

Dean: Professor R. G. Batson, M.Eng., A.K.C., M.I.C.E., M.I.Mech.E.

THE University awards the Degrees of B.Eng., M.Eng., D.Eng., Ph.D., and a Certificate and Diploma in Engineering.

Degree Candidates must pass an examination or examinations for Matriculation into the University. Certificate Candidates must submit evidence of having received a good general education. Diploma Candidates must possess the Certificate in Engineering.

The Courses are designed for students desiring to qualify as MECHANICAL, ELECTRICAL or MARINE ENGINEERS, as NAVAL ARCHITECTS and METALLURGISTS, or METALLURGICAL ENGINEERS. The Courses cover the subjects of examination for Associate Membership of the Institutions of Civil, Mechanical and Electrical Engineers. The Institutions named, subject to certain conditions, accept the degree of B.Eng. in lieu of part, and in some cases the whole, of the examinations for Associate Membership. The degree of B.Eng. in Civil Engineering admits to the special examination of the Chartered Surveyors' Institution. The various Departments are housed in commodious and well-equipped buildings, and provide ample facilities for research.

A Prospectus of the Faculty, giving particulars of Courses and a large number of Entrance Scholarships and Post-Graduate Studentships, may be had on application to the undersigned.

STANLEY DUMBELL,
Registrar.

SALES BY AUCTION

G. R.

BY ORDER OF THE MINISTER OF SUPPLY.
AT ROYAL ORDNANCE FACTORY, SELLAFIELD,
Near WHITEHAVEN, Cumberland.

PENRITH FARMERS' AND KIDD'S AUCTION CO., LTD., have received instructions to SELL BY AUCTION without reserve on MONDAY, 19th MAY, to THURSDAY, 22nd May (Sale at 11 a.m. each day),

SURPLUS GOVERNMENT STORES, PLANT AND EQUIPMENT,

comprising: Builders' (and Associated Trades) Materials and Fittings, Electrical Plant and Spares, Mechanical Plant and Equipment, Chemical Plant and Equipment.

Miscellaneous Items, including Office Furniture, Linoleum, Steel Cupboards, Wooden Racks, Structural Steelwork, Electrical Water Pumps, La Bour Pumps, Fans, M.S. Tanks, Sackbarrows, Avery Platform Scales, C.I. Water Mains, 2 Term Water and Air Valves, Tools, M.S. Piping, Asbestos Sheeting, Roof Trusses, etc.

On view from Monday, 12th May, to Thursday, 15th May, from 10 a.m. to 4 p.m.

Light Refreshments by J. Ratchford, Carlisle.

The Sale will be held in the Canteen by courtesy of Messrs. Courtaulds.

Catalogues obtainable on application to the above Auctioneers. Price 6d.

Address: Agricultural Hall, Penrith, Cumberland. Tel.: Penrith 2323/4.

PATENT AGENTS

MEWBURN, ELLIS & CO.,

PATENTS, DESIGNS AND TRADE MARKS,
70 & 72, Chancery Lane, London, W.C.2.
Grams: "Patent, London." *'Phone: Holborn 0437 (2 lines)*
And at—NEWCASTLE: 3, St. Nicholas Buildings.

FOR SALE

GENERATING Set by Canning, 500 amps., 12 volts, D.C., complete with instrument panel, switchfuse and oil-immersed starter; motor 10 h.p., 420 volts, 50 cycles.—Maun Industries Limited, Mansfield, Notts.

COMBINED Bridge Megger and Varley Loop Test Set, Evershed Vignoles, 500 v., .01 ohm to 100 megohms.—Foster, School House, Wye, Kent.

FLYPRESSES: (New) Standard and Deep Throat, All Sizes. Immediate delivery. 100 in stock.—Victa Engineering Company, Maidenhead. Telephone 50.

31 IN. Gap Bed Screwcutting Lathes, £35; 2 Brand New. 25 available for immediate delivery. Also 6 with ½ h.p. motors. Specification on request.—Victa Engineering Co., Maidenhead, Berks.

200 ELECTRIC Motors in stock, from ¼ h.p. to 25 h.p. State requirements.—Victa Engineering Co., Maidenhead. 'Phone 50.

55 KW. 400/440 volts, 3-phase, 50 cycles, 4-wire system, Diesel engine driven, ALTERNATOR SETS.—Horseshoe Supply Co. (Spalding), Ltd. 'Phone: Spalding 3088, Horseshoe Road, Spalding.

METROVICK Spot Welding Machine, 60 kVA, 400/440 volts, single-phase.—Apply—Miller Insulation Co., Ltd., 103, Northinch Street, Glasgow, W.4.

BI-UNI.—The New Push-Button Flush-Fitting Domestic Switch. Wholesale Enquiries Only. Send for details—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

ALLAN Steam D.C. Generating Set, 110 v., 182 amps., compound; Westinghouse Generator, 50 kW, 115 v., compound, 620 r.p.m.; Taylor Generator, 30 kW, 115 v., compound, 750 r.p.m.; Lister 3-h.p. Diesel Engine and Solovane 1½ in. Centrifugal Pump, 4 000 gallons per hour; Royles Cloth Filter; quantity new and used 110-v. Lamps.—Norman Crowther, 133, Roundhay Road, Leeds, 8.

FLUORESCENT REFLECTORS good quality commercial type in several designs, any quantity supplied.—Dept. 6, JOHN PHILLIPS AND CO. ELECTRICS, 31, Fortune Green Road, N.W.6. Hampstead 8132.

A.C./D.C. Motors can be supplied from stock or at short notice.—JOHN PHILLIPS AND CO. ELECTRICS, 31, Fortune Green Road, N.W.6. Hampstead 8132.

TELEPHONES, Ex-Admiralty for Ships, Mines, Factories. Handsets, Jacks and Plugs, Indicator Lamps and Jacks. 25 000 RELAYS (20 types), 150 000 yds. Sleeving, Switch Keys. Five tons Ebonite and Fibre rod, sheet and tube. 5 line Switchboards. 10 line Portable metal switchboards. Accumulator Capacity Testing sets. 5 bank Indicators and Jacks. 4 way flat and concentric Jacks and Plugs. Resistance wires, Nichrome, Cupro Nickel, Eureka and Constanton. Laminations, Interleaving Paper. Call and inspect.—Jack Davis, 30, Percy Street, London, W.1. Museum 7960.

LIGHT ALLOY SHEETS available in large quantities for immediate delivery ex-stock in all gauges from 6 ft. by 2 ft. to 8 ft. by 4 ft. from 1s. 6d. to 2s. per lb.; also Light Alloy Tubes, Bars, Strip, Coils, Angles, etc. —Box L.E.N., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

1—65 h.p. L.D. M. 3 Bearing Slip Ring Motor, 400 volts 3 phase 50 cycles, with Control Gear.—Oldfield Engineering Company Limited, 96, East Ordsall Lane, Salford, 5.

ELECTRIC MOTORS, A.C. and D.C. We supply all types and sizes of Electrical Machinery—Slow Speed Reduction Gears can be supplied to customers' requirements with short deliveries. Send your enquiries to The Electro Power Co. Ltd. (formerly Be-Be, Eng.), 3, Retreat Close, Kenton, Middlesex. Tel.: WORdsworth 4928.

FOR SALE

SECTIONAL TIMBER BUILDINGS.

COMPLETELY reconditioned and equal to new. Sizes: 6 ft. by 6 ft., 16 ft. by 8 ft., 24 ft. by 12 ft., 48 ft. by 16 ft., 60 ft. by 16 ft., 8 ft. by 8 ft., 20 ft. by 12 ft., 36 ft. by 16 ft., 54 ft. by 16 ft., 72 ft. by 16 ft. No purchase licence required. Offered subject to being unsold.—D. McMaster and Co., 21c, Mount Bures Works, Bures, near Colchester, Essex. Telephone: Bures 351/3.

FLUORESCENT FITTINGS. — Trough or Flush type fitted "Constead" or Hi-Craft Ballast control gear, complete with tubes. Delivery 7/14 days. Apply:—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

FLUORESCENT FITTINGS. — Fluorescent wise from Scemco buys. For details of Fittings, Control Gear and accessories, send for our 12 page pamphlet. Apply:—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

FLUORESCENT LIGHTING.—We guarantee our Control Gear. All types including "Constead," Hi-Craft Ballast, Transtar, etc. Immediate replacement free of charge if defective in any way. Apply:—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

FLUORESCENT LIGHTING.—CHOKES, extra quality, elongated, 4 ft., 40 W, tapped 200/250 V, silent working, each unit guaranteed, measurements 1⅜ in. by 1⅜ in. by 8½ in. Price £1 5s. each net. Carriage extra.—Write Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

FLUORESCENT LIGHTING. — 30 watt fitting complete with self-contained control gear and 36 in. tube, £6 12s. 6d. Immediate delivery with guaranteed component and tube replacement service.—Apply Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

FLUORESCENT LIGHTING. — Write for details of our amazing OUTDOOR UNIT. Guaranteed weatherproof with rubber insulated unbreakable glass covering with 1, 2 or 3 tubes. Ideal for garages, sports stadiums, wharfs, etc.—Apply, Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.

ELEMENT Products Ltd., 136, Fenchurch Street, London, E.C.3. Job lines available for immediate delivery: Rubber Tubing, Sleevings, including Systoflex and Telcothene, Tenatube, Tufnol and Bakelite Strips and Tubes, Ebonite and Paxoline Sheets, Plastic Rods. Also Fine Wire and Cables and Textile-covered Wires, Empire Cloth, etc.

FOR SALE.—Two Morrison 50 cwt. Electric Vehicles, 1939 Models, complete with Westinghouse Metal Rectifiers. All good condition.—Brickwood and Co. Ltd., The Brewery, Portsmouth.

WHY not assemble your own Fluorescent Fittings? We can supply 5 ft. Troughs, Chokes, Power-Factors, Suppressors, Starters, Lamp Holders, etc., at a special all-in price, or separately. 5 ft. and 4 ft. Fittings complete with tubes at a keen price.—Write, call or 'phone L. Goodman (Radio) Ltd., 9, Percy Street, Tottenham Court Road, W.1. MUSeum 0216.

ALTERNATOR Sets, Coventry Climax, four-cylinder engine driving 2½ kVA. 130/3/50 alternator. Completely self contained. Immediate delivery, price £85 each, or alternators rewound for 230/1/50, £125. Two months' delivery. Mathew Brothers, Sandy Lane North, Wallington. 'Phone: Wallington 4050.

LADDERS, Trestles and Handcarts, from Ramsay and Sons (Forfar), Ltd., Forfar.

FOR SALE

BRITISH Electric Co. (Beco) Ltd., can supply most types of A.C. and D.C. Motors from stock.—British Electric Co. (Beco) Ltd., Electra House, 25/29, Lower Road, Rotherhithe, S.E.16. Bermondsey 3449.

DE luxe model door chimes, Protectafil shock absorbers, radio transformers and rewinds, chokes, starter switches, 2 and 3 kW immersion heaters. Send for list.—J. E. Wildbore, 26, Marlborough Street, Oldham, Lancs.

600 SLOT METERS.—Watt-Hour 1s. prepayment 2½ amp. 200/250 V., S/P 50 period, as new.—Price on application to the Contractors Plant Register Ltd., 26, Waterloo Road, Epsom, Surrey. Tele.: 1712.

1 —CANNING Motor Generator set, 400 volts 3 phase 50 cycles, output 6 volts, 3 000 amperes.—Oldfield Engineering Company, Limited, 96, East Ordsall Lane, Salford, 5.

FLUORESCENT Lamp Control Units (80 W).—High power factor. Choke, P.F. condenser, R.I. suppressor and thermal type starter switch are embodied in a neat, elongated, compound filled unit, providing silent operation.—Zodiac Electrical Products, Springfield Road, Guiseley, Leeds.

FLUORESCENT Lighting Fittings.—Complete with 5 ft. 80 W daylight or warm white lamp and all control gear, can be supplied from stock.—Zodiac Electrical Products, Springfield Road, Guiseley, Leeds.

PYROVAC All-volt Immersion Heaters, with the finest heating elements in the world. Large stocks, immediate delivery.—Cestrian Electrical Co., Northgate, Chester. 'Phone 455.

LAMPSHADE FRAMES: Superior quality—brass. Suitable retail sale for Handicrafts. For sample range and list send 13s. to Beauti-Line Art Products, 32, Silverwood Road, Peterborough.

LAMPSHADES. Modern designs, beautifully executed at attractive prices. Generous trade terms. Agents wanted.—Thanet Industries (Kent), Clarence Road, Ramsgate.

DUPLICATE books, billheads, memos, etc.; estimates by return; prompt delivery.—Central Press, Fence, Burnley, 5.

SWITCH BLOCKS, HARDWOOD, POLISHED AND GUARANTEED.

3 in. by 3 in. by ½ in., 6s. doz.; 3 in. by 3 in. by ¾ in., 6s. 9d. doz.; 3½ in. by 3½ in. by ½ in., 6s. 9d. doz.; 3½ in. by 3½ in. by ¾ in., 7s. 6d. doz.; 6 in. by 3 in. by ½ in., 8s. 9d. doz.; 6 in. by 3 in. by ¾ in., 9s. 6d. doz.; 6½ in. by 3½ in. by ½ in., 9s. 6d. doz.; 6½ in. by 3½ in. by ¾ in., 10s. 9d. doz. Carriage paid. Crossed cheque with order.—**S.T.C. Manufacturing Co.**, 33, Grange Road, Ramsgate.

FLUORESCENT LIGHTING UNITS, 4-ft. and 5-ft., FROM STOCK, with Warm White or Daylight tubes. Send for new illustrated Trade List.—Moss Bros., 53, Goodge Street, W.1. MUS. 5385.

RUBBER STAMPS can assist in many ways. Are yours satisfactory and in good condition? W. L. Boughton, maker of all kinds, 53, Kenley Road, Merton, London, S.W.19.

SACKS and Bags in excellent condition for all commodities, as low as 4½d. each. Write: John Braydon Ltd., 230, Tottenham Court Road, W.1. Tel. No.: Museum 6972.

LEATHER FINGER STALLS.—Made of Chrome Hide. Very strong and hard wearing. Length 3 in. Price 4s. per doz. Prompt delivery. Sample on application.—Willson Brothers, Industrial Clothing Manufacturers, Epsom, Surrey.

JUNCTION Electric Irons, superior design and quality, supplied with suitable stand. Also Junction Nickel plated Torch Cases. Supplied for home trade and export. Also large selection of household electrical appliances, Fires, Radiators, other electric Irons, Toasters, Table Lamps, Torch cases, Dry batteries, etc. Please write for full list. —Brooks & Bohm, Ltd., 90, Victoria Street, London, S.W.1. Tele.: Vic. 9550/1441.

FOR SALE

ATLAS lamps from stock, delivery in London, Surrey, Sussex and Kent; other lines include clocks, toasters, fires, irons, kettles, fans, fittings, chargers, speakers, etc.—Drubel Radio Distributors, Ltd., 39a, Stafford Road, Croydon. Croydon 1107.

TIME SHEETS.—Our stock-printed Time Sheets are remarkably cheap compared with specially printed ones. On decent quality 8 in. by 10 in. paper:—100, 3s. 6d.; 500, 15s.; 1 000, £1 7s. 6d. Post Free. Send for sample.—F. H. Brown Ltd., P.O. Box 26, Burnley, Lancs.

TINNED STEEL ARMATURE BINDING WIRE.—All even numbered sizes from 16 s.w.g.-28 s.w.g. supplied from stock on 7 lb., 14 lb. or 28 lb. reels.
FREDERICK SMITH & CO. WIRE MANUFACTURERS LTD., CALEDONIA WORKS, HALIFAX.

LABELS in COLOUR by most up-to-date processes, Ltd. Studio and Photographic Department. Send to Label & Colour Specialists for samples. Carillon Press, Ltd., 1/4, Roumelia Lane, Bournemouth.

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.

WANTED

A.C. MOTORS, all sizes and voltages, best prices offered.—JOHN PHILLIPS AND CO. ELECTRICS, 31, Fortune Green Road, Hampstead, N.W.6. Hampstead 8132.

DIESEL Alternator, 25 or 30 kVA, 400 v., 3-phase, 50 cycles.—Durafencing Ltd., Bellingham Station Sidings, Bellingham, S.E.6.

DIESEL Alternator Set, 230/1/50, about 4 kW, automatic start. Urgent.—Gunn's Garage, Gairloch, Ross-shire.

URGENTLY wanted, A.C., 3-phase, 50-period, 2-speed Induction Motors, 5/5 h.p., 1 430/730 r.p.m. and 10/10 h.p., 1 430/730 r.p.m., for 415, 380 and 220-volt circuits. Protected enclosure preferred, but other enclosures considered.—W. E. Sykes Ltd., Staines. Tel. Staines 978.

URGENTLY wanted, A.C., 3-phase, 50-period Induction Motors, ½ h.p., at 935 r.p.m., and ¾ h.p. at 1 430 r.p.m., for 415, 380 and 220-volt circuits.—W. E. Sykes Ltd., Staines. Tel. Staines 978.

2—400 volts 3 phase 50 cycles Slip Ring Motors, 100 and 150 h.p., speeds 500 and 750 r.p.m.—Box L.E.O., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

APPROXIMATELY 12 Admiralty pattern 500 watt, 12 or 24 volt, L.D. and C. D.C. Generators.—Oldfield Engineering Company, Ltd., 96, East Ordsall Lane, Salford, 5.

CAPACITY available in perspex department for further orders of a mass production type.—T. W. Cawood and Son, Shopfitters, Doncaster.

FLUORESCENT Lighting Tubes, worn out and useless, 5 ft. and 4 ft. wanted, any quantities. 2s. 6d. each, plus carriage. Letters only to S. H. Brown, 37, Tavistock Square, W.C.1.

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.

ELECTRICAL steel sheet or laminations of reputable make, .014 in. to .020 in. thick will be purchased for cash in any quantity by Davenset Electrical Works, Leicester.

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.

WORK WANTED

S. AND H. BRYANT AND CO. have capacity for TOOL MAKING and PRESSWORK, production machining and assembling, experimental work, small centre lathe work.—Enquiries: 365, Torbay Road, Harrow, Middlesex.

ARMATURE Rotor, Stator and Coil Rewinding, any size.—J. E. Fowler, 241, Kirkgate, Wakefield. Tel. 3948.

PRESSED METAL PRODUCTS (LEICESTER), Middleton Street, Aylestone, Leicester, have capacity for light press work and would be pleased to receive your enquiries, for which a quoted price will be given to your drawing and specification.

ELECTRICAL Machinery overhauled, rewound, etc., any h.p., A.C. and D.C. Enquiries specially invited from colliery organisations.—Groom's (G.B.) Ltd., Queens Road East, Beeston, Nottingam. Tel.: Nott'm. 54529.

CAPACITY available Radio or Light Electrical Assembly or wiring. Experimental work undertaken. — Mail—Clifford and Richards, Electrical Engineers and Contractors, 58, Coronation Drive, Elm Park, Essex (or 'phone Hornchurch 4522, Romford 2381).

COIL winding capacity available.—Modern Armature and Coil Winding Co. Ltd., Liphook, Hants

METAL Polishing Capacity available.—Price's, 95, Lower Richmond Road, Putney, London, S.W.15. 'Phone: Putney 0179.

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

FOR Fractional H.P. Motor Rewinds and Repairs you cannot do better than send them to "Autofraction." We have a lifetime of concentrated experience in this field. Our work is high class and gives confidence to our customers. Why not send us your enquiries?—The Autofraction Motor and Eng. Co., 106, Beaconsfield Road, Southall, Middlesex (Phone: Sou. 3598).

REPAIRS

RUNBAKEN ELECTRICAL REPAIRS.—Rewinding to trade. Fractional h.p. motors a speciality, a.c. and d.c. Prompt service. Guaranteed work.—45, Oxford Road, Manchester. Tel.: ARD. 2507 (3 lines).

