

2448/11 000

THE

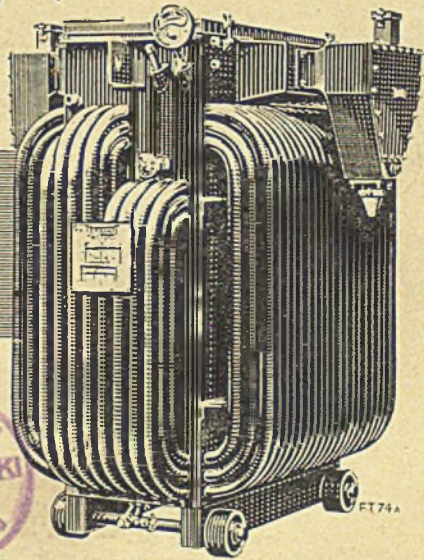
19.

ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

For your new Transformer

R. 138 (1947) Nr. 7.



Specify

Ferranti

MAN-HOUR

Savers



METROVICK
Fractional
MOTORS

METROPOLITAN
Vickers CO. LTD.

ELECTRICAL
TRAFFORD PARK ... MANCHESTER 17.



Switch to

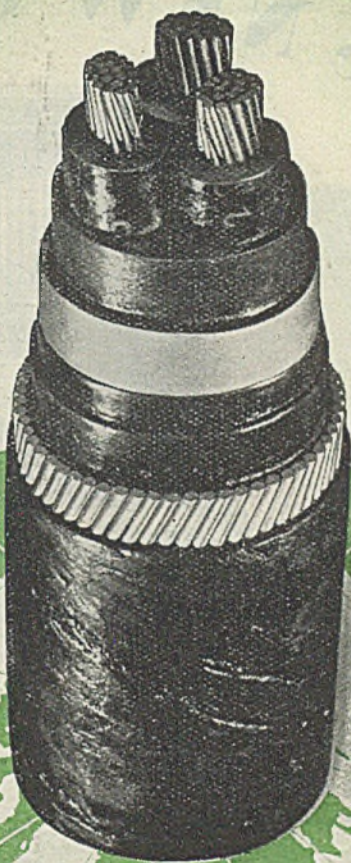
METROVICK

Lighting

when daylight fades

**For
INDUSTRIAL
POWER
DISTRIBUTION
and
TRANSMISSION**

Cables bearing the name TELCON carry with them the assurance of performance and dependability for every electric power requirement. Made to B.S. and Customers' specifications and suitable for use with all voltages up to 22 K.V. Full details and quotations on request.



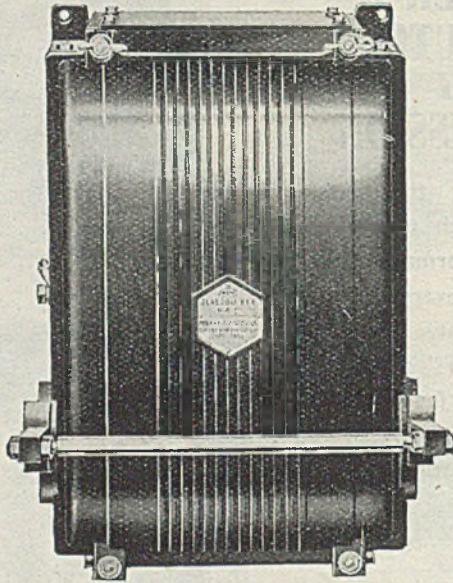
TELCON
PAPER INSULATED
CABLES



Founded 1864

THE TELEGRAPH CONSTRUCTION & MAINTENANCE CO. LTD.
Head Office: 22 OLD BROAD ST., LONDON, E.C.2. Tel: LONDON Wall 3141
Enquiries to: TELCON WORKS, GREENWICH, S.E.10. Tel: GREENWICH 1040

The NEW "Glasgow-Rex"



The Famous M.E.M Ironclad Switch re-designed for H.R.C Fuses

The new "Glasgow-Rex" H.R.C. is the first of the M.E.M. programme of new developments. Its attractive styling is the work of a prominent industrial artist and is in keeping with the advanced design of the whole unit. Easily convertible for different duties and surprisingly compact, this new version of an already world-famous switch is convincing proof of the M.E.M. leadership in switchgear design.