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

HOTPOINT, Hoover, Hoover Dustette, Electrolux, Armatures, Re-wound, 2 days' service, fully guaranteed, 35s. Trade enquiries invited.—J. Bateson, Gibraltar Works, Parkinson Lane, Halifax.

PATENTS

NOTICE is hereby given that Pye Ltd. and Dennis Illingworth Lawson seek leave to amend the Specification of the Application for Letters Patent No. 581 812 entitled "Improvements in or relating to multi-channel signalling systems."

Particulars of the proposed amendment were set forth in the Official Journal (Patents) No. 3037 dated April 30th, 1947.

Any person may give Notice of Opposition to the amendment by leaving Patents Form No. 19 at the Patent Office, 25, Southampton Buildings, London, W.C.2, on or before the 31st May, 1947.

H. L. SAUNDERS,
Comptroller-General.

SITES TO LET

BLACKPOOL DEPARTMENTAL STORE—in best position in town—has sites to let for individual traders. Rental includes site, light, heat, modern fittings and equipment and service. Unique opportunity for small trader to enjoy store popularity in finest holiday resort of the North. The Electrical Department is still available for occupation. Enquiries invited.—Write in first instance to Lawrence Mark, Solicitor, 23, King Street, Manchester, 2.

MISCELLANEOUS

WE are exhibiting a wide range of novelties in electrical appliances at Stand No. 18, "Britain's Best" Exhibition, Royal Horticultural Hall, Westminster, from May 12th-23rd, 1947. All home trade customers and overseas visitors are invited.—Brooks & Bohm, Ltd., 90, Victoria Street, London, S.W.1.

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

BUSINESS OPPORTUNITIES

SCEMCO LTD., Fluorescent Lighting Specialists, wish to contact manufacturers of electrical equipment and accessories, including Domestic and Industrial Lighting Switches, all "Novelty" and "Improved" electrical appliances. Fluorescent Tubes, Fittings and Components, both Domestic and Industrial, of particular interest. Where possible complete output will be taken and full co-operation given in exchange for sole distribution rights. Replies will be treated with strictest confidence. — Managing Director, Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1.

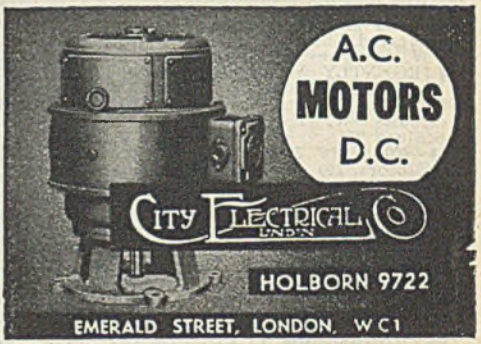
BUSINESS FOR SALE

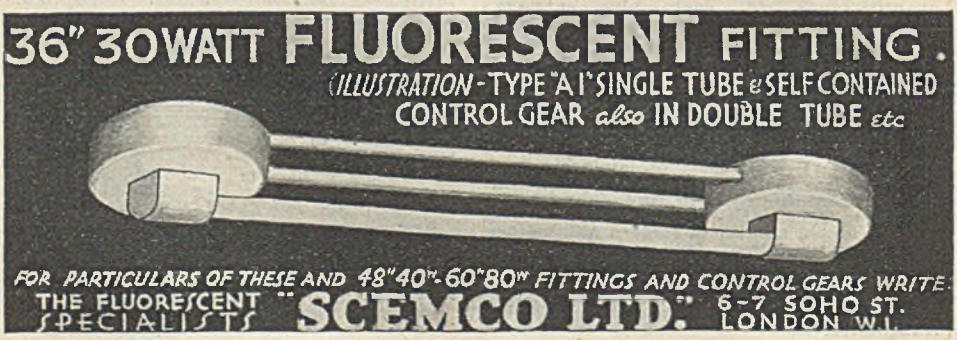
FOR SALE, Modern Works in Warrington area. Immediate Possession. Freehold and free from fief; single storey, containing 26 000 square feet approx., with ample land for extension, making an overall area of 2 acres approx. Adequate electric power and utility services, central heated, perfect natural light. Artesian well with water storage tank on roof with large cubic capacity, ensuring adequate hydraulic water supply. For further particulars and application to view—Leon Burton Ltd., 83, Princess Street, Manchester. Phone: CEN. 0778.

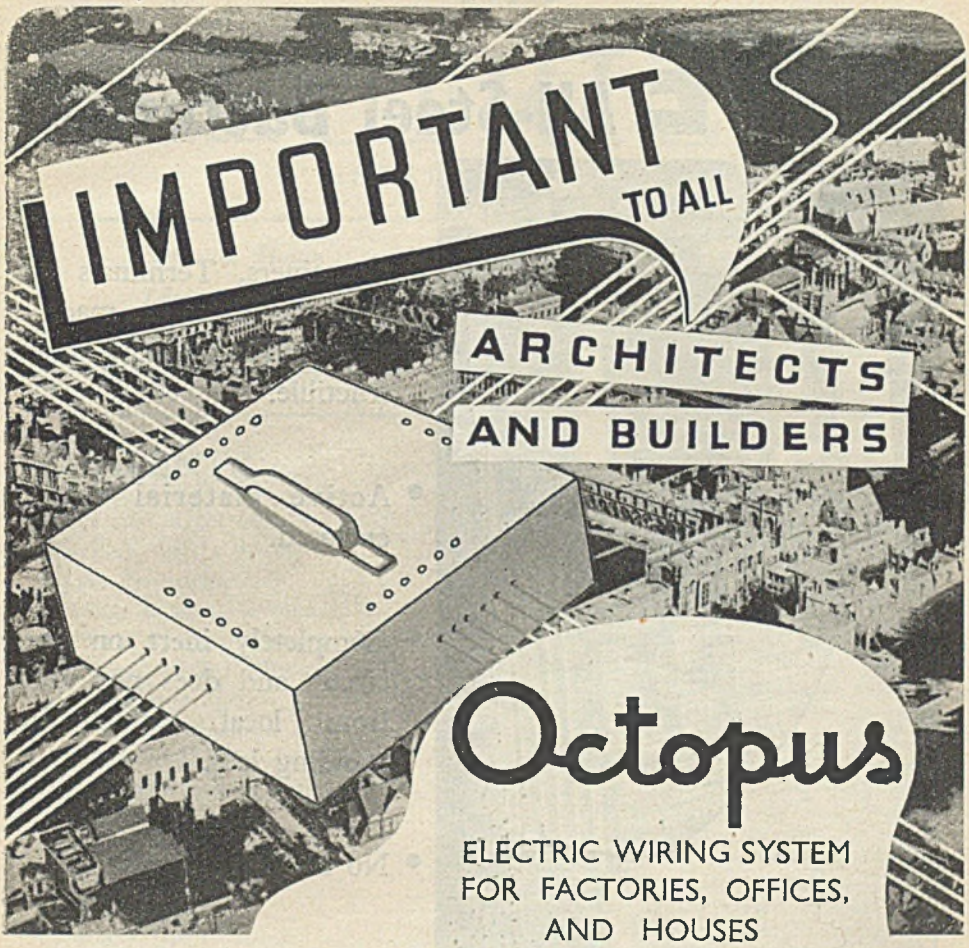
AUCTIONEERS AND VALUERS

RICHARDS & PARTNERS,
Auctioneers and Valuers of
PLANT AND MACHINERY AND INDUSTRIAL PROPERTY,
Granville House, Arundel Street, London, W.C.2
Telephone: TEMple Bar 7471.

CORK
BRITISH CORK MILLS LTD.,
167, Victoria Street,
London, S.W.1.
Phone: VICtoria 1414/6. 7913







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.

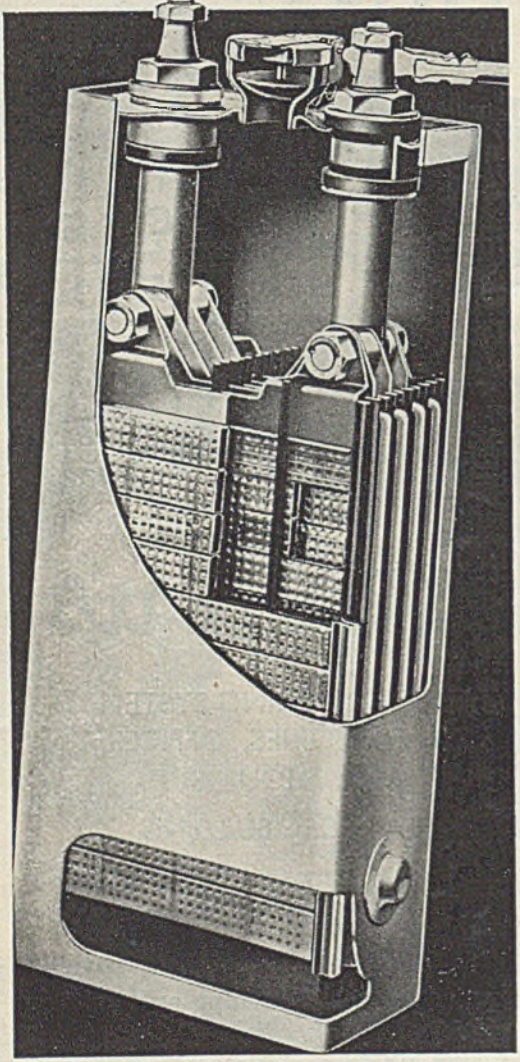
Write for illustrated brochure to

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.

NIFE All-Steel Batteries



- Containers, Terminals and even the Plates are made of steel and practically indestructible.
- Active material totally enclosed.
- Completely inert on open circuit and does not suffer from local action and standing loss.
- No corrosive fumes.
- Alkaline electrolyte non-corrosive to all cell parts, including terminals.

That's why there is

MORE LIFE in a NIFE

Now available for all purposes except private radio and private cars.

NIFE BATTERIES LTD., Redditch, Worcs.

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 3594 2 MAY 1947 *Vol* CXXXVIII *No.* 16

CONTENTS

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

SCOTTISH 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.
(BY POST) - - - - 8d.
ANNUAL SUBSCRIPTION
HOME AND OVERSEAS - - - 30s

The B.I.F.

THE British Industries Fair opens in London and Castle Bromwich on Monday, with a record number of 3 131 manufacturers occupying 835 000 sq. ft. of floor space; a million square feet could have been disposed of, it is reported, had it been available. That British industry, only 21 months after the end of hostilities should have offered this measure of support, indicates not only the remarkable extent to which reconversion has taken place in the face of unprecedented difficulties, but also the conviction among manufacturers that the Fair represents an important unit in the spearhead of the export drive. Since its inception in 1915, this event has always been directed primarily at the overseas markets, but whereas before the war the prosperity of the country hinged on a satisfactory volume of exports, there is to-day a general awareness that not only prosperity but national survival will be conditioned by the degree to which foreign buyers can be persuaded to purchase British goods in quantities higher than at pre-war levels.

As the advance review of exhibits which begins on a later page clearly shows, the electrical industry has much to offer that is new and much that, given fair opportunity, should have little difficulty in finding and maintaining general, as well as technical, popularity overseas. Where export market conditions and preferences have changed since the war, the personal contacts between buyers and manufacturers, which are one of the most valuable features of the Fair, will indicate to industry what adjustments

may be required. There have in recent months been too many ill-worded statements concerning British economic and political prestige, and though behind the shop-windows of Birmingham and London next week will lie a grim story of shortages and the effect of the crippling fuel crisis of last February, the Fair will, nevertheless, give ready answer to our critics. It remains true—and buyers at the Fair will have no doubt of it—that on the score of quality, Britain still leads the world. Given determination in all grades of industry to work harder, and by the agents of bureaucracy, less hindrance to the process of expanding production, the B.I.F. of 1947 may well prove a useful sign-post on the road which will lead us to even greater reward for our endeavour.

Electrical Exports Improve

THE overseas trade returns for March showed that electrical exports increased in value during the month from £5 016 602 in February to £5 438 004, a rise of £421 402, but did not reach the total for January of £5 574 939. While this improvement gives some cause for encouragement there are indications that the full effect of the fuel crisis is not yet evident, and there is considerable leeway to be made up before the best monthly return for 1946, of over £6 million, is reached. Shipments of telegraph and telephone wires and cables fell in value from £169 287 in March of last year to £113 521, electric cables, wire strips and strands, with insulation other than rubber, from £492 260 to £293 455, radio telegraph and telephone equipment from £507 369 to £437 437, electric lamps from £123 082 to £114 220, and portable electric appliances (other than vacuum cleaners) from £35 295 to £18 737. These decreases were more than offset by increases in supplies of other articles to overseas buyers and, in the aggregate, the exports for the month exceeded in value those for March of last year by £1 244 278. The figures for the first quarter of this year rose by £4 527 653 over those for the corresponding period of 1946, so that in spite of restrictions, shortages of materials, skilled labour and other handicaps, the electrical industry is maintaining steady if not spectacular progress. It is, however, still not within measurable distance of reaching the export target set for it, as is indicated by the fact that while the total value (£16 030 009) of its products sent out of the country was nearly three times the value (£5 487 604) of those despatched in a quarter of 1938, the volume, except in domestic radio receiving sets and vacuum cleaners, was in most cases where figures are given, considerably less than double the quantity, and in others little more, than the 1938 exports.

The 25 per cent. Economy Plan

THE Government ban on electric space heating from May 5 to September 30 was not altogether unexpected in view of the present load shedding made necessary by shortage of generating capacity, but to expect each household to reduce consumption by 25 per cent. on last year is optimistic in the extreme. Public - spirited householders have already cut their consumption to the bone, and since space heating is little used during the summer months, economy can only be made in lighting and cooking. The daylight prolonged by Double Summer Time will assist economy in current consumption for lighting little more than it did last year, and since to use the heating elements of a cooker longer than is necessary would only result in over-cooked fare, it is reasonable to assume that any reduction in current consumption in that respect is also unlikely. Again, the ban makes no recognition of the fact that domestic consumers are normally economical in the use of current for reasons concerned with their household budgets, and with space heating eliminated, there is little or nothing left in the way of electricity service which can be substantially reduced, unless the public is prepared to retire before it is dark or eat food which is only partly cooked.

Electricity Saves Coal

THE 25 per cent. fuel economy scheme was devised for saving 2 500 000 tons of coal by gas and electricity users, but the arrangements, we submit, need serious revision. The coal prospect for next winter, so far as the supply industry is concerned, is no less critical than last and it is therefore in the national interest that the most effective means of economy in solid fuel be applied. Among

those whose attention we hope to attract by this note must be included those who conceived the 25 per cent. economy plan, in that the scheme has about it a poor appreciation of relative values. Accepting for the moment the possibility of a 25 per cent. saving in electricity consumption, consideration should be given of its cost in substitute coal consumed for water boiling purposes, for instance. The overall economy of electrical methods compared with those using other fuels has been stressed time and again by the industry, and bearing in mind the fact that the latest ban is put forward not as a means of avoiding load shedding, but as a measure to save coal, we suggest that its result will be disappointing.

Miss Haslett Points Out a Danger

A SERVICE to the housewife and to the electrical industry was rendered last week by MISS CAROLINE HASLETT when, in the course of her paper on "Electricity in the Home," read before the Royal Society of Arts, she drew attention to the danger that the present difficult situation may not only carry us back to the old inefficient methods of using coal, but might also lead to neglect of the energy-saving aspect of electricity. The importance of the latter in relation to the need for women in industry was stressed. If the fullest use is to be made of the labour of married women, it is obvious, MISS HASLETT said, that labour-saving homes with proper labour-saving tools for all household jobs are as essential a part of the national industrial equipment as the worker's factory bench. The tendency in some quarters to consider that the development of domestic electrification has gone ahead too rapidly and that the need for saving the greatest possible quantity of coal is so great as to make the use of electricity for domestic purposes undesirable and uneconomic is, MISS HASLETT suggested, aggravated by confusion of thought regarding the two aspects of the problem of electricity supply—the short-term one of the lack of generating plant and the long-term one of the need for economy in the use of coal. The question of whether we can afford to use coal to produce electricity for domestic purposes, MISS HASLETT pertinently remarked, may well be countered by the question "Can we afford not to use it in this way?"

Heavy Plant Committee

THE reconstituted Heavy Electrical Plant Committee, the composition of which was given in our last issue, appears to be representative of every conceivable interest, and it is to be hoped that its size will not impair its efficiency and that sectional differences or conflicting opinions will not lead to prolonged discussions where harmony and singleness of purpose are essential for prompt decision. The stated object of the Committee, under the chairmanship of MR. JOHN WILMOT, Minister of Supply, is to serve as a medium for advice and co-ordination of the Ministries concerned, the two Electricity Boards and industry, and to act as a steering body for increasing and accelerating the output of heavy electrical plant for our power stations. At his Press conference, when the "We Work or Want" Campaign was opened, SIR STAFFORD CRIPPS, President of the Board of Trade, assured a representative of THE ELECTRICIAN that now that priority had been given by the Government, the necessary materials would be forthcoming. If the Ministry of Labour provides the skilled workers, the only remaining hurdle to be surmounted will then be the siting of new stations.

The Electron Jubilee

DURING an evening discourse at the Royal Institution in London on April 30, 1897, the British physicist, PROF. J. J. THOMSON, later SIR JOSEPH THOMSON, not only announced the existence of the electron and gave "an approximate estimate of its mass," but also foreshadowed the electron theory of matter, which has dominated physical research for the last 50 years. To THOMSON for the original discovery, for the brilliance with which he led the researches for the succeeding 20 years and the selfless devotion he gave to the training of the men who were to follow him, the world generally, and this country in particular, owe much. To mark the jubilee the Institute of Physics and the Physical Society, in collaboration with the I.E.E., are arranging a series of lectures and other functions to be held in London on September 25 and 26. In addition, an exhibition will be held.

Electricity in the Home

Confusion of Thought Regarding Supply Problems

In view of the Government direction that domestic consumers must, as from Monday next, reduce their current consumption and eliminate electric space heating, the following remarks by the E.A.W. Director are of special interest.

A WARNING that any arbitary decision to restrict the manufacture of electrical motor-driven household apparatus in an effort to reduce the consumption of current would have implications far beyond the actual saving involved, was voiced by Miss Caroline Haslett, director of the Electrical Association for Women, in a paper on " Electricity in the Home " read before the Royal Society of Arts in London on April 23.

After referring to the effect on the domestic consumer of electricity cuts, Miss Haslett said an impression was prevalent in some quarters that electricity was a luxury—an extra that could be dispensed with at the cost of inconvenience, but without real hardship. Though that impression might have been true many years ago, when electricity was used mainly to supplement other fuels, it certainly was not true to-day. It was necessary to differentiate clearly between the use of electric current to fulfil the normal functions of a fuel, when it was used as an alternative to gas, oil or solid fuel, and its use as a force, to operate motor-driven appliances, when it was employed as an alternative to human energy. That differentiation was of great significance for us to-day. The current consumption of electrical motor-driven household appliances was relatively small, and any arbitary decision to restrict the manufacture of such apparatus in an effort to reduce the consumption of current would have implications far beyond the actual savings involved. There was a distinct danger of the present difficult situation carrying us back, not only to the old ineffective methods of using fuel, but to the neglect of the energy-saving aspect of electricity. Although human energy could to some extent be substituted for the energy of electric power both in the domestic and industrial field, no one would suggest a permanent ban on the use of power-driven machinery in industry.

If, as a long-term policy, it was accepted that Great Britain must make the fullest use of the labour of married women, it was obvious that labour-saving homes with the proper labour-saving tools for all household jobs were as essential a part of the national industrial equipment as the worker's factory bench. It was important that the present fuel crisis should not be allowed to dominate the minds of those responsible for the provision of houses to such an extent that houses were erected without the necessary wiring, outlets and spatial planning to make possible the attainment of a full electric standard of living with all that it meant in terms of cleanliness, comfort, and the avoidance of unnecessary fatigue. There was a tendency in some quarters to consider that the development of domestic electrification had gone ahead too rapidly; that it outstripped the capacity of the generating plant to maintain the domestic load, and that the need for saving the greatest possible quantity of coal was so great as to make the use of electricity for domestic purposes undesirable and uneconomic. That tendency was aggravated by a confusion of thought regarding the two aspects of the problem of electricity supply—the short-term problem of the lack of generating plant, and the long-term problem of the need for economy in the use of coal. The question of whether we could afford to use coal to produce electricity for domestic purposes might well be countered by the question, " Can we afford not to use it in this way? "

It was essential from the point of view of the domestic consumer that the housewife should have free choice as to the purposes for which she used the electric current, which might be available within the framework of a national policy of fuel economy. She only was capable of deciding which of the services offered by electricity were most relevant to her needs, and which were the ones she would be prepared to reduce or dispense with under the pressure of an over-riding need for economy. The choice, if it was imposed by restriction in the national supply of coal, should not be further complicated artificially by non-provision of adequate basic installations in new or converted buildings, or by artificial limitations on the supply of apparatus.

Miss Haslett went on to deal with the various facilities offered to the housewife by electricity—space and water heating, lighting, cooking, refrigeration, cleaning, laundering, and the amenities of telecommunications.

British Industries Fair

Brief Details of the London and Birmingham Sections

The London and Birmingham Sections of the British Industries Fair will open simultaneously on Monday next, thus resuming, after the interruption of the war years, an event which has taken place annually since 1915. With a total of 3 131 manufacturers occupying approximately 835 000 sq. ft. of floor space, this year's Fair will constitute a record for size, the figures for 1939 having been 2 300 exhibitors and 816 000 sq. ft. At Olympia and Earls Court, where the textiles and lighter industries, including radio and electrical instruments, will be shown, there will be 2 153 exhibitors. The heavy engineering and hardware sections, which will again be at Castle Bromwich, will show the products of 978 manufacturers.

AS a result of catering difficulties and restrictions generally, it has not been found possible, in the 1947 British Industries Fair, to extend official hospitality at Birmingham, to societies and associations, as was the custom in pre-war days, while another departure from pre-war practice is the discontinuance of the committees, representing the industries concerned, which formerly acted in an advisory capacity on the selection of exhibits.

The Fair will be open each day from Monday, May 5, until Friday, May 16, both dates inclusive, with the exception of Sunday. The London Section (both Earls Court and Olympia) will open at 9.30 a.m. and close at 7.30 p.m., while the hours at Castle Bromwich will be from 10 a.m. until 6 p.m. For the convenience of buyers, the London section will be closed to the general public until 4.30 p.m. each day, with the exception of Saturday, May 10, when public admission will be permitted all day. There will be no similar restriction at Birmingham.

Exhibits at Olympia and Earls Court

AT the London Section of the Fair, the exhibits will be divided between Olympia, where most of the electrical interest will lie, and Earls Court. Representing the light industries, the Section will include scientific instruments and radio apparatus, at Olympia, and suction cleaners, at Earls Court. Below is given a brief review of some of the stands.

B.X. Plastics, Ltd., will, amongst a number of plastics products, show many of particular interest to the electrical industry. (Stand 809, Earls Court.)

Baldwin Instrument Co., Ltd., will show resistance, capacitance and inductance bridges, meters and many other laboratory instruments. (Stand A.1102, Olympia.)

Belling and Lee, Ltd., will feature radio and television components, such as interference aerials, fuseholders, delay switches and valveholders. (Stand C.1540, Olympia.)

Benn Bros., Ltd., proprietors of THE ELECTRICIAN, will display this and other trade and technical journals. (Stand A.1179a, Olympia, and Stand 754, Earls Court.)

Bowen Instrument Co., Ltd., will be showing electrical instruments, thermocouples and pyrometers. (Stand A.1106, Olympia.)

British Electronic Products, Ltd., will have process timers, motor controllers, servos, radio transmitters and a number of other electronic devices on show. (Stand C.1535, Olympia.)

British Physical Laboratories will feature conventional measuring instruments, multirange sets and several bridges, analysers and oscillators. (Stand A.1033, Olympia.)

British Vacuum Cleaner and Engineering Co., Ltd., will, at Olympia, display electric clocks and other timing systems and their "Teasmade" bedside tea-making set; and at Earls Court, various Goblin electric cleaners. (Stands F.1848 and E.1777, Olympia, and 718, Earls Court.)

Bylock Electric, Ltd., will feature suction cleaners for domestic and industrial use, electric floor polishers, hair driers, hot and cold air blowers, F.H.P. motors and electrical sub-assemblies. (Stand 719, Earls Court.)

Dawe Instruments, Ltd., will be exhibiting a variety of testing apparatus, which will include "Q" meters, valve voltmeters and stroboscopes. (Stand A.1103, Olympia.)

Dubilier Condenser Co. (1925), Ltd., in addition to a selection from their conventional capacitors and resistors, intend to show some special types, include transmitting condensers with gas dielectric, and high stability resistors. (Stand C.1525, Olympia.)

Duratube and Wire, Ltd., will show plastic insulated sleevings and conduits and various sizes of extruded plastic strip. (Stand 815, Earls Court.)

Easco Electrical, Ltd., will be exhibiting their "Call-Boy" intercommunicator equipment and some battery chargers. (Stand B.1406, Olympia.)

W. Edwards and Co. (London), Ltd., will be displaying rotary and diffusion vacuum pumps of various sizes, measuring equipment and plant for special vacuum processes in industry, research and education, and small compressors. (Stand A.1019, Olympia.)

Evans Electroselenium, Ltd., will show photo-electric cells and electronic counting devices. (Stand A.1013, Olympia.)

Foster Instrument Co., Ltd., will be exhibiting pyrometers and other indicating, recording and controlling instruments. (Stand A.1074, Olympia.)

Hoover, Ltd., will show their usual domestic appliances, including some new models; an additional feature of their stand will be laboratory equipment. (Stand 714, Earls Court.)

Industrial Tapes, Ltd., will show self-adhesive tapes in cellulose cloth and paper. (Stand 607, Earls Court.)

Marconi's Wireless Telegraph Co., Ltd., have taken the largest stand in the Radio Section at Olympia, an important feature of which will be a new 5 kW medium-wave broadcasting transmitter. Various navigational aids, police radio, aircraft communication equipment and marine radar devices will also be shown. (Stand C.1514, Olympia.)

Mullard Wireless Service Co., Ltd., will exhibit amplifiers and accessories, cathode-ray oscillographs and a number of other laboratory instruments, Ticonal magnets and a selection of transmitting and receiving valves. (Stands A.1018 and C.1538, Olympia.)

Multicore Solders, Ltd., will be showing five alloys and nine gauges of their well-known three-core solder wire. (Stand C.1516, Olympia.)

Pye, Ltd., will display examples of their post-war radiogramophones, television receivers, communications equipment, radio test gear and laboratory instruments. (Stand C.1518, Olympia.)

Rediffusion, Ltd., will make the main feature of their stand demonstrations of radio-frequency heating. Communications equipment, test gear and amplifiers will also be shown. (Stand C.1527, Olympia.)

Scientific Instrument Manufacturers' Association of Gt. Britain, Ltd., will indicate the activities of their 88 member firms, covering the whole range of scientific instruments and laboratory apparatus. (Stand A.1113, Olympia.)

Scophony, Ltd., will show their Skiatron dark-trace cathode-ray tube, high speed electric motors and television receivers and transmitters. (Stand A.1066, Olympia.)

Smith's English Clocks, Ltd., will show many types of synchronous and mechanical clocks. (Stand E.1749, Olympia.)

Sperry Gyroscope Co., Ltd., will show a representative sample of their products, including gyro-compasses and gyrosyns. (Stand A.1034, Olympia.)

Standard Telephones and Cables, Ltd., will demonstrate the scope of their activities with examples of telephone, telegraph and teleprinter equipment as well as radio communication and navigational systems. (Stand B.1439, Olympia.)

Sterling Engineering Co., Ltd., will show their Silent Electrix vacuum cleaner, electric floor polishers and a table griller. (Stand 711, Earls Court.)

Sunvic Controls, Ltd., will display bi-metal temperature controllers, an electronic relay and temperature recording equipment. (Stand A.1041, Olympia.)

Synchronome Co., Ltd., will have on show several types of time recording instrument, including impulse clocks, frequency checking equipment for generating stations and electric clocks for domestic use. (Stand E.1759, Olympia.)

Taylor Electrical Instruments, Ltd., will exhibit a range of measuring instruments, signal generators and other test equipment. (Stand No. C.1513, Olympia.)

Telegraph Construction and Maintenance Co., Ltd., will show examples of many of their products in the field of high-frequency cables, magnetic, resistance and glass sealing alloys, bimetals and thermoplastic mouldings. (Stand C.1524, Olympia.)

Thorn Electrical Industries, Ltd., will show "Atlas" fluorescent and incandescent lamps, lighting fittings, Ferguson radio receivers and "Mary Ann" household appliances. (Stand C.1528, Olympia.)

Wego Condenser Co., Ltd., will show capacitors for various purposes, such as fluorescent lighting, power factor correction, flash photography, X-ray work and television. (Stand C.1521, Olympia.)

Woden Transformer Co., Ltd., will exhibit a number of transformers designed for radio and industrial purposes, fluorescent lighting chokes, microphones and loudspeakers. (Stand C.1535, Olympia.)

Exhibits at Castle Bromwich

Brief Review of Some of the Items to be Seen

Divided into four main trade groups—Hardware, Building and Heating, Electricity and Engineering—and with a composite group of outdoor equipment, the Castle Bromwich section of the Fair will cover more than seven acres of floor space and will be easily the largest exhibition of heavy industry to take place in this country. For the convenience of visitors, parking facilities for 5 000 cars are to be provided, while for those travelling from London a special restaurant-car express is to run daily from Euston to Castle Bromwich. All main line services to and from Nottingham, Derby and the North on this route will stop at Castle Bromwich for the duration of the Fair.

BELOW will be found an advance review of some of the many interesting electrical exhibits. A further account of the Fair will be given in our next issue.

Benn Brothers, Ltd.

The proprietors of THE ELECTRICIAN extend a cordial invitation to visitors at their stand, where information relative to the electrical industry will be placed at their disposal. (Stand A. 427.)

British Insulated Callender's Cables, Ltd.

Among the products which are to be shown are cables and boxes, crane collector equipment, capacitors for power factor correction, high-frequency heaters and automatic resistance welders. There will also be demonstrations of a magnetic moulding machine, a device operating on 240 V d.c. and designed so that the operator can concentrate on mould production without having to spend time stripping the finished mould. Maintenance costs are lowered since pipe lines, glands and packings are eliminated by the use of electric instead of hydraulic power. The machine is suitable for single or double sided pattern plate work and can be equipped to permit the use of boxes of practically all shapes. It is, the makers state, the only machine of its type manufactured in Great Britain. (Stand C. 709/608.)

British Thomson-Houston Co., Ltd.

From the lighting division of this firm, a number of industrial and domestic lighting appliances will be shown. These will include 5 ft. and 4 ft. fluorescent lamps and several types of fluorescent fitting. Among the latter are examples from a new range comprising 22 industrial and commercial fittings which, differing from one another in detail, have all been developed from a single basic design. All can be used either as individual units or mounted in continuous lines. Examples of fittings for 2 ft. tubes, developed for two of the main line railway companies, will also be shown. Infra-red stoving is becoming an increasingly important industrial process, and a new internally-silvered infra-red lamp which will shortly be in production in this country will be exhibited for the first time. The lamp, it is claimed, is more efficient than older types, since there is no external reflector to keep clean and the internal silvering gives a better concentration on the work. (Stand C. 511/410.)

Chloride Electrical Storage Co., Ltd.

The exhibits to be shown will include stationary batteries, Exide-Ironclad batteries for road vehicles, mine locomotives, etc., car batteries, l.t. radio batteries and a range of Drydex l.t. and h.t. batteries for radio and hearing aids. Among the new products exhibited will be an Exide switch-tripping equipment, which incorporates in a single cabinet a battery of cells, complete with trickle-charge and testing gear. As it requires only routine examination, it is suitable for unattended sub-stations, and can be used, in addition, for supervisory equipments, electric impulse clocks and burglar alarms. (Stand C. 417.)

E. K. Cole, Ltd.

This company's exhibit will concentrate on lighting and heating, with a special emphasis on new developments in the fluorescent field. A variety of fittings for standard 5 ft. fluorescent tubes will include models for home and factory use, and a range of auxiliaries, such as starters, ballasts, bi-pin and miniature bi-pin holders will be shown. Tungsten lamps, with some special types for ozone generation, cinema projection and decorative purposes, will also be shown, as will the Ekco all-plastics table or desk lamp. In the heating section, inset and floor standing heaters in plastics casings with anodised aluminium grilles will be featured, and there will be shown Thermovent convection heaters designed for use on board ship. (Stand C. 306.)

English Electric Co., Ltd.

From their wide range of products, this company has selected five divisions for display at the Fair, dealing with fusegear,

instruments and meters, electronic equipment, welding, and domestic appliances. The electronic section will feature a colour-matching indicator suitable for use in the paint, dye and fabric industries, for scientific comparison between colours, and a motor controller using thyratrons for operating d.c. motors from a.c. supplies, giving infinite stepless control of speed and torque. The fusegear exhibits will include high-rupturing-capacity cartridge fuses, distribution boxes and pole mounting fuse units. The domestic appliances will include cookers, washing machines and electric fires. Photographic panels and models will illustrate some of the company's heavy engineering activities. (Stand C. 613/512.)

Eralite Manufacturing Co., Ltd.

Domestic appliances are the main feature of this stand, and will include convection heaters, an electric towel rail and a table cooker. A 3½-pint electric kettle of unusual design, will also be shown. Finished in bright satin-silver aluminum, anodised inside and out, it is suitable for use at the meal table and has a non-furring immersion heating element and a spout which is part of the handle assembly. (Stand C. 302.)

Ferranti, Ltd.

This company will be exhibiting a wide range of products from their transformer department, including a rotary-type on-load tap-changing gear for power transformers rated up to 5 000 kVA and 132 kV; high-voltage cable testing equipment working at 80 kV d.c.; and pole-type distribution transformers for rural electrification. There will also be a number of meters, a feature of particular interest being a new pre-payment switch which is now being fitted and which has successfully interrupted, under test, a circuit of 100 A at 230 V. From the instrument departments of the firm will be shown and demonstrated a variety of measuring devices, while a number of new electronic instruments will be seen. There will also be shown some domestic appliances and electric clocks. (Stand C. 514/615.)

General Electric Co., Ltd.

Electronics will be the main theme on this stand, but there will be displays, also, of mining, aeronautical, and lighting equipment. Among the exhibits will be seen a new a.c./d.c. receiver and a 13-valve communications superheterodyne, covering a wide frequency band. Another exhibit will be a high-fidelity plastic tape recording equipment and there will be, in addition, a number of specialised valves, including disc-seal triodes and magnetrons. Demonstrations will be given of industrial heating, using a 5 kW generator, and a new plant for rapid production line drying by radiant heat and a small infra-red oven will be shown. Also on the stand will be a photo-cell device, an aeronautical runway flood, aircraft galley equipment and an air circulating oven for heating frozen foods. (Stand C503/402.)

Metropolitan-Vickers Electrical Co., Ltd.

The unifying theme in the company's display will be the transition from war to peace, the exhibit being designed to show how peaceful counterparts have been found to war-time developments. Perhaps the most outstanding example of this changeover is in radar, and the main feature of the stand will be a "Seascan" marine radar, a type now being fitted successfully to merchant ships, some of which have been able to enter harbour in thick fog with its aid. To illustrate the company's work in the field of heavy plant, models will be used, and part of a gas turbine engine will be on view. Motors, control gear, mining transformers, ripple control, lamps and lighting are among the other subjects which will be featured on the stand. (Stand C. 510.)

Newman Industries, Ltd.

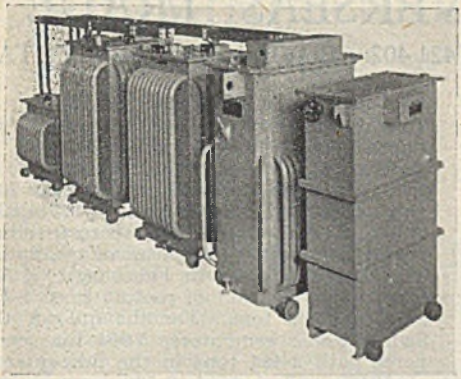
The principal interest on this stand will be a selection of industrial and F.H.P. motors. In the former category will be shown totally enclosed, fan-cooled squirrel cage motors in a range from ½ H.P. up to 25 H.P. This series will also include a double-cage high torque motor and a totally enclosed high efficiency loom motor. In the F.H.P. range, split-phase, capacitor start patterns ranging from $\frac{1}{16}$ to ¾ H.P. will be shown designed for foot mounting, flange mounting, resilient cradle mounting or Metalastic resilient mounting. The company will also display motor starters of various types and rating. (Stand C. 304.)

Westinghouse Brake and Signal Co., Ltd

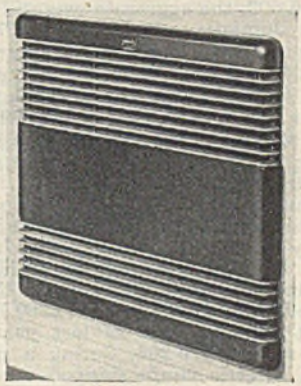
The exhibits which will be seen at this stand have been designed to show the advances in metal rectifier technique since the last Fair, one of these being the introduction of the double-voltage Westalite rectifier, which is now available in a range of sizes from 15 mA to large types used for power purposes and carrying up to 30 A per element. Among the other exhibits will be a 1 000 A plating rectifier equipment. Battery chargers, "Stabilistors" and cinema arc rectifiers will also be shown. (Stand C. 508.)

[*The remainder of the outstanding electrical exhibits to be seen at Castle Bromwich will be described in next week's issue.*]

To Be Seen at Castle Bromwich

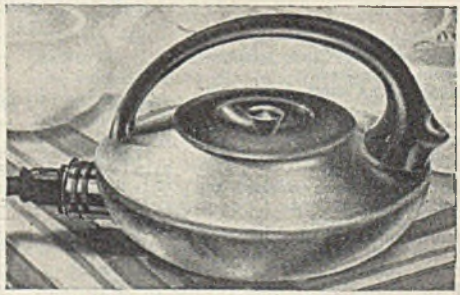


Westalite oil immersed plating rectifier equipment with separate voltage regulator. Output 16 V, 2 500 A, for anodising by sulphuric acid process, etc. (*Stand C.*508.)

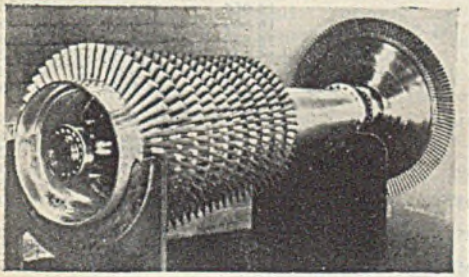


Ekco inset Thermovent convector. (*Stand C.*306.)

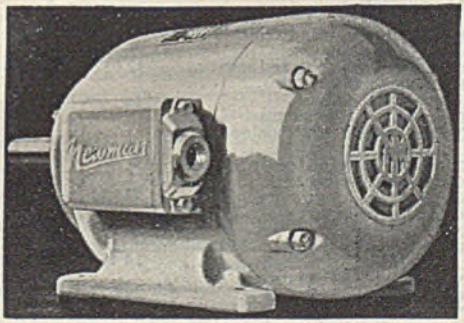
Mazda internally silvered infra-red lamp. (*Stand C.*410/511.)



Eralite 3½ pint electric kettle. (*Stand C.*302.)



Rotor assembly of Metrovick type F2/4 jet propulsion engine showing 10-stage compressor, rotor extension and turbine wheel. (*Stand C.*510.)