The "Glasgow-Rex" complies fully with Home Office regulations and the

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

A descriptive list No. 278 is available giving full details of the new "Glasgow-Rex" range rated from 30-200 amps. Send for your copy today.



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

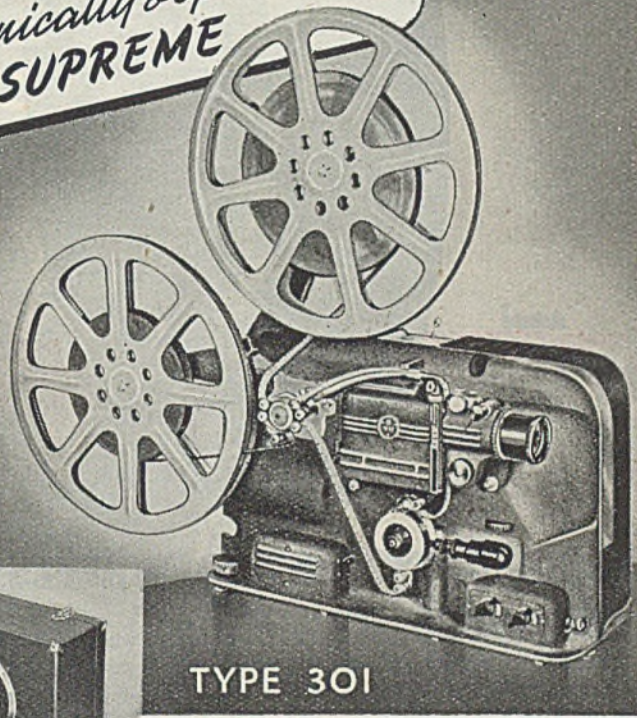
MIDLAND ELECTRIC MANUFACTURING CO. LTD., BIRMINGHAM, 11

BRANCHES IN LONDON & MANCHESTER

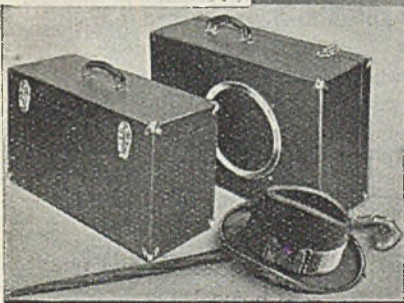
THE NEW

16mm SOUND PROJECTOR
Mechanically & Optically
SUPREME

Made by
B T H
 PIONEERS
 OF SOUND-FILM
 PROJECTORS



TYPE 301



- Twice the Light.
- Twice the Sound.
- Half the Weight.