Newman totally-enclosed fan-cooled motor. (*Stand C.*304.)

ELECTRICAL OVERSEAS TRADE

VALUE OF MARCH EXPORTS £421 402 ABOVE FEBRUARY TOTAL

ALTHOUGH there was an increase of £421 402 in the value of electrical exports for March over the February total of £5 016 602, the aggregate was still below that for January, which was £5 574 939. The figure for March last year was £4 193 726, and the monthly average in 1938, £1 829 156. For the first quarter of this year the total was £16 030 009, contrasted with £11 502 356 for the corresponding period of last year, and £5 487 604 in 1938.

The number of radio sets despatched decreased from 32 952, value £360 587, in February to 32 635, value £364 754, in March. For the first quarter of this year the number was 106 633, value £1 154 809, compared with 31 807, value £280 769, in the first three months of last year, and 21 160, value £110 266, during a quarter of 1938. Electric lamps shipped numbered 3 386 605, value £114 220, in March, as against 2 704 540, value £86 516, in February, and 3 760 761, value £123 082, in March last year. For the first quarter of this year the number was 9 128 739, value £309 398, contrasted with 9,341,831, value £352 563, for the corresponding period last year. Purchases of generators fell from 2 583 tons in February to 1 534 tons in March, and of motors from 1 154 tons to 1 053 tons. For the quarter the figures were: generators, 5 964 tons compared with 2 484 tons in the first quarter of 1946; and motors, 3 539 tons against 2 478 tons. Other electrical machinery despatched increased from 1 629 tons in February to 2 755 tons in March compared with 1 821 tons in March last year. For the last quarter the total was 6 683 tons, contrasted with 4 596 tons in the first quarter of last year.

	Imports			Exports		
	Monthly average	Month ended March 31,		Monthly average	Month ended March 31,	
	1938	1946	1947	1938	1946	1947
	£	£	£	£	£	£
Submarine cables				17 289	125 984	111 210
Other telegraph and telephone wires and cables				71 803	169 287	113 521
Electric cables, wires, &c.—rubber insulated	31 246	1 374	3 140	117 533	230 368	321 875
With other insulation				153 256	492 260	293 455
Radio transmitters (and radar) and equipment	47 870	1 831	16 228	28 296	52 884	99 557
Radio receiving sets	10 148	11 472	6 154	36 755	129 651	364 754
Radio long distance telegraph and telephone equipment	9 243	13 925	2 857	242 716	507 369	437 437
Other descriptions			13 371	57 848	88 841	206 058
Transmitting and industrial valves	10 893	2 729	15 478	41 272	15 380	34 621
Other					68 157	112 538
Furnace carbons, electric	4 054	—	11 762			
Other electric carbons	2 301	2 864	3 941			
Electric lamps, complete	10 265	1 475	3 636	49 440	123 082	114 220
Other lamps, lighting appliances and fittings	38 662	849	2 774	48 565	130 525	213 303
Batteries and/or cells, primary ...	3 549	123	277	13 572	54 634	29 955
Accumulators				48 647	114 984	134 992
Parts and accessories				—	38 445	38 374
Heating apparatus and elements ...				14 064	61 036	137 826
Other heating equipment				16 600	30 971	70 966
Electrical instruments and parts ...	32 057	3 185	13 700	15 878	41 816	76 768
House service meters				15 791	38 605	65 282
All other descriptions				9,612	22 823	36 108
Electro-medical apparatus ...				3 038	11 784	25 996
X-ray and other valves and vacuum tubes and parts	9 734	37 030	12 996	4 881	22 481	44 035
Insulating cloth and tapes				7 038	36 465	36 976
Other insulating materials... ...				12 305	46 724	61 022
Other articles	52 980	6 691	20 134	108 083	215 830	177 123
Generators and parts				157 150	437 412	494 776
Motors and parts	26 033	5 037	3 131	145 045	207 439	321 090
Other descriptions of electrical machinery	14 455	1 255	3 141	355 663	479 405	912 912
Vacuum cleaners and parts ...				26 662	67 276	199 522
Other portable appliances	24 627	2 453	9 985	10 394	35 295	18 737
Welding machinery (including electrodes) other than tube making	—	1 041	9 332	—	96 513	132 995
Total	328 115	93 334	152 109	1 829 156	4 193 726	5 438 004

SUB-MINIATURE D.C. MOTORS

TECHNICAL DETAILS OF A NOTEWORTHY DESIGN

AS long as designers, seeking to build miniature electric motors, tried simply to reproduce all the features of the conventional F.H.P. machine on a reduced scale, they met with little success. Although possibly satisfactory in performance, the final products frequently failed on the grounds of high manufacturing cost, since miniaturisation presented its special problems, making heavy demands on time, money and workmanship. An alternative method, favoured by toymakers, was to reduce motors to their simplest possible form before miniaturisation, but this, while cutting costs at the factory, did not normally give a good operating efficiency.

Both the above expedients relied on making what was normally a large article on a very small scale, but a few years ago, two brothers in Lancashire, Messrs. J. V. and J. E. G. Eurich, concluded that the solution to the miniature motor problem lay in an entirely new approach, that the baby motor should, in short, be regarded not as a scale-model of conventional machines, but as a device deserving re-design from first principles.

Visitors to the B.I.F. at Birmingham next week will be able to see the first successful results of this line of attack, in the form of a working motor, $\frac{3}{16}$ in. long and the same in diameter, weighing under one gramme and running at something like 7 000 r.p.m. About a dozen will fit quite comfortably inside a thimble.

The type 200 Electrotor, actual size

This microscopic machine is the smallest of a series of motors which Messrs. Eurich have invented and developed. All, to distinguish them from conventional machines, have been named Electrotors with different type numbers, and all represent, as will be evident from the following description, a radical and important departure from existing practice. The makers are Rev Motors, Ltd., of Bolton.

In Fig. 1 is shown an exploded view of a typical Electrotor. It consists essentially of a permanent ring magnet *e*, rotating

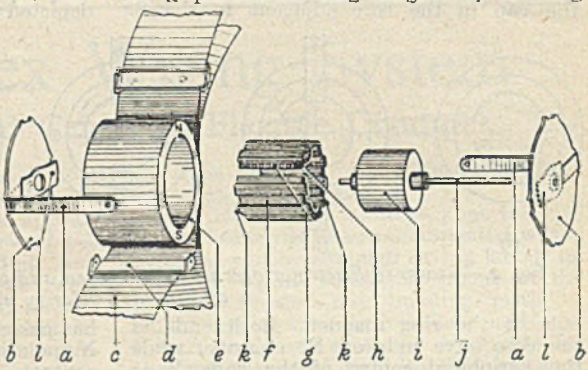


Fig. 1.—Exploded view of a typical machine

within which is an armature *f*, *g*, *h*, mounted on a plastic bobbin *i* which, in turn, is attached to a spindle *j*. At each end of the ring magnet is an end plate *b*, usually made of a self-lubricating plastic material, drilled with a central hole to form the spindle bearing. A brass contact strip *a* passes through each end plate, and is shaped inside *l* to bear lightly on the edge *k* of the winding *f*. The other end of each strip is used for making connection with the driving battery.

The two contacts *l* are so arranged, it will be noticed, as to connect with the winding at points 180° apart and normal to the field of the ring magnet. For example, in Fig. 1 the North pole of the ring magnet is shown at the top: thus, the line joining the two contact points is at right angles to the flux.

It is in its armature that the Electrotor makes the greatest departure from conventional methods. The core *g* consists of a number of high permeability iron wires, isolated from one another, and wrapped in horse-shoe shape around the bobbin, each forming a ring broken by a small gap. This set of core wires is encased in insulating material.

An energising winding is now wound on the core, in the form of several layers of double-nylon-covered copper wire *h*, the edges *k* of the winding being bared to enable the strips *l* to make contact. The two ends of the winding are left free, there being no soldered joints or other stationary connections at any point of the machine. As a whole, the armature can be considered to be horse-shoe electromagnet, in which

the broken iron rings form the core and the outer winding the magnetising coil. The contact points, whose position relative to the gap in the core will plainly determine the flux distribution in the electromagnet, are, in effect, brushes.

In considering the cycle of operation, see Fig. 2.

At (i) the system is at rest, with no current flowing in the winding and with the gap in the core adjacent to the S. pole of the ring magnet. Both ends of the core have induced N. polarity, while the peripheral centre of the core, lying adjacent to the N. pole, becomes, by induction, a S. pole.

The working condition is shown at (ii), where the contact strips have been added. With the closing of the circuit, the core becomes magnetised, the direction of winding being such, in this example, that the end near the positive contact (which, it will be recalled, has induced N. polarity by virtue of its position under the S. pole of the permanent magnet) becomes a strengthened N. pole, while that near to the negative contact becomes a S. pole of reduced strength, the S. polarity resulting from the electromagnetic effect being stronger than the N. polarity induced by the permanent magnet.

As a result of these conditions, the N. pole of the core is attracted to the S. pole of the permanent magnet. At the same time, the pole on the other side of the gap will be repelled from its adjacent S. pole. The two forces combine to set up a torque and, if free, the assembly will rotate.

In the next diagram (iii), the forces on the core are examined about 45° later. The flux density of the N. pole of the core has now lost some of its end concentration and become first more evenly distributed between the gap and the positive contact and eventually concentrated under the contact. Conversely, the flux at the S. pole of the winding becomes, as the gap nears the negative contact, progressively more concentrated at the end of the winding. The arrows show how, in these conditions, there is a strong attraction between points on the core and the permanent magnet, in such a direction as to continue rotation.

The next stage examined (iv) shows the gap in the core lying under the negative contact. The ends of the core on either side of the gap are given S. polarity while the peripheral centre, lying under the positive brush, becomes N. As before, the effect is to continue rotation, the two core ends being attracted to the magnet N. pole and the centre to the S. pole.

Completion of the first half-revolution is depicted in (v), immediately after the gap has passed the negative contact. The core N. pole is concentrated under the positive contact, and, consequently, the point of flux concentration is attracted to the magnet S. pole. The end of the armature lying under the negative contact is a S. pole, and will move towards the magnet N. pole. In this way, rotation continues, the conditions in the second half-revolution being similar to those already described.

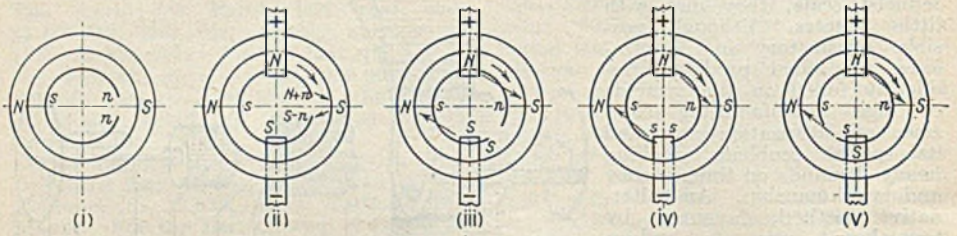


Fig. 2.—Stages in Electrotor operation; energised and permanent polarity is shown N,S, and induced polarity n,s

A typical Electrotor, the type 240, has the following characteristics:—

Input voltage	—	3½—4½ V.
Size	—	⅛" wide × ⅞" diameter.
Torque	—	23 gm. cms. (approx).
Power	—	550 microhorsepower approx.
Efficiency	—	35% (approx.)
Life	—	approx. 130 hrs. (47 million revs.)

For applications such as cine cameras, windscreen wipers, fans, and general industrial purposes, there are larger Electrotors, for inputs of 0-24 V. These, known as Types 440 and 540, measure 1¼ in. and 3 in. in diameter respectively, and have a speed of approximately 4 000 r.p.m.

Among possible disadvantages of Electrotors in the form described are lack of balance of the moving portion—an effect, however, which is not particularly noticeable at the high running speeds achieved—and the somewhat rudimentary end bearings. On a more advanced model, it is stated, these possible disadvantages have been eliminated with a corresponding increase in efficiency and running life.

Relying as they do upon a highly unusual method of winding, the Electrotors have called for developments in factory technique which are of considerable interest but lie beyond the scope of the present article. The makers are now con-

templating a move from their present factories in Bolton and Horwich to a larger works, where it is hoped to reach a production of five million units during 1948.

It seems fairly certain that, with their remarkable simplicity and small number of machined parts, these new d.c. motors will be, within their limits, far cheaper and more efficient than machines of similar performance, but following conventional methods of design. As their capabilities become widely known, it is likely that a number of applications which have awaited the introduction of a compact and readily expendable power unit will arise, and even in the more obvious uses, such as model aircraft and boats, Electrotors seem assured of a considerable popularity.

The Gilflex Wiring System

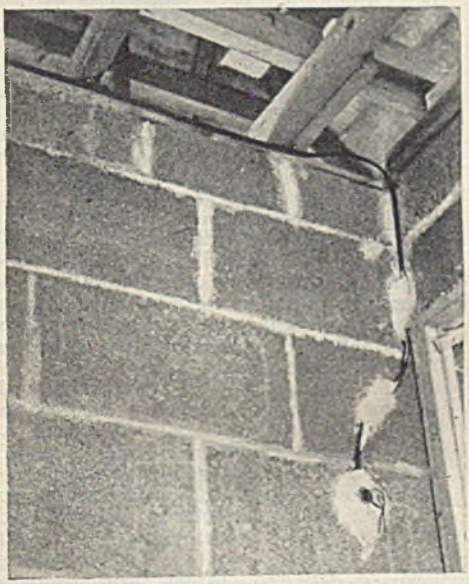
Plastic Insulated Cables in Flexible Conduit

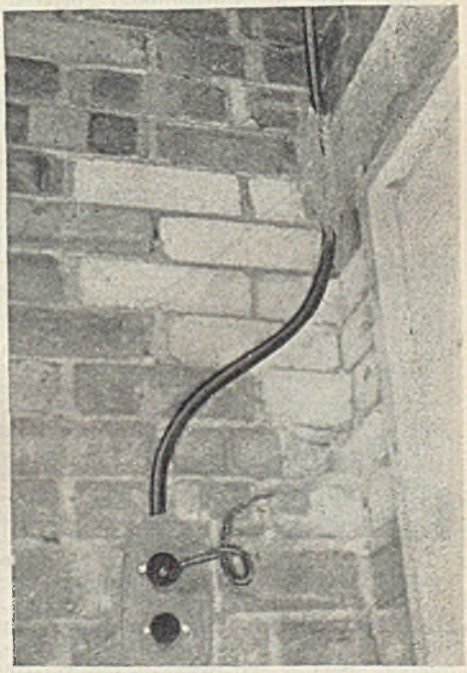
THIS new system, consisting as it does of plastic insulated cables in flexible non-metallic conduits, makes its appearance at an opportune time, in view of the present shortage of steel conduit and fittings. The system at present being placed on the market is designed for the small house and the farm, but heavier systems will be available as soon as the raw material position permits.

It is claimed that owing to the methods of installation adopted, up to fifty per cent. labour costs on small installations can be saved. One corporation which is adopting the system for housing estates finds from experience that an overall saving of from fifteen to twenty per cent. as compared with light-gauge steel conduit systems is possible, depending upon the type of house, and representing from £4 to £6 per house.

It is claimed, in addition, that the system is less costly than prefabricated wiring systems, which, although saving labour on the site require additional labour in the factory. Present day building methods, employing perforce hollow floor and wall construction, are at times unsuitable for the installation of rigid conduit systems, but the new flexible system can easily be adapted to all such innovations.

Fuller details of the system can be obtained from Flexible Non-Metallic Conduits Ltd., of 208, Tottenham Court Road, London, W.1.





Examples of Gilflex labour-saving wiring

Electrical Personalities

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. J. C. EDWARDS has been appointed sales manager for Bastian and Allen, Ltd. Before joining the company in 1945, he was a supervising contract engineer with W. T. Glover and Co., Ltd. On leaving Manchester Grammar School, Mr. Edwards joined the Chloride Electrical Storage Co., Ltd., under their training scheme, and continued his education at the Manchester High School of Commerce and Manchester University.

MR. J. C. EDWARDS

MR. W. A. TURNER, senior assistant in the electrical department of Burnley Technical College, has resigned to take up a similar post at Northampton Polytechnic, London.

MR. G. D. DEUCHARS has been appointed United Kingdom Civil Aviation Telecommunications Representative, Cairo, in succession to Air Cmdre. W. E. G. Mann, who is now in charge of overseas telecommunications developments for the Ministry of Civil Aviation.

MR. J. H. COTTON has been appointed to the board of the Dubilier Condenser Co. (1925) Ltd., in the capacity of works director. Mr. Cotton received his education and technical training in the U.S.A. He has been closely associated with the fundamental developments in capacitors and has had wide experience in the design and manufacture of capacitors and resistors for all purposes in the U.S.A. and this country since 1928. He joined the Dubilier organisation in 1930 and has held the positions of production manager and works manager. He has served on several Government missions to the Continent and the U.S.A. during and since the war and he is an expert on production methods.

MR. J. H. COTTON

MR. B. CALVERT, of the Sheffield electricity undertaking, has been appointed mains superintendent with Scarborough Corporation.

MR. J. J. RATCLIFFE, son of Mr. James Ratcliffe, engineer and manager of the Bredbury and Romiley electricity undertaking, has been appointed an assistant mains engineer in the Ashton-under-Lyne electricity department.

MR. C. R. BALCH has been appointed manager of the Cardiff plant sales division of Crompton Parkinson, Ltd., as from May 1. He succeeds Mr. D. Nield who has retired, but is remaining temporarily in a consultative capacity. Mr. Balch was the Crompton Parkinson representative in Wolverhampton.

MR. R. G. MUKHERJI, electrical executive engineer in charge of the western electrical division of the Government of Bengal, has been elected a member of the American I.E.E. He was elected an A.M.I.E., India, in 1935, and an A.M.I.E.E. in February of this year. Mr. Mukherji received his technical education at the City and Guilds College, London, and training in the works of Siemens Schukert, Berlin, in the testing department of Babcox and Wilcox, Ltd., London, and other works in England. He has had experience of the maintenance and operation of the British grid system.

MR. R. G. MUKHERJI

MR. C. F. MAASY, inspector in the engineering division of the Post Office at Oxford, has been presented with a cheque and other gifts by the staff at Telephone House, Oxford, on his retirement after 34 years' service.

MR. WILLIAM JOHN HYDE, of Plaistow Grammar School, has been awarded the "Faraday" Scholarship, and Mr. Raymond Peter Ronald Hunt, of Buckhurst Hill County High School, has gained the "Maxwell" Scholarship at Faraday House Electrical Engineering College, Southampton Row, London, W.C.1.

MR. F. CROOK (Birlec, Ltd.), as past chairman; Mr. J. Wainwright (the English

Electric Co., Ltd.) as chairman; and Mr. J. W. Lawton (Nife Batteries, Ltd.) as vice-chairman have been nominated by the Committee of the I.E.E. Scottish Midland Students' Section for election at the annual meeting on May 14.

MR. W. S. BRUCE, as chairman, and Messrs. W. G. Thompson (senior) and J. W. Donovan (junior) as vice-chairmen, have been nominated by the Committee of the I.E.E. South Midland Centre for election at the annual meeting on May 5 for the 1947-48 session.

MAJOR L. H. PETER, has been appointed by the Westinghouse Brake and Signal Co., Ltd., as chief development engineer; Mr. L. E. Thompson has been made chief electrical engineer; Mr. K. H. Leech, chief design engineer; and Mr. N. G. Cadman, chief brake engineer.

MR. M. RAYMOND, managing director of Raymond Electric, Ltd., is flying to America on May 13. During his stay of six weeks he will meet a number of executives of American and Canadian radio and valve manufacturers to discuss and study the latest methods of manufacture, design and research in the electronic field.

MR. F. B. HINSLEY (Cardiff), as branch president; Mr. J. Brodie (Beddan), as first vice-president; and Mr. A. W. Kidd (Pengam), as second vice-president; have been nominated by the South Wales Branch Council of the Association of Mining Electrical and Mechanical Engineers for election at the annual meeting on May 31.

MR. A. E. L. COLLINS, a member of the Management Committee, has been elected hon. secretary of the Hyderabad Centre of the Institution of Engineers (India) for the year. The office of the Hyderabad Centre has been moved from the P.W.D. Workshops, Saifabad, to its own building at Khairatabad, Hyderabad-Dn, India.

MR. T. H. TAYLOR, who has been appointed engineer and manager of Marple electricity department, was at one time assistant to the Borough Electrical Engineer of Richmond (Yorks). Latterly he has been mains engineer with Sussex Electrical Supply Co., Ltd. Mr. Taylor is a member of the E.P.E.A. and has served on the Southern Divisional Council, No. 11 Area Investigation Committee and District Joint Board and the Section Committee.

MR. JOHN INNES, managing director of Cable and Wireless, travelled by air from London to Berne on April 22 to attend the celebration the next day of the 25th anniversary of the foundation of Radio Suisse, which was due to British initiation. The anniversary had a special significance as it coincided with the 50th anniversary of the first demonstration of wireless telegraphy in Great Britain. It was the occasion of an international gathering of telecommunications chiefs in Berne.

MR. HOWELLS, general manager, South Wales Power Co., and Mr. A. J. Nicholas, of South Wales Switchgear, Ltd., have been elected members of the South Wales Executive Committee of the Industrial Association of Wales and Monmouthshire. Lt.-Col. James Rankin, North Wales Power Co., Ltd., has been elected a member of the North Wales Executive Committee of the association—a newly-constituted body uniting two associations previously operating separately in North Wales and South Wales and Monmouthshire respectively. The Industrial Association is sponsoring and organising the "Industrial Wales" Exhibition to be held in the Empire Hall, Olympia, London, from August 26 to September 13.

MR. E. P. HOLLIS, of Twickenham, has been awarded the first prize and shield in the W. E. Highfield Shield Competition, held under the auspices of the Association of Supervising Electrical Engineers, for his paper entitled "In Pursuit of Safety." The second prize was won by Mr. A. Spencer, of Blackburn, with his paper on "Electrical Education and Recognition," and there was a tie for the third place by Mr. F. T. Bartho, Oxley, Herts, with a paper on "Some Notes on the Application of Squirrel Cage Motors"; and Mr. M. W. G. Johnson, Islington, with a paper on "Large Scale Electric Cooking Equipment." The shield and prizes will be presented to the successful competitors by the president of the association, Mr. H. Nimmo, at the opening meeting of the association's London lecture session at the Lighting Service Bureau, 2, Savoy Hill, on Tuesday, October 14. The examining board was composed of Messrs. H. W. Swann (past-president), E. R. Wilkinson (immediate past-president), W. H. Brooks and E. J. Sutton.

Obituary

LT.-CMDR. HAYDN THIES HARRISON, associated with the Electric Street Lighting Apparatus Co., Canterbury, as technical adviser for many years, on April 24, aged 76 years. He was a member of the I.E.E.

MR. FREDERICK WILLIAM H. WHEADON, late managing director of the Adelaide Electric Supply Co., Ltd., in Adelaide, South Australia, on April 26. He was made an associate of the I.E.E. in 1895, an associate member in 1904 and a full member in 1910. He had held simultaneously the offices of chairman and hon. secretary of the South Australian Committee of the institution.

The Kelvin Lecture

ELECTRICAL DISCHARGE THROUGH GASES

THE thirty-eighth Kelvin Lecture of the Institution of Electrical Engineers was delivered at the Kingsway Hall, London, on Thursday, April 24, by Prof. L. B. Loeb, Professor of Physics at the University of California, who took for his subject "Electrical Discharge Through Gases."

Before the lecture, Mr. V. Z. de Ferranti, president of the institution, handed the vellum certificate of Honorary Membership to Sir John Kennedy in recognition of his distinguished work in the sphere of electricity supply and his services to the institution.

Sir John Kennedy, in acknowledgment, said that if he had had any success in achieving his life's ambition, to spread the use of electricity, it was due to the example of his late father, who had been a pioneer, and to the help of a loyal and efficient staff.

The President also presented the Faraday Medal to Sir Leonard Pearce, for "his outstanding contributions to the advancement of engineering practice and notable achievements in electrical engineering." Sir Leonard, he said, had been a pioneer in all branches of the electricity industry. An example of his pioneer work was the Barton generating station at Manchester, the design of which created a standard never before achieved in this country, and revolutionised long-accepted principles. He was responsible also for the engineering design and the operation of the Battersea generating station.

TRIBUTE TO MICHAEL FARADAY

Sir Leonard Pearce, responding, said he looked upon the award as in the nature of a coping stone to a period of activity which might be drawing to a close. It gave him special pleasure to follow fellow-workers in the field of electricity supply who had been similarly honoured, such as Ferranti, from whom he had received much help and inspiration; Crompton, Charles Merz, John Snell and Archibald Page. As Battersea power station had been mentioned, it might be of interest that an inscription there recorded that it was unveiled on St. George's Day in the year of the centenary of Michael Faraday's great discovery, to serve as another memorial of scientific heritage. In association with the tribute which his company thus desired to pay to Faraday, it would be appreciated how he would treasure the medal bearing Faraday's name.

Prof. Loeb, in the course of his lecture, said it was timely that the subject of discharge through gases should be dealt with before the institution, since 1947 marked the fiftieth anniversary of the scientific beginning of that field of study, and it was from the research laboratories of England that most of the early significant advances had come. The subject was of peculiar interest and importance to the electrical engineer, in that we lived and operated in a gaseous atmosphere. It was not surprising, therefore, that the limitations set by the electrical properties of the atmosphere, and in particular its electrical breakdown characteristics, were in this electrical age of considerable practical importance.

WORK AT THE CAVENDISH LABORATORY

With the discovery of X-rays in 1895 there became available a method of producing sufficient conductivity in gases for proper study to be initiated, and in the next ten years significant advances were made by the group of physicists working under J. J. Thomson at the Cavendish Laboratory; most of the fundamental properties of gaseous conduction were delineated and a general understanding of the subject achieved. Thereafter, development became relatively slow, the initial studies having gone as far as existing knowledge and techniques permitted.

The later development of the Bohr atom, the discovery of the elastic electron impacts, excitation and ionisation functions, inelastic impacts of the second class and various mechanisms of secondary electron emission were essential to proper interpretation, and the vast improvements in physical techniques which took place were even more essential to further advance. It had accordingly, and not unexpectedly, been found that the mechanisms derived from earlier study, while correct in outline, were in many cases seriously wrong in detail, and that in general the simple pictures which had now become fixed in the textbooks needed radical revision.

In the early studies much interest focused on the nature and mobility of the positive and negative ions in gases, and particularly whether the ion was molecular or consisted of a large cluster of molecules. Inadequate techniques and lack of gaseous purity led to confusing results, which became comprehensible when it was realised that ions could change charge, had specific affinities for certain atomic or molecular species, and that in one second

of time an ion could collide with some hundred millions of molecules. Hence in order to study ions of a known constitution with the controlled gaseous purity obtainable, it was necessary that ions that did not change charge should be observed in short periods of time. Recognition of these difficulties led to a satisfactory solution of the problem, and this work, together with the recognition that dielectric polarisation and electrostatic attraction played a role in giving a fictitious collision cross-section, independently of the size of the ion cluster, brought the theory of ionic mobilities into agreement with experiment. While much detailed work remained to be done, the resulting information would be of no great importance in engineering applications. What the engineer must recognise was that gaseous ion mobilities with ions of more than 10^{-4} second of age, except in a few special cases, could have significance unique to the particular gas conditions of a given measurement only. Most values given in tables, therefore, were not of general applicability even in the supposedly same gases; such values might, however, be used in roughly predicting ionic velocities in order of magnitude in practical application.

The coefficients of diffusion of ions were related to their mobilities by the expression $k/D = Ne/P$ where k was the mobility, D the coefficient of diffusion, N the number of molecules per unit volume, e the charge, and P the pressure. Thus what had been said about mobilities could be said of the coefficients of diffusion with little modification.

ELECTRON VELOCITIES IN GASES

One of the most important problems in the study of gaseous conduction and breakdown hinged on the values of the velocities of electrons in electrical fields in gases, and in particular on their energy distribution and their average energies. The method devised by J. S. Townsend in 1913 was still the only existing method of evaluating the energies of the electrons and relating them to the experimental parameter, X/p, the ratio of field strength to pressure, which was the determinative quantity in most measurements of gaseous behaviour. As a result of further work, the problem of negative ion formation had been fairly satisfactorily solved, while experimental data existed on electron velocities over a wide range of pressures in some standard gases.

Work on the theoretical study of electron velocities had shown that the departure from the conventional Maxwell distribution law was so radical and that the distribution varied so extensively over the energy ranges experimentally covered that it was impossible either to interpret the meaning of the Townsend evaluation of average electrical energy in terms of X/p or to apply these to an analysis of the ionisation and excitation functions, so that probably the most important fundamental problem outstanding to-day was in the evaluation of electron energy distribution functions in various gases over extensive energy ranges and relating these to the experimental parameter X/p.

The increase in our knowledge of atomic structure, together with improved techniques, led to the solution of the problem of the formation of negative ions from free electrons and molecules. While much work still remained to be done, the present information was adequate for the engineer.

IONIC RECOMBINATION PROCESS

The process of recombination of negative ions or electrons with positive ions to annihilate the charges in the gas had proved to be one of the most difficult problems to interpret. In general, there were four possible steps in the recombination process: a diffusive approach, an active electrostatic attraction, a mutual orbital encounter, and the transfer of charge. Depending on the density of the ions, the nature of the carriers, the pressure, the temperature and the energy of negative ion formation, some of those four processes were either the determinative factor fixing α (the coefficient of recombination of ions), or might even be absent. The worst difficulty lay in the fact that in all but the purest gases made of single types of atoms the ions changed their size and character during the 10^{-4} second of measurement, thus altering α continually. Even more than for ionic mobilities were the values of the coefficient of recombination dependent on ionizing conditions, gaseous purity and composition, so that almost all data given in the literature were unreliable.

In the study of gaseous discharges such as arcs or glows with ion concentrations of the order of 10^8 ions/cm^3 much information of value could be obtained by the use of electrical probes. It was probable that with post-war developments probe techniques could be improved and extended into the regions of lower ion densities, where they were urgently needed.

Probably the greatest contribution to the fundamental analysis of electrical discharge mechanisms was due to the studies of J. S. Townsend, beginning in 1899-1903, on the two ionization coefficients. Townsend observed that if one started a current of i_0 electrons from the cathode in a uniform field plane parallel gap of length x and placed a high field X at a pressure p across the gap, the current of electrons and ions i measured after the initial electrons had crossed the gap was given by

$i = i_0 e^{\alpha x}$. Here α was a constant dependent on the nature of the gas and the value of X/p. It gave the average number of new electrons produced per unit distance traversed in the field direction by one electron through ionization by collision of the gas atoms or molecules. Townsend further found that α, now designated as the first Townsend coefficient, varied such that one could write $\alpha/P = f(X/p)$. Apart from the ignorance of the correct electron energy distribution, the information most urgently needed by the engineer to-day was a reliable set of experimentally-determined values of α/p over large ranges of X/p in important gases of recognised purity. There were as yet no values of α/p in pure mercury-free air for the region covering most discharge phenomena in air.

BREAKDOWN AND FREQUENCY

The simultaneous application of all available methods of study, together with the development of new fast oscillographs, had led to notable advances in the understanding of the positive and negative corona mechanisms and their ultimate breakdown to a spark. The study of breakdown with alternating potentials, particularly as functions of frequency, showed that the threshold was lowered some 17 per cent. as frequency was increased from 10^4 to 4×10^5 cycles in short gaps, doubtless owing to positive space charge accumulations. As frequencies went up to the radar range of 10^{10} to 3×10^{10} cycles, the potential rose some 25 per cent. above the d.c. breakdown. In this case the electrons travelled only short distances between field reversals and the mechanism was little understood.

Considerable advance in the understanding of the vacuum spark, so important in modern industrial applications, had resulted from W. H. Bennett's theory of the self-focusing beam. Thanks to the development of probe studies, more was known about the glow than any other form of gaseous discharge, and, wherever probe studies were possible, gradients, potentials, electron energies and their energy distributions could be measured. There were, however, two regions in which such methods were not very successful: the cathode dark space, where inonisation was insufficient, and the region of the anode fall of potential. The vital element in any quantitative treatment of the glow discharge lay in a knowledge of the cathode fall of potential. With modern improvements in techniques such as electron multipliers and cathode-ray oscillographs, it was expected that more information could be obtained.

With regard to the mechanisms of arcs, the high temperatures and microscopic scales of distance involved in the critical areas precluded study and much remained to be done. While the refractory electrode arcs were amenable to some measure of theoretical treatment, the mechanism of the low melting point metal vapour arc was not clearly understood. There seemed little doubt but that the source of ions in such arcs was in the plasma of the gas adjacent to the cathode, and the situation might be similar to that encountered near the surface of particles moving with supersonic velocities, where it was not possible to apply the familiar procedures of thermodynamics and kinetic theory. In those cases one had in microscopic regions large numbers of atoms or ions moving to the cathode or a surface, interchanging energy with solid or liquid surfaces and leaving those surfaces with considerable directed momentum and energy. In those regions there were thus large numbers of particles of energy many times those of thermal equilibrium with directed velocities. The conditions for ionisation were present, but a new mathematical physics was needed to calculate the consequences, which departed widely from equilibrium conditions.

He had endeavoured to show that while we had now come very far, we had much further to go. He hoped that the indication of a few of the problems to be solved would arouse interest and inspire a few workers at least to aid the physicist and the engineer in solving those and many of the other problems.

GAS-FILLED CABLE PROBLEMS

Prof. C. L. Fortescue, proposing a vote of thanks to Prof. Loeb, said that on the last occasion on which Kelvin attended a scientific gathering, at the meeting of the British Association in Leicester in 1907, he read an address on an aspect of the subject with which Prof. Loeb had dealt. The subject was one which touched on Kelvin's activities as a mathematician, a physicist and an engineer. On the engineering side, Prof. Loeb might be a little optimistic in suggesting that sufficient information was available for engineers. Their invitation to Prof. Loeb to give his lecture might be due to the fact that they did not feel sufficiently well informed; they wanted to know more about the stratosphere, the Heaviside layer, and what was going on in the high-pressure arcs in mercury vapour. On the other hand, for gas-filled cables they wanted to know how to make that gas non-conductive of electricity, so that they could use much higher voltages on their transmission systems and perhaps avoid setting the City fathers of London at one another's throats over the new power station.

Mr. J. Hacking seconded the motion.

Ultra High-Speed Relays

PROTECTIVE AND MEASUREMENT APPLICATIONS

A PAPER on "Ultra-High-Speed Relays in the Fields of Protection and Measurement," by Messrs. W. Casson and F.H. Last, was read at a joint meeting of the I.E.E. Measurements and Transmission Sections on Friday, April 25.

In 1944 the authors discovered some characteristics of ultra-high-speed relays which did not appear to have been described previously. These electromagnetic relays enabled phase comparison to be made very simply. The paper described and outlined the basic theory of two types.

Ultra-high-speed relays will follow faithfully the cyclic changes of alternating currents of commercial frequency in their operating coils. If these relays are polarised, they can be utilised to provide measuring equipment in which the quantity to be measured is converted into impulses whose time duration is a function of that quantity. They can also be utilised to form schemes of protection for transformers, feeders, generators and the busbars of switchgear, employing the principle of phase comparison. This principle is attractive in many ways, and ultra-high-speed relays enable it to be applied with simplicity and fast operation. Restricted zone protective equipment so constructed can be designed to have an overall operating time of the order of 0.015 sec., and the discrimination between an internal and external fault can be obtained in the first half-cycle of fault current. The factors which have to be taken into consideration to overcome difficulties which arise with this principle in the case of complicated faults were discussed in the paper.

Experimental equipments have been tried out successfully on the Central Electricity Board's system.

MR. H. LEYBURN (Reyrolle) said that the outstanding feature upon which the authors' proposals were based was that the relay had an operating time of one millisec. This represented only 10 per cent. of half a cycle, and it was that characteristic which enabled the relay to operate with reasonable accuracy at a predetermined instant of the current and thus to measure or compare instantaneous quantities which otherwise would be measured only by electronic means. That was an important step forward and it would enable many problems to be solved in a simpler way than hitherto.

MR. F. H. BIRCH (C.E.B.) referred to the fact that the authors' discovery started in about 1944, whereas one at least of the relays was developed in 1934. That was an example of electrical engineers going their separate ways, and of one group not knowing what another group was doing. It was remarkable that this tool should have been available for ten years before its application in the fields of protection and measurement were fully appreciated. Many schemes depended not only on the ultra-high-speed relay, but also on the metal rectifier. It was true to say that up to about 1943 there was always the feeling that if the metal rectifier were left unenergised for a long period of time, when it was energised again its response in the reverse direction would be low as compared with what it should be. We had now, however, reached a point where metal rectifiers could be regarded as entirely reliable, even if they were not normally energised.

One speaker suggested that for busbar protection, bias schemes were likely to be more simple than phase comparison schemes. It had to be remembered, however, that in considering the application of busbar protection to existing switchgear, particularly if the switchgear was of the metal-clad type and the current transformers in compound-filled chambers, the alternatives were to make the best use of the existing current transformers—and that could be done with a phase comparison scheme—or to face a considerable expense in replacing them. That problem arose in the case of some 33 kV switchgear, where he investigated the various schemes of busbar protection which were available and found that the authors' scheme was the only one offering unquestionable stability with high-speed operation, using the existing current transformers. That meant not only a big saving in cost, but the avoidance of dislocation, because the switchgear was in service and each switch would have had to be taken out of service for some time if the current transformers were to be changed.

MR. P. P. ECKERSELEY suggested that in many applications the prejudice against relays was ill-founded because the extraordinarily acute work which had been done made them reliable pieces of apparatus.

MR. L. B. S. GOLDS (Edmundsons) congratulated the authors on the idea of applying the high-speed relay to phase comparison. The valve technique was not

really suited to that problem, unless one had to use valves for carrier current protection. The relay was quite fast enough for what was wanted, and to introduce valves was complicating the issue.

MR. R. E. H. CARPENTER said that he, too, had employed vibrating relays in connection with electrical measurements, but with a somewhat different angle of approach from that in the paper. In developing the more sensitive models of the types of polarised relays described by the authors, he found there was no milliammeter of sufficient sensitivity for measuring the frequently very small input currents which had not either an inconveniently high impedance or, what was worse, a variable impedance which resulted in the distortion of the input wave form in a way deleterious to the operation of the relay. He decided to employ a polarised relay as a mechanical rectifier in conjunction with a moving coil ammeter. In the scheme he preferred, the relay was arranged to short-circuit the moving coil meter for approximately a half-cycle in each cycle, the coil of the relay being energised from the same power source as that supplying the measurement circuit through a variable phasing device which was preferably calibrated in electrical degrees. The a.c. to be measured was passed through the intermittently short-circuited milliammeter and the phase of the input to the relay was adjusted until the meter showed a maximum deflection. In those circumstances it was obvious that the one half-wave in each cycle was passing through the meter, and by multiplying the reading of the meter by a factor of 2.22, the r.m.s. value of the current (on the assumption of a sine wave) could be ascertained. The other side contact was used to short-circuit a dummy resistance equal to that of the meter resistance. This arrangement made available a power frequency miliammeter, or micro-ammeter, having power losses of the same order of magnitude as those appropriate to d.c. instruments.