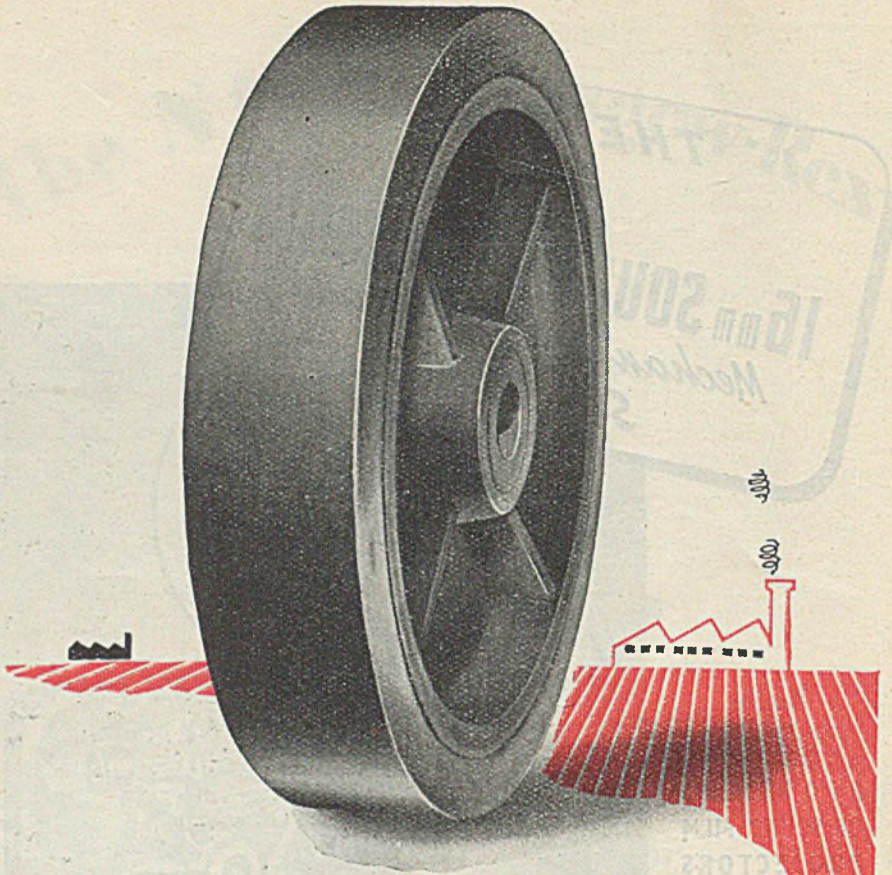
B T H

RUGBY

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, RUGBY, ENGLAND.

A3695





PAXOLIN TYRES AND WHEELS FOR INDUSTRY

Paxolin tyres and wheels for industrial type trucks and trolleys have considerable advantages over those made from the more traditional materials. They neither distort under heavy loads nor develop flats during periods of idleness, and are practically unaffected by most materials with which they are likely to come into contact, including water, petroleum products, industrial solvents and chemicals. They will not cause sparks, and therefore can be used in explosive or inflammable atmospheres, and can, if required, form satisfactory components of an electrically insulated vehicle. Paxolin tyres and wheels can be recommended particularly for the movement of heavy loads over rough surfaces.



THE MICANITE & INSULATORS COMPANY, LTD.

EMPIRE WORKS, BLACKHORSE LANE, WALTHAMSTOW, LONDON, E.17.

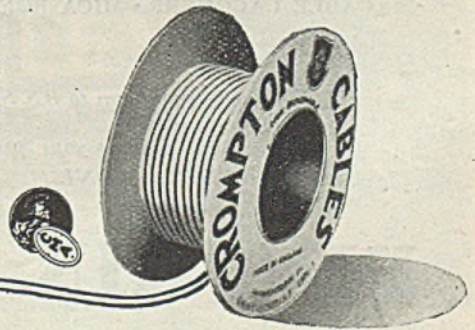
Manufacturers of MICANITE (Built-up Mica Insulation). Fabricated and Processed MICA. PAXOLIN (Synthetic-resin laminated sheets, rods, tubes and cylinders). HIGH-VOLTAGE

BUSHINGS and TERMINALS for indoor and outdoor use. EMPIRE varnished Insulating Cloths and Tapes and all other forms of Electrical Insulation. Suppliers of Vulcanised Fibre, Leatheroid, Presspahn, etc. Distributors of Micoflex-Duratube Sleeveings and Kenutuf Injection Mouldings (P.V.C.).

GOOD CABLE RUNS ARE MADE



WITH
Crompton
V.I.R. CABLE



CROMPTON PARKINSON LIMITED, ELECTRA HOUSE, VICTORIA EMBANKMENT, LONDON, W.C.2
Telephone: TEMple Bar 5911
Telegrams: Crompark, Estrand, London



MINERVA ELECTRICAL

Insulating Varnishes

STOVING VARNISHES (<i>Natural Resin Type</i>) Black and Clear
STOVING VARNISHES (<i>Synthetic Resin Type</i>) Black and Clear
THERMO-SETTING VARNISHES Black and Clear
AIR-DRYING VARNISHES Black and Clear
CLOTH VARNISHES Black and Clear
SLEEVING VARNISHES Black, Clear and Colours
CORE-PLATE VARNISHES (<i>Stoving and Air-drying</i>) Black and Clear
COPPER-WIRE ENAMELS Black and Clear
ACID AND HEAT-RESISTING ENAMELS All Colours
CABLE LACQUERS • MICA BONDING VARNISHES • COMPOUNDS	