MR. C. W. MARSHALL (C.E.B.) said that the last obstacle to the efficient use of the lower voltage networks was likely to be removed in the course of this year, and they could then be operated directly in parallel. There was, therefore, a great need for a highly efficient and economical discriminative protective system, and the Casson-Last system offered one of the best means of providing it. With inter-connection, the stresses on short-circuits were going to be increased, but the circuit-breaker manufacturers had done a reasonably good job in that direction. The relay speeds must be increased in the interests of both power and communication systems. He had too much experience of the development of protective gear to expect that a new system of this kind would go through without trouble, but the amount of trouble he had had with a few samples was far below normal. The most obvious applications were bus-bar protection and circuit protection, using Post Office pilots, but there were two other possibilities worthy of examination. The first was the determination of fault location, as well as the clearance of faults, and the Casson-Last system, in common with several others, offered that possibility. On large inter-connectors, one of the great needs was to get a real measure of the load on the line. The grid lines were designed for 200 A, but during the war they had to operate at 400 A or over, and during the recent cold period, owing to the demand for sudden changes in load, they were operating at 700 and even 900 A. These relays offered the possibility of measuring the phase displacement on lines, and modifications could be made if warning was given.

The Summer Restrictions

ANNOUNCING the end of the statutory ban on the domestic use of electricity during certain hours of the day, Mr. Shinwell, on April 24, gave details of the new Government plan to save 2½ million tons of coal during the summer months.

In industrial and commercial premises, space heating by any form of fuel would be banned between May 5 and the end of October. Provision would be made for premises where night work was done in May, September and October, and there would be no interference with the supply of heat necessary for premises in which certain types of process work were carried out. (The existing ban on central heating was temporarily lifted on Wednesday.)

For residential consumers, the ban would extend until the end of September and would prohibit the use of gas and electric space heating at all times during this period, except where a medical certificate was given. There would be no statutory restriction on the use of solid fuel for space heating. All domestic consumers were asked, Mr. Shinwell said, to aim at saving 25 per cent. of the amount they consumed during the comparable period last year, this figure to include the savings made as a result of the space heating ban. Residential premises served by Scottish water-power, or other undertakings not using coal or oil, are exempt.

Changes in weather conditions, however, suggest that the date on which the ban is to be applied may be altered.

Industrial Information

Illuminating Engineering Society

The annual dinner of the Illuminating Engineering Society will be held at the Grosvenor House, Park Lane, London, W.1, on May 14, 6.30 for 7 p.m.

Marconi Jubilee Convention

A convention, organised by Marconi's Wireless Telegraph Co., Ltd., to celebrate the fiftieth anniversary of its foundation and attended by delegates from thirty countries, was opened by Sir George Nelson, chairman of the company, at a luncheon at Grosvenor House Hotel, London, on Monday, April 28. It is continuing with conferences at the South Kensington Hotel until May 7. The activities include visits by the delegates to the establishments of the Marconi companies and of the English Electric Co. (with which the Marconi companies are now associated) at Chelmsford, Great Baddow, St. Albans and Stafford, to see the latest developments in wireless and engineering practice.

Branch Managers' Conference

The Tube Investments subsidiary, Simplex Electric Co., Ltd., held a conference of branch managers at their new Blythe Bridge factory, near Stoke-on-Trent, on April 18. The delegates were welcomed by Mr. C. Lacy-Hulbert, managing director, who stated that, with the addition of the Blythe Bridge factory, the Simplex Company's factories now totalled over one million sq. ft. of factory floor space.

Cambridge Branch of E.A.W.

The inauguration of the Cambridge and District branch of the E.A.W., the fifteenth to be formed since the war, took place at the Guildhall, Cambridge, on April 22, in the presence of a large audience. Under the chairmanship of the Mayoress, Mrs. F. Doggett, the chief speakers were the Mayor, Counc. F. Doggett; Miss Caroline Haslett, E.A.W. director; Mr. M. D. Bradford and Mr. P. Sydney, chairman and general manager, respectively, of the Cambridge Electric Supply Co. The inaugural resolution was proposed by Lady Butler and seconded by Mrs. Bradford. Mr. Sydney arranged a luncheon for the Committee and speakers before the meeting, and the Cambridge Electric Supply Co. organised an interesting electrical exhibition, and provided tea. Thirty-five members were enrolled.

Electron Jubilee

The Institute of Physics and the Physical Society, in collaboration with the Institution of Electrical Engineers, are arranging to mark the jubilee of first public announcement, made by Prof. J. J. Thomson (later Sir Joseph Thomson) on April 30, 1897, of the existence of the electron, and the first approximate estimate of its mass. The celebrations will take the form of a series of lectures and other functions in London on September 25 and 26, and an exhibition at the Science Museum, which will remain open from September 26 for about three months.

E.A.W. Annual Conference

The 22nd annual conference of the Electrical Association for Women will

A view of the new Marconi marine radar equipment, the "Radiolocator," showing the transmitter and aerial unit. The equipment is on view at the Marconi Jubilee Exhibition at Queen's House, Kingsway, London

be held in London on May 13 and 14. The programme is as follows: Tuesday, 10 a.m., Registration of delegates at the Connaught Rooms, Great Queen Street; 10.30 a.m., annual general meeting; 1 p.m., luncheon, speaker Mr. George Tomlinson, Minister of Education; 3.30 p.m., Council meeting at 38, Grosvenor Place, S.W.1, followed by house warming for members from 4.30 to 8.30 p.m.; 8.30 p.m., British Industries Fair Ball at the Dorchester Hotel. Wednesday: 1 p.m., visit to British Industries Fair, Olympia, and Earls Court sections; 12.30, lunch, followed by golf competition

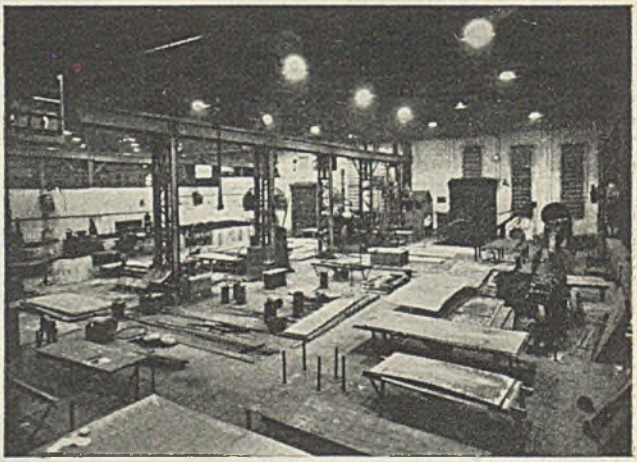
for the Lady Hughman Challenge Cup, at Croham Hurst Golf Club, Croham Road, Croydon.

B.I.R.E. Convention

A convention, organised by the British Institution of Radio Engineers, will be held at the Tollard Royal Hotel, Bournemouth, from May 19 to May 23. It will be international in character, and the lectures will cover a variety of subjects, including "International Automatic Networks" and "High Fidelity Recording and Reproduction," accompanied by demonstrations of late technical developments.

Engineering Works' Lighting

Improved lighting recently installed in the engineering and boiler-making works of Robert Jenkins and Co., Ltd., at Rotherham, was planned by lighting engineers of the British Thomson-Houston Co., Ltd. A survey of the works revealed an average intensity of 5 to 10 f.c. with a prevalence of glare from bare and insufficiently screened high wattage lamps. When drawing up plans for relighting, care was taken to relate the number and wattage of the lamps, and the type, spacing and mounting height of the reflectors to the work carried out in each shop. The result is a striking improvement in the overall illumination and glare-free lighting upon every working plane. In the main plating bays, shown in the accompanying illustration, the general illumination comes from 24 1 000 W Mazdalux concentrating reflectors which are mounted 28 ft. 6 in. above floor level in four rows at intervals of 20 ft. by 20 ft. This arrangement gives a service intensity of 11 f.c. Three 200 W dispersive reflectors mounted over the cutting block provide local lighting for the plate edging machine. The electrical contractor was Mr. L. R. Smith, of Rotherham.



An improved lighting installation in the plating bays of an engineering works at Rotherham

Radio Dealers' Conference in Bombay

On March 21, at the Taj Mahal Hotel, Bombay, the first Indian Ekco dealers' conference passed a resolution requesting Col. Young, joint managing director, Ekco-Ensign Electric, Ltd., who made a special journey to India to attend, to convey to dealers in Ekco radios in the United Kingdom fraternal greetings and best wishes for success. On his return on April 20, Col. Young, who was accompanied by Mr. Harold Hunt, of the E. K. Cole development and engineering division, spoke of the practical value of the conference, which was attended by nearly 200 dealers from all over the continent, from the North-West Frontier to Colombo.

M.V. "Fulham VIII" Launched

The motor collier, "Fulham VIII," built for the Fulham electricity department, was launched from the shipyard of the Burntisland Shipbuilding Co., Ltd., on Tuesday, April 22, the naming ceremony being performed by the Mayoress of Fulham, Mrs. C. P. De Winter, who was accompanied by the Mayor, Coun. C. P. De Winter. There are three large self-trimming cargo holds served by hatchways fitted with steel covers. The holds are built on the hopper principle, which allows the coal to flow by gravity to within the range of the discharging grabs. All the deck machinery is electrically driven. An electrically-driven steering gear is fitted over the rudder head and is operated by telemotor from the bridge. Single-screw Diesel propelling machinery of 1 480 B.H.P. is fitted. This consists of twin 12-cylinder vee-type Diesel engines manufactured by Mirrlees, Bickerton and Day, Ltd., of Stockport. The auxiliary machinery comprises two cold starting marine type Diesel engines developing about 75 B.H.P., driving two large electric generators. A third auxiliary Diesel engine of 30 B.H.P. drives an electric generator, air compressor and general service pump. There is also an independent electrically operated starting

air compressor, self-priming ballast pump, lubricating oil filter, fuel transfer pump, salt water circulating pump and vertical split casing bilge pump. The main engines and auxiliary Diesel engines are fresh water cooled. The design of "Fulham VIII" has been specially developed by the builders in collaboration with Mr. W. C. Parker, borough electrical engineer.

Price Reductions

As and from April 16, it is announced, the prices of all Eralite domestic electric appliances were reduced. The new prices are plus purchase tax.

Diesel-Electric Shunter

With reference to the Crompton Parkinson new Diesel-electric locomotive, described in our issue of March 14, we are informed that the mechanical parts were built by Andrew Barclay and Co., Ltd., of Kilmarnock.

Advance in Prices

F. W. Brackett and Co., Ltd., announce that, due to increases in the cost of raw materials, electric motors and labour, they are obliged to advance the prices of their "Argosy" pumping sets by 10 per cent.

I.E.E. Annual Report

Copies of the annual report of the I.E.E. Council for the session 1946-47 and of the accounts for the year ended December 31, 1946 to be presented at the annual general meeting on Thursday, May 15, at 5.30 p.m., can now be obtained by members on application to the secretary.

New Communications Company

A new company, to be known as Electronic Transmission Equipment, Ltd., has been formed by the Mullard Wireless Service Co., Ltd. It will develop and manufacture a comprehensive range of communications apparatus, including that for line and supersonic work, and will take over the present communications activities of Radio Transmission Equipment, Ltd., in the new laboratories and works situated at Brathway Road, Wandsworth, London, S.W.18. The products will be marketed through the communications division of the Mullard Wireless Service Co., Ltd.

Floating Exhibition for S. America

Representative products of electrical and allied industries are prominently displayed in the exhibition staged in the South American Saint Line's 9,500 ton cargo liner, the m.v. "St. Merriel," which was due to sail from the Royal Albert Dock for South America on April 30. It will visit Rio de Janeiro, Santos, Montevideo, Buenos Aires and Rosario. The exhibitors include the Brush Electrical Engineering Co., Ltd. (a two-ton industrial battery electric truck, and a six-way distribution board, type "A.F."); Enfield Cables, Ltd. (cables, cable-jointing and insulating materials); Enfield Rolling Mills, Ltd. (copper and brass sheets, brass polishing plates, etc); Erinoid, Ltd. (samples of moulded articles in cellulose acetate); the Plessey Co., Ltd. (radio components); Reed Brothers (Engineering), Ltd. (plastics injection moulding machine); Relco, Ltd.—the export division of Elexcel, Ltd.—(an electric cooker, electric fires and an electric iron); Vardon Murray, Ltd. (12 V battery charging set and a direct lighting set); British Oil Engines (Export), Ltd. (Petter single cylinder four-stroke air cooled engine and a "Cub" horizontally-opposed twin cylinder four-stroke Diesel engine); J. H. Carruthers and Co., Ltd. (power driven centrifugal pumps); Heenan and Froudes, Ltd. (automatic wire forming machine); the Morton Machine Co. (electric pie machine and mixing machines).

I.M.E.A. Exhibition

THE customary exhibition to be held in connection with the I.M.E.A. Convention at Bournemouth next month, will be supported by the following:

Aidas Electric, Ltd.; Automatic Telephone and Electric Co., Ltd.; Backer Electric Co., Ltd.; H. J. Baldwin and Co., Ltd.; Barlow-Whitney, Ltd.; Bastian and Allen, Ltd.; Belling and Co., Ltd.; Benjamin Electric, Ltd.; Berry's Electric, Ltd.; Best Products, Ltd.; Geo. Bray and Co., Ltd.; British Electric Meters, Ltd.; British, Foreign and Colonial Automatic Light Controlling Co., Ltd.; British Insulated Callender's Cables, Ltd.; British Power Transformer Co., Ltd.; British Refrigeration Association; the British Thomson-Houston Co., Ltd.; Bulpitt and Sons, Ltd.; Burco, Ltd.; Cable Covers, Ltd.; Cable Makers' Association; E. K. Cole, Ltd.; Crompton Parkinson, Ltd.; Dorman and Smith, Ltd.; the Edison Swan Electric Co., Ltd.; Electric Lamp Manufacturers' Association of Great Britain; the Electrical Apparatus Co., Ltd.; Electrical Association for Women; Electrical Industries' Benevolent Association; the Electroflo Meters Co., Ltd.; Elexcel, Ltd.; Enfield Cables, Ltd.; the English Electric Co., Ltd.; Falco Electrical Appliances, Ltd.; Falk, Stadelmann and Co., Ltd.; Ferranti, Ltd.; H. Fisher (Oldham), Ltd.; the General Accessories Co., Ltd.; the General Electric Co., Ltd.; Gillott Electro-Steam Cookers, Ltd.; the Gramophone Co., Ltd.; Hague and McKenzie, Ltd.; T. M. C. Harwell (Sales), Ltd.; Heatrae, Ltd.; Hoover, Ltd.; the Hotpoint Electric Appliance Co., Ltd.; Jackson Electric Stove Co., Ltd.; Johnson and Phillips, Ltd.; Measurement, Ltd.; the Metropolitan-Vickers Electrical Co., Ltd.; Moffats, Ltd.; Parnall (Yate), Ltd; the Revo Electric Co., Ltd.; A. Reyrolle and Co., Ltd.; the Rheostatic Co., Ltd.; Sangamo Weston, Ltd.; Santon, Ltd.; Siemens Electric Lamps and Supplies, Ltd.; the Simplex Electric Co., Ltd.; Smith Meters, Ltd.; South Wales Switchgear, Ltd.; Standard Telephones and Cables, Ltd.; Sunvic Controls, Ltd.; Thorn Electrical Industries, Ltd.; Tricity Cookers, Ltd.; the Universal Boilers and Engineering Co., Ltd.; Venner Time Switches, Ltd.; J. and H. Walter, Ltd.; Wilkins and Mitchell, Ltd.

Electricity Bill in Committee

Further Government Concessions on Financial Clauses

CLAUSE 22, which deals with the control of dividends and the safeguarding of company assets pending transfer to the Electricity Authority, was the occasion for several Government concessions when it came before the House of Commons Electricity Committee, last week.

Mr. Glenvil Hall, Financial Secretary to the Treasury, refuted Opposition arguments in support of amendments that a director absent on business in the U.S. could not be held liable for actions of his co-directors of which he had no knowledge, as he claimed, before any action of which he disapproved was taken, the absent director would have ample time to resign.

Mr. Hall gave an assurance that before the Report stage a Government amendment would be put down to meet the contention of an Opposition amendment that where the revenue of a company in the period before the vesting date was insufficient to meet the permitted 4 per cent. or annual rate paid in the last complete financial year before January 10, 1947, whichever was the higher, recourse could be had to reserves for equalisation of dividends in order to maintain the dividend.

After an amendment to change the reference date for dividends to the three complete financial years before January 1, 1939, had been rejected on a division, Mr. Gaitskell accepted an Opposition amendment to exempt redemption of redeemable preference shares from sub-section 4 (a), prohibiting payments to members to reduce share capital. An amendment to cut out sub-section 4 (b), prohibiting payment to members " out of capital moneys " was refused, but Mr. Glenvil Hall agreed to look at the wording, which he admitted was drawn very wide.

Describing another amendment as " objectionable as it stood," Mr. Shinwell said that in truncated form it might be less objectionable, and he wanted to consider it. It made members of a company liable to the Central Authority for any loss suffered by reason of an excess distribution, instead of directors. He accepted an Opposition amendment to exclude sub-section 4 in reference to a payment or distribution to a member otherwise than in his capacity as a member.

Mr. Hall stated that directors who redeemed an existing high interest bearing stock or share issue in favour of a lower-interest security before the vesting date would not be regarded as infringing sub-section 5 (a), as such a move was preserving the assets. Where a stock was compulsorily redeemable at a price in excess of the compensation as laid down by Stock Exchange prices, the excess that had to be legally paid would be sanctioned, but no additional premium on top of the fixed redemption price.

Clause 23, dealing with the final payment of dividends and interest, was attacked by the Opposition, who sought by amendment to include in net revenue to be distributed in the final accounting period any net revenue already in hand. After Mr. Hall had refused to accept the amendment, Col Walter Elliott described the refusal as an attack on the Chancellor of the Exchequer's policy of ploughing profits back, and an invitation to companies in other industries to raise dividends up to the hilt in order to increase the Stock Exchange quotation of their shares, in case of nationalisation.

The clause, with minor Government alterations, was approved, together with clause 24 (income tax provisions).

From Monday, May 5, the Committee will sit on three mornings a week.

Trade Conference

A RESOLUTION concerning the Electricity Bill was successfully adopted at the National Chamber of Trade Conference held at Eastbourne last week. Tabled by the South Midlands Area Council, it stated that the present time was inopportune for the transfer of electricity undertakings to the State and viewed with alarm the inevitable dislocation which would occur with a serious repercussion on industry. It also requested the Conference to consider that " Clause 2 (sub-sections three and four) should be deleted in the Electricity Bill if proceeded with, subject to the State retaining the right to hire electrical equipment to consumers, but not under a hire-purchase contract; and was further of the opinion that the " compensation Clauses for local authority and other undertakers are unfair and should be revised in order that fair compensation shall be paid having regard to the value as going concerns of the undertakings affected."

The Conference fully debated the resolution which was finally adopted.

A resolution by Fareham that in view of the industrial crisis through which the country is now passing, any further proposals for the reduction of working hours should be resisted, was passed.

In Parliament

Electrical Questions Asked and Answered

Generator Exports.—Mr. Belcher, in answer to a question by Mr. W. Shepherd, stated that in January and February, 1947, 96 tons of electrical generators valued at £40 800 were exported to Poland.

Street Lighting.—Mr. Gammans asked the Minister of Fuel what was the estimated saving in coal in the month of March effected by the restrictions on street lighting. Mr. Shinwell replied that it was impossible to give any exact figure, but as a very rough estimate coal consumption on street lighting during March was 30 000 tons less than the average monthly rate in 1946.

Electrical Steel Sheets.—Replying to Mr. Reid, who asked if the Minister of Supply was aware of the shortage of electrical sheet steel, which was needed for the manufacture of goods exportable to the hard currency areas, Mr. Wilmot said that it was hoped to expand U.K. production of electrical steel sheets by over one-third by the end of the year. Substantial quantities would be imported from the U.S.A., Germany and Belgium.

German Generating Plant.—Mr. Prescott asked the Minister of Fuel and Power whether consideration had been given to the importation of electrical power station equipment from Germany, and what decision had been arrived at. Mr. Shinwell said that importation had been considered. An interim report of the special mission which recently visited Germany to inspect power station plant had now been received and was being examined.