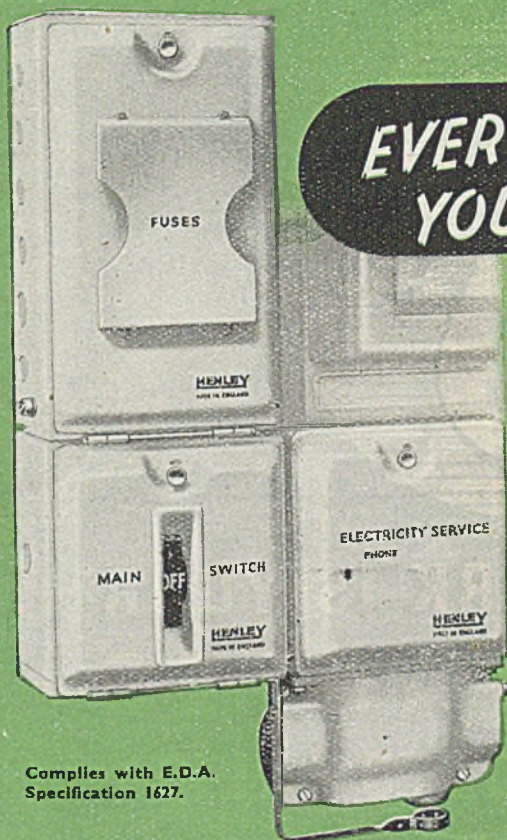
All Varnishes conform to B.S. Specifications wherever applicable.

*Please submit your problems to our Electrical
INSULATING VARNISH TECHNICAL DEPARTMENT.*

PINCHIN JOHNSON

15 CLIFFORD STREET • LONDON • W.1

Telephone: REGent 7471



**EVERYTHING
YOU NEED**

This simple, compact service unit incorporates everything you need for the supply intake and control for domestic consumer's installations. The three main components, Supply Intake Chamber, Main Switch Chamber, and Consumers' Fuse Chamber, can be assembled in various formations to suit most requirements.

Write for details.

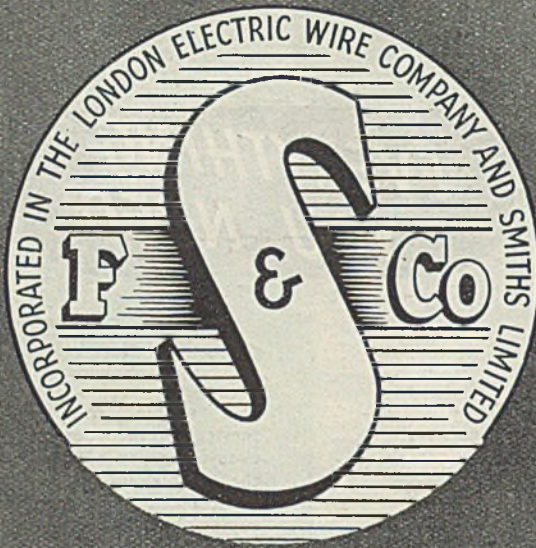
Complies with E.D.A.
Specification 1627.

HENLEY

CONSUMER'S SERVICE UNIT
W.T.HENLEY'S TELEGRAPH WORKS CO. LTD.

51-53 HATTON GARDEN · LONDON · E.C.1

CHANCERY 6022
GRAMS: HENLETEL, SMITH, LONDON



**THIS MARK IS YOUR
GUARANTEE
OF A GOOD QUALITY
PRODUCT**

BARE COPPER, CADMIUM COPPER & BRONZE • WIRES
STRIP, STRAND, BARS, RODS, SECTIONS, TROLLEY
WIRE, OVERHEAD LINES, TELEPHONE & TELEGRAPH
WIRES, FINE WIRES, RADIO AERIAL WIRE, TAPES &
BINDERS • COMMUTATOR COPPER, COPPER FORGINGS,
FUSE WIRES, EARTH RODS, RAIL BONDS, ETC.

FREDERICK SMITH & CO.,

(Incorporated in The London Electric Wire Company and Smith's Limited)

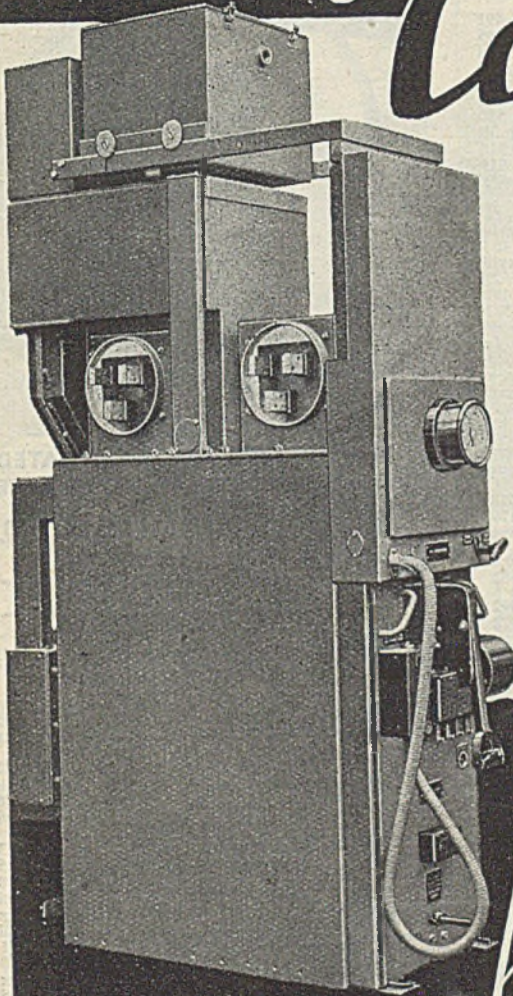
ANACONDA WORKS, SALFORD, 3 LANCS

Telephone: BLACKFRIARS 8701 (8 Lines)

Telegrams: ANACONDA MANCHESTER

Introducing a

Compact filled METAL CLAD unit



UP TO
1200 Amp. 250MVA. 6.6/11kV

COOKE & FERGUSON *Ltd.*

**ELECTRICAL
DIVISION**


THE TYPE FTD4, DUPLICATE BUSBAR, FULLY INTER-LOCKED, OIL AND/OR COMPOUND-FILLED UNIT, EMBODIES THE PRINCIPLE OF BUS TRANSFER OFF-LOAD SELECTION. INCORPORATING THE ASTA CERTIFICATED TYPE D4 LOW OIL CONTENT CIRCUIT-BREAKER

by

VICTORIA STREET, OPENSHAW, MANCHESTER CF73

Aidas Electric, Ltd.	520
Arrow Switches, Ltd.	Supp. xiv
Automatic Coil Winder & Electrical Equipment Co. Ltd....	Supp. xxxiv
Barries Electrical Agencies, Ltd.	491
Bastian & Allen, Ltd.	485
Bill Switchgear, Ltd.	Supp. xxxi
Birmingham Products, Ltd.	522
Britannic Electric Cable & Construction Co., Ltd.	474
British Cork Mills, Ltd.	520
British Thomson Houston Co., Ltd. (The)	Supp. iii
Brooks & Bohm, Ltd.	518
Buck & Hickman, Ltd.	519
Bushing Co., Ltd. (The)	Supp. x
Cable Makers Association	Supp. xii
Castle Engineering Co., Ltd. (The)	Supp. xxviii
Chance Bros.	484
Chamberlain & Hookham, Ltd.	Supp. xxxiii
Charlton Electrical Appliances, Ltd.	522
Chloride Electrical Storage Co., Ltd. (The)	472
Churchill, H. & D., Ltd.	521
Clarke, H., & Co., Ltd.	Supp. xxvi
Cooke & Ferguson, Ltd.	Supp. ix
Cornercroft, Ltd.	518
Crompton Parkinson, Ltd.	Supp. v
Cryselco, Ltd.	Supp. xxxii
Davis & Timmins, Ltd.	Supp. xx
Dorman & Smith, Ltd.	Supp. xxv
D.S. Plugs, Ltd.	Supp. xviii
Duratube & Wire, Ltd.	491
Electricity Services Ltd.	518
Enthoven, H. J., & Sons, Ltd.	479
Ericsson Telephones, Ltd.	Supp. xxviii
Ferranti, Ltd.	Cover i
Fluxite, Ltd....	483
General Electric Co., Ltd.	492
General Lighting Lighting & Equipment Co.	472
Glover, W. T., & Co. Ltd.	Supp. xxxv
Harbro Rubber Co., Ltd.	Supp. xxv
Hawkins, L. G.	482
Henderson, Craig & Co., Ltd.	483
Henley's W. T. Telegraph Works, Ltd.	Supp. vii, 474
Hopkinson Motors & Electric Co., Ltd.	Supp. xxiv
Howells Electric Motors	479
Hudson Pressings, Ltd.	523
Iddon, Victor H., Ltd.	Supp. xvi
Independent Pneumatic Tool Co., Ltd.	469
International Correspondence Schools, Ltd.	482
Jones Samuel & Co., Ltd.	481
Kaye, E. & E., Ltd.	Supp. xviii
Keith Blackman, Ltd.	Supp. xxix
Kent, Wm. (Porcelain), Ltd.	476
Lindley Thompson Transformer & Service Co., Ltd.	524
Linread, Ltd.	Supp. xxi
Litholite Insulators & St. Albans Mouldings, Ltd.	484
London Shafting & Pulley Co., Ltd.	Supp. xxx
L.P.S. Electrical Co., Ltd.	Supp. xxiii
Lundberg, A. P., & Co.	480
Lyons, Claude, Ltd....	480
Mathews & Yates, Ltd.	484
Mavitta Drafting Machines, Ltd.	485
Measurement, Ltd.	Cover iv
Metallic Seamless Tube Co., Ltd.	477
Metropolitan Vickers Electric Co., Ltd.	Cover ii
Micanite & Insulators Co., Ltd.	Supp. iv
Micramatic Electrical Instruments Co., Ltd.	Supp. xxv
Microfuses, Ltd.	483
Midland Electric Manufacturing Co., Ltd.	Supp. ii
Mosses & Mitchell, Ltd.	522
Multicore Solders, Ltd.	481