Bankside.—Strong criticism of the Government's decision to permit the erection of a new power station on Bankside, Southwark, opposite St. Paul's Cathedral, was voiced at an all-party meeting of members of both Houses of Parliament on Tuesday night. It was decided to accept an offer from Mr. Silkin, Minister of Town and Country Planning, to address a further all-party meeting, and to invite Mr. Shinwell, Minister of Fuel and Power, to attend.

Menai Straits Tidal Scheme.—The scheme prepared and submitted to the Government by Mr. F. O. Harber, borough electrical engineer at Bangor, was the subject of a question by Mr. Price-White, who asked the Minister of Fuel and Power whether it was his intention now or at some future date to put the proposals, which provided for the production of electrical power by means of harnessing the waters of the Menai Straits, into operation. Mr. Shinwell replied that the merits of the scheme could not be determined without a detailed survey and the construction of a tidal model. Capacity for the construction of such models was limited and was being reserved for the tidal model of the Severn Barrage scheme. For the present, therefore, they could not proceed with the tests required.

Domestic Cooking Methods.—Sir S. Reed asked the Minister of Fuel whether, in view of the conflicting claims of electricity, gas and solid fuel in the economical use of coal for cooking and heating, inquiry would be instituted to determine the respective merits of gas and electricity, modern grates and heat storage stoves, in order to ensure the best use of our limited coal supplies. In reply, Mr. Shinwell said that inquiries of that kind were already in progress in a number of research laboratories. It could not be expected, however, that those investigations would make it possible to reach general conclusions regarding the relative merits of gas, electricity and solid fuel for domestic cooking in view of the great differences in the services provided by these forms of fuel and of the wide variations in the requirements of different households.

Generating Plant Priority.—Replying to a question by Mr. Ellis Smith, the Minister of Supply, Mr. John Wilmot, stated that four meetings of the Heavy Electrical Plant Committee were held in 1946. Two had since been held under his chairmanship and, as a result, a progressing organisation had been set up to help manufacturers in overcoming production difficulties. The highest priority had been given to the supply of labour and essential materials needed for the manufacture, installation and repair of plant, and arrangements had been made to ensure that export orders did not interfere with home requirements. The numbers of shifts and hours worked on plant and power house construction, he added, varied considerably and details were available centrally. It was too early yet to say the extent to which delivery dates would be improved by these arrangements. Replying to supplementary questions, Mr. Wilmot stated that every effort was being made to speed the constructional programme to the maximum extent. He would consider proposals to bring to this country German and Italian engineers, and would look into the matter of a priority for manufacturers of power station flooring.

Electricity Supply

Carlisle.—Two rural electrification schemes are proposed. One plan, to cost £2 600, will supply Smithfield, Hetherside, Kirklinton and Upperton, and the other at £3 700, will supply Sprunston, Untbank, Raughton, Gaitsgill, and Raughtonhead.

Bolton.—A sub-station to augment the supply in the Halliwell district is to be erected, at a cost of £4 650, and reinforcements in the Tonge Moor area and the south-eastern district will cost £13 430 and £21 300, respectively. The Electricity Committee is seeking sanction to borrow £16 000 for sub-stations, £10 000 for consumers' services and £5 000 for meters.

Littlebrook.—Under the direction of the C.E.B., the Kent Electric Power Co. has applied to the Commissioners for consent to a third extension of 120 000 kW at Littlebrook generating station, thus completing the total capacity of 360 000 kW originally authorised. The third section involves the installation of two 60 000 kW turbo-alternators and ancillary plant, four 360 000 lbs. hr. boilers, operating at 900 lbs. sq. in., and 940°F., and the necessary buildings and civil engineering work.

Croydon.—After taking Counsel's opinion on what could be done to prevent the nationalisation of their electricity undertaking, the Borough Council has been told that beyond continuing their opposition to the Electricity Bill in its progress through Parliament there is no action which the Corporation can take to resist acquisition. Accordingly, the Electricity Committee has sent a letter to the members for the borough, informing them that it is the Council's wish that the rejection of the Bill should be moved on the Third Reading.

North of Scotland.—The Hydro-Electric Board published yesterday their Constructional Scheme No. 8, for the electrical development of Kintyre (Argyllshire), consisting of a hydro-electric scheme in Glen Lussa, costing £480 000, and having an average annual output of 8½ million units, and transmission lines which will bring electricity to the coastal villages and to farms and cottages on both sides of the Kintyre peninsula between Campbeltown and Tarbert, and also provide additional supplies of power for industrial development in Campbeltown.

Shoreditch.—So that new blocks of flats now being erected as part of the borough redevelopment plans may be switched over easily to possible future district heating schemes, the Council has authorised that where individual central heating plants are to be installed, provision should be made for these plants to be speedily shut down and connections conveniently made to heat transmission pipes. This decision follows upon consideration of a report prepared by the Borough Electrical Engineer (Mr. R. H. Rawll) and the Borough Suveyor, in which the whole question of district heating as applied to new buildings was reviewed. In order to save fuel, 48-year-old Bellis and Morcom reciprocating engines coupled to d.c. generators, are being run again from steam provided from the burning of refuse from the dust destructor plant. The output is being fed directly into the d.c. l.t. distributing system.

London.—The report and accounts of the London and Home Counties J.E.A. give details of additions to the generating capacity in the Authority's area which have been approved during the year. Of three new stations, the largest is that of the Poplar Borough Council at East India Dock, where two 52 500 kW alternators will be installed, followed by the Northmet Power Co.'s station at Rye House, Hoddesdon, Herts, which will have two 32 000 kW alternators. The third new station is being built by Kingston Borough Council, and will have two 30 000 kW alternators. The additions to existing stations are two 50 000 kW alternators at Bankside (City of London E.L. Co., Ltd.); three 75 000 kW alternators at Barking (County of London E.S. Co., Ltd.); one 50 000 kW and one 2 500 kW alternator at Croydon (Borough Council); and one 60 000 kW and one 5 000 kW alternator at Battersea (London Power Co., Ltd.). In addition, alterations of supply systems and pressures have been approved at Barnes, Finchley and West Ham. The accounts show that units sold in bulk by the Authority during the year ended December 31, 1946, were 867.2 millions, while supply sent out in the Authority's local distribution undertakings amounted to 273.6 million units. The income in respect of bulk supplies was £2 227 415, compared with £1 897 757 in 1945, and income on the local distribution account was £1 863 996, compared with £1 659 499, giving a total income for the year of £4 308 505, compared with £3 712 455. The surplus to be carried forward, after deduction of expenditure of £4 141 446, was £167 059.

Book Reviews

"Let Us Know the Worst." By Sir Ernest Benn. (London: Society of Individualists.) Price 6d.

Except among the very young, few days pass in the course of which men and women do not discuss the business of surviving the present crisis. But they do not often express themselves as trenchantly and in so connected a form as does Sir Ernest Benn in his pamphlet "Let Us Know the Worst." The author has the advantage of a knowledge, already mature, of men and affairs before 1914, and of an unabated activity of mind and perception in 1947. He can thus balance the two eras one by the other, and presents his statement of account to the general reader in the space of an essay that gathers the loose threads of thoughts in the minds of many, thereby making the causes of our ills, and the remedy for the ills themselves, plain for all to read. The title of the pamphlet is not really descriptive of its contents. "Let Us Know the Worst" is not an appeal, but a dissection of what is amiss in England now, and an assertion of the true remedy. That remedy is a plain and simple one. Its adoption would call for no expensive legislation. It lies, moreover, within the reach of everyone. From the beginning of the Lloyd Georgian era in politics to the electoral triumph of Mr. Attlee, Sir Ernest traces—with facts and figures—a deterioration in our political values that began when the idea got about "that a cash value could be attached to the vote." Politics have taken charge of the counting house and the workshop. We are paying the price in ever-increasing poverty. The argument, stated only baldly in this review, is developed by the author with thoroughness and fire. It makes most interesting reading by virtue alike of its matter and the style in which it is written.

Industrial High Voltage Distribution.—By E. J. Barrows. (London: Pitman and Sons.) Price 15s.

The author confines his attention to one aspect of industrial distribution practice, namely, the selection and layout of plant with reference to the short-circuit currents with which it will have to deal under fault conditions. General descriptive matter concerning switchgear and other plant is not included. The subject is one of considerable importance in view of the great increases in short-circuit kVA which have, in many cases, resulted from recent factory extensions and intensive electrification schemes. It is regrettable that many of the foremen or charge-hands responsible for the electrical equipment have only a limited technical knowledge, and it is to help such engineers that the book has been written; the treatment is therefore simple, and mathematics are restricted almost entirely to simple arithmetic and geometry. After an introductory chapter the elements of alternating currents, reactance and impedance, are described—it is, however, unnecessary in this connection to calculate reactance to six significant figures as on p. 37—and the principles of short-circuit calculations are explained. Succeeding chapters discuss various problems arising with industrial plants, and, incidentally, with small public supply systems; these include the selection of appropriate switchgear for fault clearance, choice of cable sizes to carry the fault currents, sub-division of networks to limit fault currents, the use of reactors, the choice of distribution voltage and the use of fuse-protected switchgear. Full calculations for typical layouts with various alternative schemes are given, together with a discussion of the reasons for the choice of any particular size and arrangement of plant. Most text books dealing with short-circuit calculations limit their treatment to the choice of suitable switchgear for clearing the fault, and the author is to be commended for going beyond this and considering the various other factors which are influenced by short-circuit considerations.—E. O. T.

Electric Washing Practice

SOME 180 members from the South-East and East England area of the Electrical Development Association met, on April 22, for lectures and demonstrations of electric washing methods. The occasion was the fifth of the series of sales lecture-meetings arranged by the Area Officer, Mr. R. D. Reynolds, and those present included sales assistants and demonstrators from electricity showrooms.

The meeting opened with an informative talk on the "theory" of washing, delivered by Mr. E. V. Elwes, in which he described the characteristics of different types of fabric met with in the normal family wash, with the aid of diagrams, and explained that the most important single factor in removing dirt was the amount of agitation which the materials received during the washing process.

These considerations were further stressed by the second speaker, Miss N. Bewley, who, using two electric washers of different design, demonstrated the ease with which a large basket of dirty laundry could be dealt with by modern equipment.

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:—

Hastings, May 5.—Supply, delivery and erection at Broomgrove power station of one 11 kV, three-phase, 500 MVA, rupturing capacity switchboard, comprising five units. Specification from Borough Electrical Engineer and Manager, York Buildings, Hastings.

Sale, May 5.—(a) Supply, delivery and laying of 1 700 yds. 0.2 sq. in., 6.6 kV cable and the laying of 1 200 yds. 0.25 sq. in. l.t. cable in same track; (b) supply and delivery of two 500 kVA, three-phase standard indoor core-type double-wound O.N. cooled transformers. Specifications from Borough Electrical Engineer, Town Hall, Sale, Manchester.

Plymouth, May 10.—Supply, delivery and erection of one 100-ton, overhead electric travelling crane. Specification from City Electrical Engineer, Armada Street, Plymouth.

Dartford, May 10.—Provision of additional light points in houses on the Council's estates. Specification from Town Clerk, Town Clerk's Office, Dartford, Kent.

Birkenhead, May 13.—Supply and delivery of: (a) e.h.t. and l.t. p.i. cables; (b) rubber-insulated cables; (c) meters; (d) general stores; for period of 12 months commencing July 1, 1947. Specifications from Borough Electrical Engineer, Craven Street, Birkenhead.

Liverpool, May 14.—Supply and delivery of: (a) twenty-four 1 000 kVA transformers, 11 000/415 V; (b) twelve 500 kVA transformers, 11 000/415 V; (c) twelve 15 kVA transformers, 11 000/240 V. Specifications from City Electrical Engineer, 24, Hatton Garden, Liverpool, 3.

Willesden, May 19.—Electrical installations in 44 houses and 10 flats, in four contracts. Specifications from Borough Electrical Engineer and Manager, Electric House, 296, Willesden Lane, N.W.2.

Blackpool, May 19.—Supply, delivery and erection of two 20 MVA and one 10 MVA 33/6.6 kV transformers, with on-load tap-changing equipment; and delivery, jointing and laying of various lengths of cable. Specifications from Borough Electrical Engineer, Shannon Street, Blackpool.

Manchester, May 20.—Supply, delivery and erection at Stuart Street generating station of ventilating plant in turbine and boiler houses. Specification from Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2; deposit, £1 1s.

Melbourne, June 4.—Supply of porcelain disc insulators for 220 kV transmission lines, for State Electricity Commission of Victoria. Particulars from Agent-General for Victoria, Victoria House, Melbourne Place, Strand, London, W.C.2; deposit with tenders, £25.

Batti-Wallahs' Society

THE newly-elected president, Colonel H. J. Wellingham, was formally inducted and invested with the badge of office by the immediate past president, Mr. P. V. Hunter, at the monthly luncheon of the Batti-Wallahs' Society at the Connaught Rooms, London, on Thursday, March 25. There was a large attendance.

Colonel Wellingham thanked the members for the honour they had done him, and said it would not be an easy task to follow Mr. Hunter, who had put the Batti-Wallahs on the map again after the war. They were grateful to their old friend, Mr. M. Whitgift, for again taking on the duties of "mate," hon. secretary, and treasurer, and they also thanked Mr. Temple Hazell for agreeing to assist Mr. Whitgift.

In welcoming Miss Caroline Haslett, director of the E.A.W., the guest speaker, the President recalled that it was at one of the ladies' nights held by the society that Miss Haslett made her first public speech.

Miss Haslett entertained the members with interesting and amusing stories of incidents that occurred on her war-time travels. Her experiences were both grave and gay, and in many respects unique. She was a passenger in the "Queen Mary" to America, when it was being used as a troopship, before Pearl Harbour was attacked by the Japanese; she flew high over the German lines to Sweden and Finland; and also went out to the Middle East, visiting Egypt and Palestine, where she addressed units of the Forces.

Miss Haslett referred to the fact that the first winner of the Caroline Haslett Travelling Exhibition was Miss Joan Whitgift, daughter of the society's "mate," and said her tour in America recently was an enormous success. The next exhibitioner would go to Sweden.

A cordial vote of thanks was accorded Miss Haslett on the motion of Sir Thomas Purves.

Company News

RICHMOND (SURREY) ELECTRIC LIGHT AND POWER CO., LTD.—Elec. from revenue acct. for 1946 £31 711 (£31 758) plus surplus on sale of Govt. secs. £2 294 (nil). To sinking fund contribution £1 213 (£1 204), res. for depreen., renewals, etc., £12 500 (£11 600), contings. £1 500 (£500), div. 6% (same), fwd. £914 (£722).

KENT ELECTRIC POWER CO.—Bal. from rev. acct., 1946, £519 171 (£418 349), plus £73 494 from contings. and other res. To int. on deb. stks. and temp. ln. £103 210 (£100 685), skg. fnd. £3 603 (£3 498), res. for depreen., etc., £195 502 (£186 638), res. for tax £75 000 (£50 000), contings. £35 000 (nil), gen. res. £50 000 (£100 000). Final div. 5%, mkg. 8% (same); fwd. £175 564 (£164 908).

TELEGRAPH CONDENSER CO., LTD.—An increase of ordinary dividend to 10 per cent. (7½) and cash bonus of 5 per cent. (same), making 15 per cent. (12½) less tax, are proposed. Profits on trading for 1946 have amounted to £98 708, compared with £83 476. Depreciation is £12 281 (£13 145), fees £2 309 (£1 707), income tax £43 000 (£34 159). Preference dividend £4 290 (£3 900) and transfer to reserve £25 000 (£18 800). The sum carried forward is £40 232 (£40 402).

NORTHAMPTON ELECTRIC LIGHT AND POWER CO., LTD.—Gross income, 1946, £844 379 (£805 277). Deduct operating exes. £754 197 (£671 424), lvg. £90 182 (£133 853), plus E.P.T. recoverable £65 000 (£50 000), int. and divs. £11 601 (£6 998), mkg. £166 783 (£190 851). To deb. and ln. int. £21 613 (£21 920), employees' benevt. acct. £2 000 (same), lvg. net rev. £143 170 (£166 931). To addtl. contrib. to pension fund nil (£20 358), tax £45 000 (£69 000), gen. res. £20 000 (same), ord. div. 6%, mkg. 10% (same), fwd. £139 927 (£111 050).

BRITISH POWER AND LIGHT CORPORATION, LTD.—In the Chairman's address, Air Commodore C. E. Benson reviewed the part played by the company in rural electrification, and said that from 1930 to 1939, when they had been free to develop their undertakings, the subsidiary companies spent over £2 300 000 on capital works, mainly in the development of predominantly rural areas. There was to-day an insistent rural demand for electricity, but it would be some years before the plant was available to meet all the requirements. Speaking of the recent coal crisis, the Chairman said that the North Wales Power Co. had expended a considerable amount of time and money in the investigation of the possibility of developing further the water-power resources of North Wales, and a report by two engineers had been submitted more than two years ago to the appropriate Ministry. It was a great disappointment that these efforts had so far borne no results, as it was felt that the shortage of coal supplies made it more than ever essential that the fullest use should be made of the water-power resources of the country, as was being done in Scotland.

MONTREAL LIGHT, HEAT AND POWER CONSOLIDATED.—The Quebec Hydro-Electric Commission has made it known that it is prepared, until further notice, to purchase from U.K. shareholders their shares at $25 (Canadian) per share. The Quebec Bill, which empowers the Commission to purchase at $25 per share all the remaining shares of Montreal Light Heat and Power Consolidated, provides for the taking over of all the assets of the company and also empowers the Lieut.-Governor in Council to dissolve the company and its component companies. This move for compulsory purchase, it is believed, now disposes of earlier hopes that the directors' claim that the shares were worth $41 each would be examined by an arbitration board.

Metal Prices

		Monday, Price	Inc.	April 28 Dec.
Copper—				
Best Selected (nom.)	per ton	£135 10 0	—	—
Electro Wire bars	„	£137 0 0	—	—
H.C. Wires, basis	„	£155 0 0	—	—
Sheet	„	£178 10 0	—	—
Bronze Electrical quality 1% *Tin*—				
Wire (Telephone) basis	per ton	£177 15 0	—	—
Brass (60/40)—				
Rod basis	„	1s. 2¼d.	—	—
Wire	„	1s. 6½d.	—	—
Iron and Steel—				
Pig Iron (E. Coast Hematite No. 1)	per ton	£8 19 0	—	—
Galvanised Steel Wire (Cable Armouring) basis 0.104 in.	„	£34 5 0	—	—
Mild Steel Tape (Cable Armouring) basis 0.04 in.)	„	£21 15 0	—	—
Lead Pig—				
English	„	£91 10 0	—	—
Foreign and Colonial	„	£90 0 0	—	—
Tin—				
Ingot (minimum of 99.9% purity)	„	£440 10 0	—	—
Wire, basis	per lb.	5s. 6¾d.	—	—
Aluminium Ingots	per ton	£80 0 0	—	—
Spelter		£70 0 0	—	—
Mercury (spot)	per bott.	£21 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.*

SCOPHONY, LTD., London, S.W., mfrs. of sound, etc., apparatus.—March 17, deb., to Lloyds Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *£22 000. March 29, 1946.

VORTEXION, LTD., London, S.W., radio dlrs.—March 14, two morts., to Midland Bank, Ltd., each securing all moneys due or to become due to the Bank; respectively charged on 257, The Broadway, Wimbledon, together with machinery, fixtures, etc., and on land adjoining 257, The Broadway, Wimbledon, on which is erected a factory, together with fixtures and fittings.

WEYMOUTH RADIO MANUFACTURING CO., LTD.—March 3, deb., to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge.

TIMMS-ROE, LTD., Derby, dealers in dynamos.—February 17, debenture, to Martins Bank, Ltd., securing all moneys due or to become due to the Bank; general charge.

AUTO ELECTRIC SERVICE (STOURBRIDGE), LTD.—March 13, £870 mort. to Brierley Hill and Stourbridge Incorporated Bldg. Soc.; charge on 1, St. Mary's Lane, Oldswinford. *Nil. June 11, 1945.

BARLITE LAMPS, LTD., Blackpool.—March 18, £1 000 deb., to G. H. Knight, Hanley; general charge.

Satisfactions

TELEVOICE, LTD., Birmingham, electrical dlrs.—Satisfaction, March 18, of deb. reg. February 17, 1944, to the extent of £74 6s. 10d.

TELLUX, LTD., London, W., mfrs. of electrical apparatus.—Satisfaction, March 15, of mort. reg. April 15, 1946.

CRITERION ELECTRIC, LTD., London, E.C. —Satisfaction, March 17, £900, reg. August 27, 1941.

BRIGHTON LIGHTING AND ELECTRICAL ENGINEERING CO., LTD. — Satisfaction, February 13, of debs. reg. May 11, 1927, to the extent of £1 250.

Coming Events

Friday, May 2 (To-day)

I.E.E., N. EASTERN STUDENTS' SECTION.—Newcastle-on-Tyne. At the County Hotel. Annual Dinner, preceded by Annual General Meeting. *7.30 p.m.*

Saturday, May 3

I.E.E., N. WESTERN STUDENTS' SECTION.—Manchester. Annual General Meeting. "Engineering Aspects of Gramophone Record Reproduction," by H. K. Barker and R. G. Whitehead. *2.30 p.m.*

Monday, May 5

BRITISH INDUSTRIES FAIR.—Castle Bromwich, Olympia and Earls Court. (Closing date, May 16.)

I.E.E., S. MIDLAND CENTRE.—Birmingham. "Industrial Applications of Electronic Techniques," Dr. H. A. Thomas. *6 p.m.*

I.E.E., LONDON STUDENTS' SECTION. — Lecture. "The Presentation of Technical Information," by A. Duxbury, followed by discussion.

Tuesday, May 6

I.E.E., N. MIDLAND CENTRE.—Leeds. At the Corporation Electricity Department. Annual General Meeting and Visit of T. G. N. Haldane, Vice-President of the Institution. *6 p.m.*

I.E.E., N. WESTERN CENTRE.—Manchester. Annual General Meeting. "The Teaching of the Principles of Electrical Machine Design," by L. H. A. Carr. *6 p.m.*

Wednesday, May 7

BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION.—London. Sales Management Conference, until May 9

I.E.E., SOUTHERN CENTRE.—Southampton. In the Physics Theatre, University College. Annual General Meeting. "The Development of the Gas-Cushion Cable for the Highest Voltages," by T. R. P. Harrison. *6.30 p.m.*

I.E.E.—London. Radio Section. "Accurate Measurement of the Group Velocity of Radio Waves in the Atmosphere, Using Radar Technique," by R. A. Smith, E. Franklin and F. B. Whiting. *5.30 p.m.*

BRITISH INSTITUTION OF RADIO ENGINEERS, N. WESTERN SECTION.—Manchester. At the College of Technology, Reynolds Hall. Discussion. "Single Side-Band Communication Channels," opened by E. C. Cherry. *6.45 p.m.*

Thursday, May 8

I.E.E.—London. Installations Section. "Special Electrical Requirements of a Viscose Rayon Factory," by C. F. Freeman and H. V. Mather. *5.30 p.m.*

ELECTRIC LAMP MANUFACTURERS' ASSOCIATION OF GREAT BRITAIN.—Liverpool. At the Electricity Showrooms, 9-11, Whitechapel. Commencement of a Three-day Course on Illumination Design. *5.15 p.m.*

Friday, May 9

ILLUMINATING ENGINEERING SOCIETY.—Birmingham. "The Physical Nature of Light," by H. J. Cull. *6 p.m.*

Company Meeting

Associated Electrical Industries

Record Orders

The forty-seventh annual general meeting of Associated Electrical Industries, Ltd., was held on April 23 in London.

The Rt. Hon. Oliver Lyttelton, D.S.O., M.C., M.P., the chairman, said that the gross trading profits of the group were approximately the same as those for the year ended December 31, 1945. Non-recurring profits amounted to £119 000. The gross profits of the holding company were £2 282 000, compared with £2 084 000. Some of the group factories had been unaffected by the switch-off of electrical power in February. In some others they had been able to maintain at work a high percentage of their total numbers; others, however, had been shut down completely. It was impossible to compute indirect losses, but the direct losses caused by payment of wages to those who could not be employed amounted to about £200 000 gross.

Dividend and Bonus

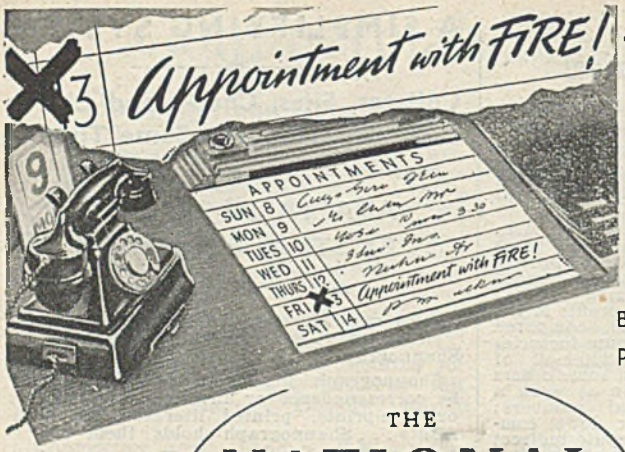
For the group as a whole the orders on the books were considerably higher than last year and in fact were the largest ever recorded in the history of the company. The directors recommend a final dividend of 7½ per cent. on the ordinary stock (following an interim dividend of 5 per cent.) and a bonus at the rate of 2½ per cent., both less tax. The financial strength of the company was one which it would be difficult to match anywhere in a company of their size. The manufacturing floor space occupied by their factories was now 9 000 000 sq. ft., an increase of 60 per cent. since 1939. That fact would give stockholders an idea not only of the progressive policy which was being pursued, but also of the wider responsibilities which they had assumed. During the year they had continued to attempt where practicable to bring the work to the workers, and they were trying to make their contribution to a balanced industry in all parts of the U.K.

A large number of important orders and projects were now being handled by the group. If the Government wished to accelerate the building of power stations, they would have to attack the problem on a wide front. First of all, they must set up some clearing house or improved administrative machinery to clear the projects through the eight different public authorities concerned. At present it took nearly a year to get the site and project approved.

Their problems were those of production, and that they saw in front of them some years of high activity. They were glad to learn that the Government were now taking steps to precent the worst effects of a shortage of materials and notably electrical steel. That by itself would not be enough, because the capacity of their companies and of others engaged in the electrical equipment business was not being fully utilised, owing to a shortage of labour, particularly skilled labour.

They were well placed to take advantage of the great developments which might be expected in the electrical industry and could confidently rely on their technical and manufacturing departments to be in the forefront of electrical developments. They based their confidence very largely upon the fact that they had been and intended to remain in the van of research and development into the generation and application of electrical power.

The report was adopted.



Do you know when fire will break out in your premises?

Be prepared against such a possibility. Install "National" the most efficient fire fighting equipment on the market and take advantage of our maintenance service to ensure you are always ready to combat the danger wherever and whenever it threatens.

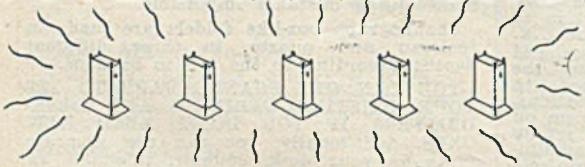
NFP

THE
NATIONAL
FIRE PROTECTION
COMPANY LIMITED.

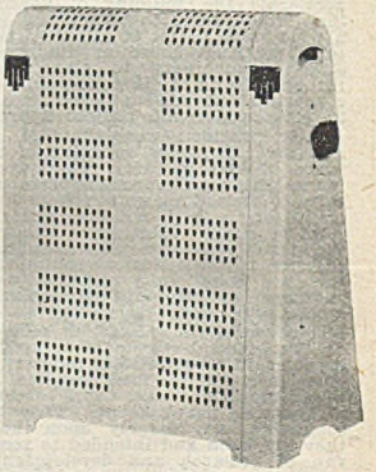
ARGOSY WORKS
KINGSTONE ROAD
LEATHERHEAD · SURREY
Telephone: LEATHERHEAD 2208

WRITE FOR ADVICE ON YOUR OWN PARTICULAR RISKS

FIVE heaters in ONE

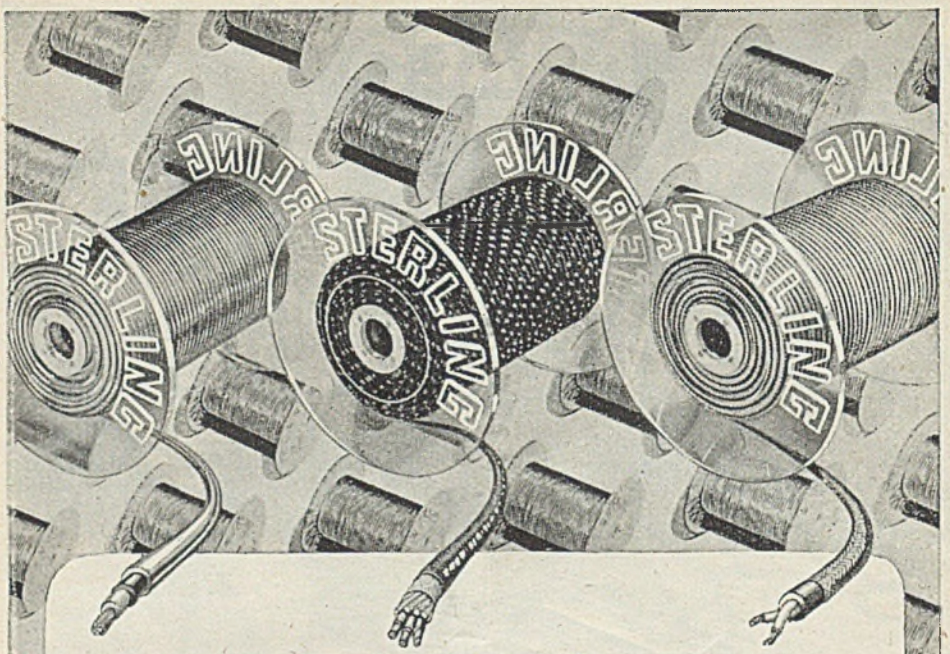


It's quite true! Five heaters in one! A variable heat control lever pre-selects the heat required—330 w, 500 w, 1 kw, 2 kw, or 3 kws. Can be used in the centre of a room with perfect safety, and will effectively heat a large or small room. Full details can be obtained from the Manufacturers.



The COMPTON ELECTRIC Space Heater

THE COMPTON ENGINEERING CO., LTD.,
Minerva Rd., North Acton, London, N.W.10.
Telephone: Elgar 6666.



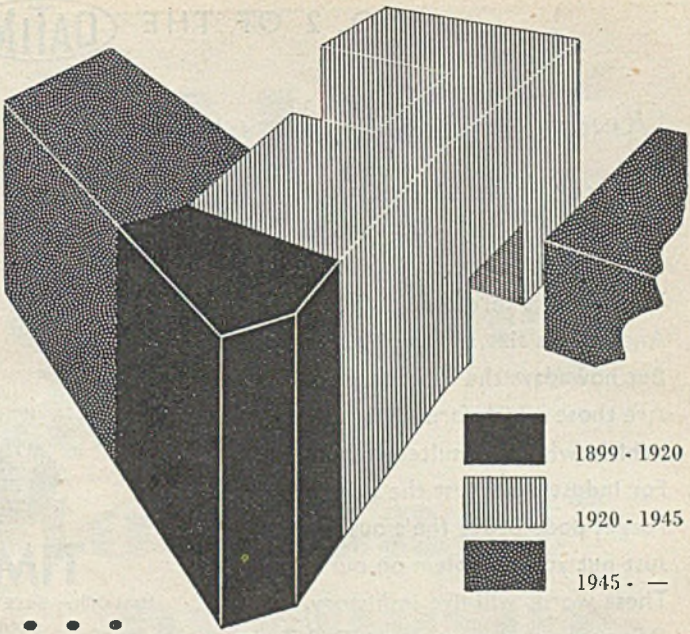
1826

Made to British Standards and G.D. specifications, STERLING Insulated Cables and Flexibles are available in a wide range to fulfil all domestic and industrial applications. Any STERLING Flexible can be made up into "ready-to-fit" leads to meet individual requirements. We will gladly send you samples and fullest information on request.

Sterling Cable Co. Ltd.,
Queensway, Ponders End,
Middlesex.
Telephone: Howard 2611
and at Aldermaston, Berks.

STERLING
CABLES OF QUALITY

STAND No. C.111, B.I.F., BIRMINGHAM



but now . . .

the original Sunco building is difficult to identify — so much has been added, so much expansion has taken place. Behind its ruined facade still bearing the scars of war the 'Sun' still fights the battle of supply and demand, confident in the fact that its resources and experience places it in an unassailable position to supply all electrical and radio material, limited only by the presence of restrictions and quotas that make things so difficult today. Limited too, we may add, by our firm resolve to supply only high quality material—'junk' is rather plentiful now, but it finds no place in the Sunco range.

The

SUN

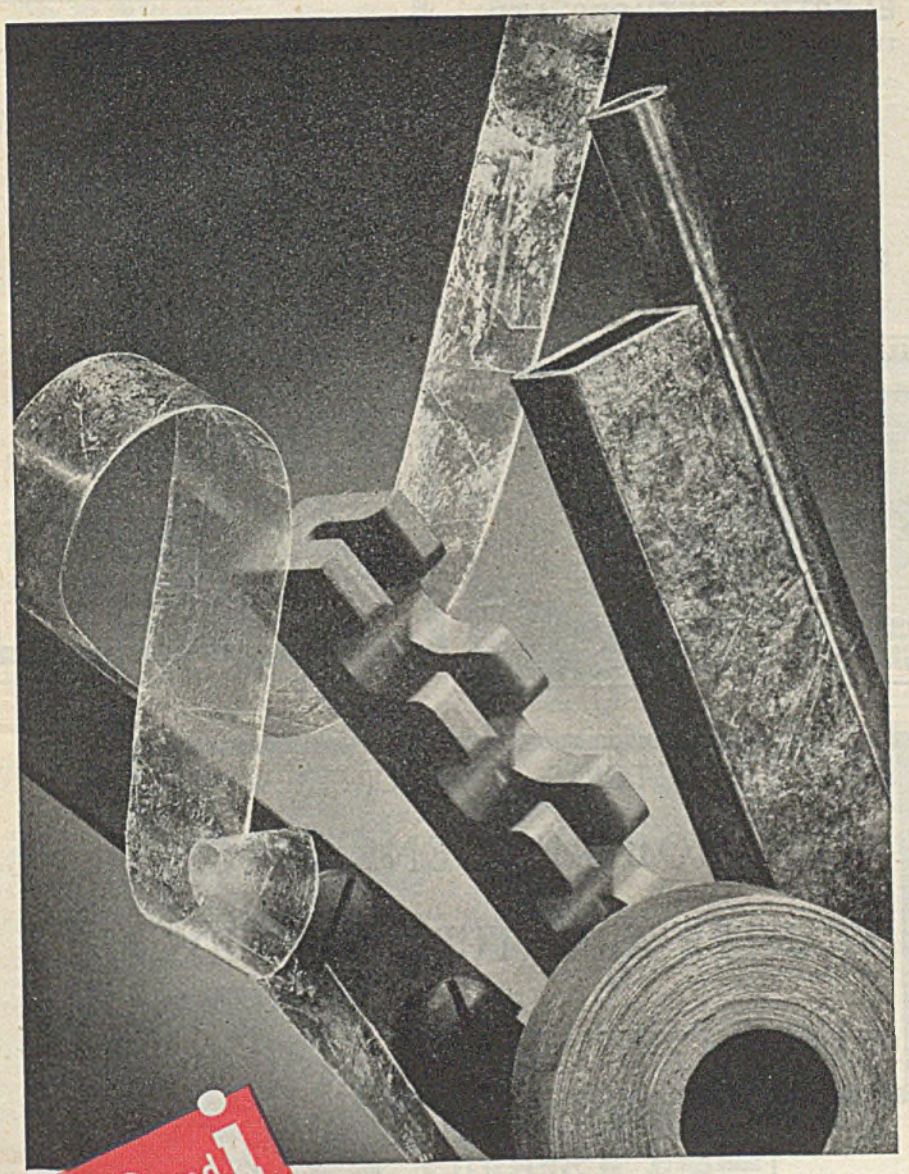
ELECTRICAL CO., LTD.

118 - 124, CHARING CROSS ROAD, LONDON, W.C.2

Telephone: TEMple Bar 3500 (18 lines) *Telegrams: Sunelec, Westcent, London.*

ALSO AT LEEDS, SLOUGH AND NEWCASTLE.

SUNCO means more to more people - NOW



m and i

THE MICANITE & INSULATORS COMPANY LTD.

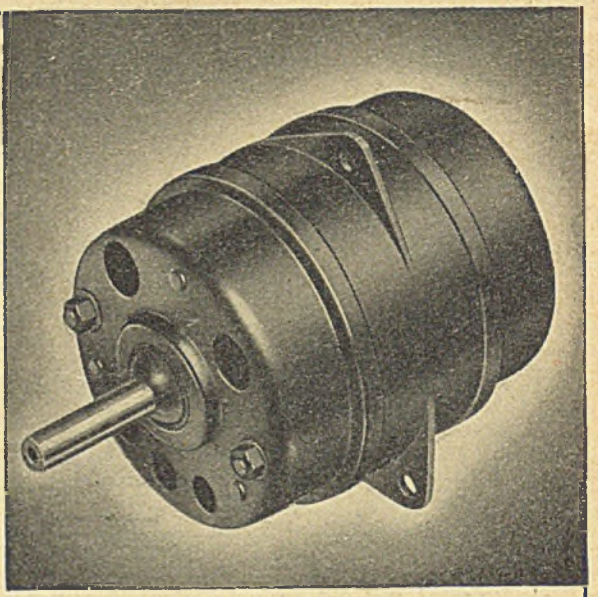
Empire Works, Blackhorse Lane, Walthamstow, London, E.17

Manufacturers of MICANITE (Built-up Mica Insulation). Fabricated and Processed MICA. PAXOLIN Laminated Materials. EMPIRE Varnished Insulating Cloths and Tapes. HIGH VOLTAGE BUSHINGS and TERMINALS. Distributors of Micoflex-Duratube sleevings.

Another new HOOVER product to be launched shortly

SHADED POLE MOTORS

of entirely new design



If you make Refrigerator condensers, Air conditioning units, Room Heaters, Fans, or similar appliances you will find these motors particularly effective on account of their

high starting Torque
silence in operation
reliability

and we would strongly advise that you get in touch with us now as to your future requirements.

ALSO FRACTIONAL H.P. MOTORS

Squirrel Cage Induction Motors. Split Phase, Capacitor or Three Phase Types. Solid or Resilient mounting. Ball or Sleeve Bearings.

H.P.	Overall Length	Body Diameter	Approx. Weight
1/6	10 7/32 in.	6 9/16 in.	24 lbs.
¼	10 15/32 in.	6 9/16 in.	26 lbs.
⅓	11 25/32 in.	6 9/16 in.	36 lbs.

Performance curves and data on other types supplied on request.

TWO TYPES TO BE AVAILABLE

Large . . . . . 400 grm/cms.
Small . . . . . 130 grm/cms.
Speed . . approx. 1,100 R.P.M. on load.

Suitable for 200/250 volts 50 cycle A.C.

HOOVER LTD

PERIVALE
GREENFORD • MIDDLESEX

Visit our Stand No. C710 at the B.I.F. Birmingham.

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, May 2, 1947.