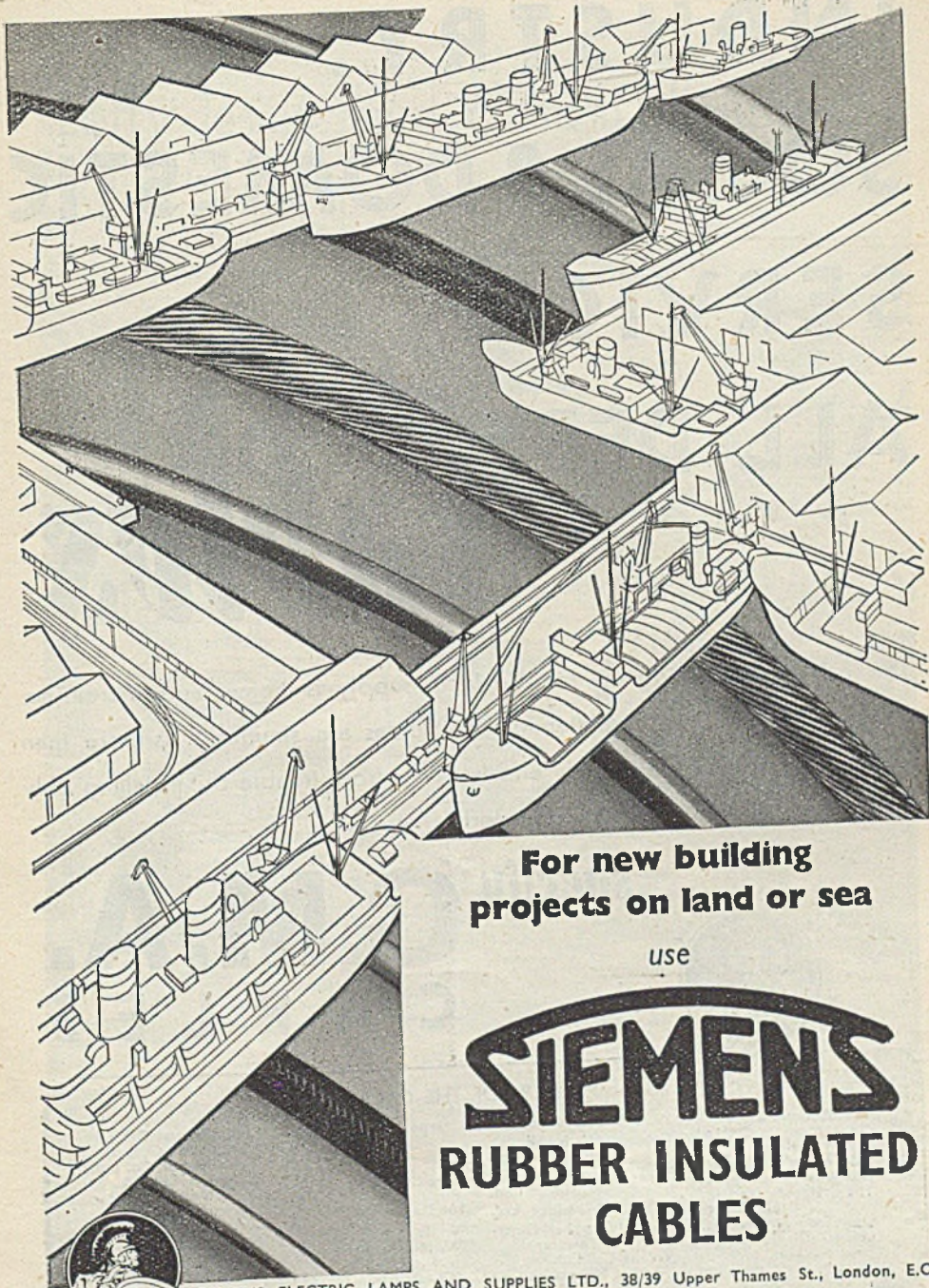
immediate delivery!



TEXOLEX TUBES IN LAMINATED FABRIC OR PAPER BASE

THE BUSHING CO. LTD.
HEBBURN-ON-TYNE

National Fire Protection Co., Ltd.	481
Newman Industries, Ltd.	517
Pinchin Johnson & Co., Ltd.	Supp. vi
Pitman, Sir Isaac, & Sons, Ltd.	485
Precision Equipment Co., Ltd.	Supp. xx
Record Electrical Co., Ltd.	522
Reynolds, A., & Co., Ltd.	Supp. xiii
Riley, Robert, Ltd.	476
Ripaults, Ltd.	Supp. xxxvi
Sankey, Joseph, & Sons, Ltd.	523
Santon, Ltd.	475
Scott, A. C., & Co., Ltd.	478
Siemens Electric Lamps & Supplies, Ltd.	Supp. xi
Sims, F. D., Ltd.	Supp. xix
Smith, Fredk., & Co., Ltd.	Supp. viii
Smiths Industrial Instruments, Ltd.	471
Sound	520
Streamline Filters, Ltd.	Supp. xxx
Symonds, R. H., Ltd.	Supp. xvi
Synchromatic Time Recording Co., Ltd.	520
Taylor Electrical Instruments, Ltd.	473
Telegraph Construction & Maintenance Co., Ltd.	Supp. i
Terry, Herbert, & Sons, Ltd.	Supp. xxvii
Uhlhorn Bros.	478
United Ebonite & Lorival, Ltd.	470
Universal Tools, Ltd.	Supp. xvi
Watliff Co., Ltd.	Supp. xv
Waymouth Gauges & Instruments, Ltd.	485
West Insulating Co., Ltd.	518
Westinghouse Brake & Signal Co., Ltd.	Cover iii
Whiteley, B. S. & W., Ltd.	Supp. xxii
Wilcox, Fd., & Co., Ltd.	Supp. xxiv
Zenith Electric Co., Ltd. (The)	483



**For new building
projects on land or sea**

use

SIEMENS

RUBBER INSULATED CABLES



SIEMENS ELECTRIC LAMPS AND SUPPLIES LTD., 38/39 Upper Thames St., London, E.C.4

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

INDUSTRY, SOCIAL & DOMESTIC SERVICE - ALL DEPEND ON *Cables*

The call upon equipment for electrical supply is heavy and increasing. When production and maintenance resources are strained it is more than ever essential to ensure safety and freedom from trouble by installing only the best obtainable transmission material.

specify **C.M.A.**
CABLES



Regd. Trade Mark
Nos. 566, 883-6-7

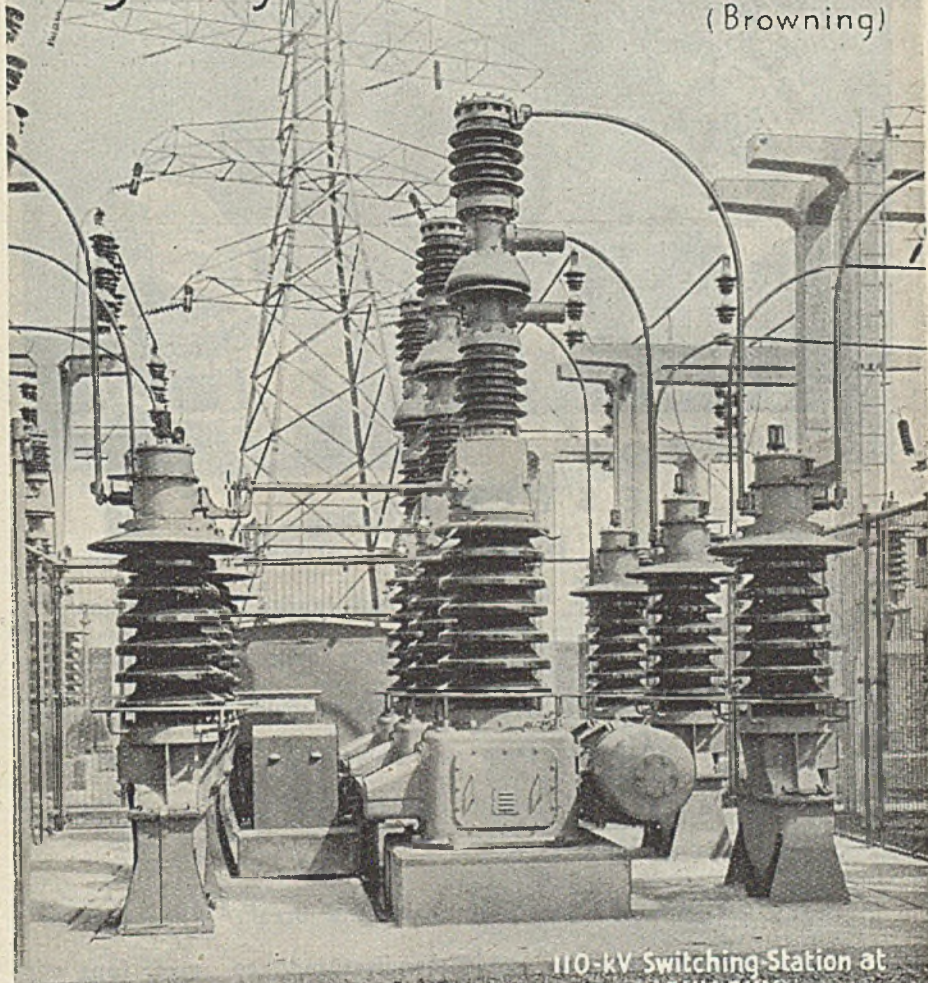
MEMBERS OF THE C.M.A.

- | | | | |
|---|---|---|--|
| The Anchor Cable Co. Ltd. | W. T. Glover & Co. Ltd. | Liverpool Electric Cable Co. Ltd. | Pirelli-General Cable Works Ltd. (General Electric Co. Ltd.) |
| British Insulated Callender's Cables Ltd. | Greengate & Irwell Rubber Co. Ltd. | The London Electric Wire Co. and Smiths Ltd. | St. Helens Cable & Rubber Co. Ltd. |
| Connollys (Blackley) Ltd. | W. T. Henley's Telegraph Works Co. Ltd. | The Macintosh Cable Co. Ltd. | Siemens Brothers & Co. Ltd. (Siemens Electric Lamps and Supplies Ltd.) |
| The Craigpark Electric Cable Co. Ltd. | Johnson & Phillips Ltd. | The Metropolitan Electric Cable & Construction Co. Ltd. | Standard Telephones & Cables Ltd. |
| Crompton Parkinson Ltd. (Derby Cables Ltd.) | The India Rubber, Gutta-Percha & Telegraph Works Co. Ltd. | | Union Cable Co. Ltd. |
| Enfield Cables Ltd. | (The Silvertown Co.) | | |
| Edison Swan Cables Ltd. | | | |

Advt. of the Cable Makers' Association, High Holborn House, 52-54 High Holborn, W.C.1. Holborn 7633

Lofty designs must close in like effects

(Browning)



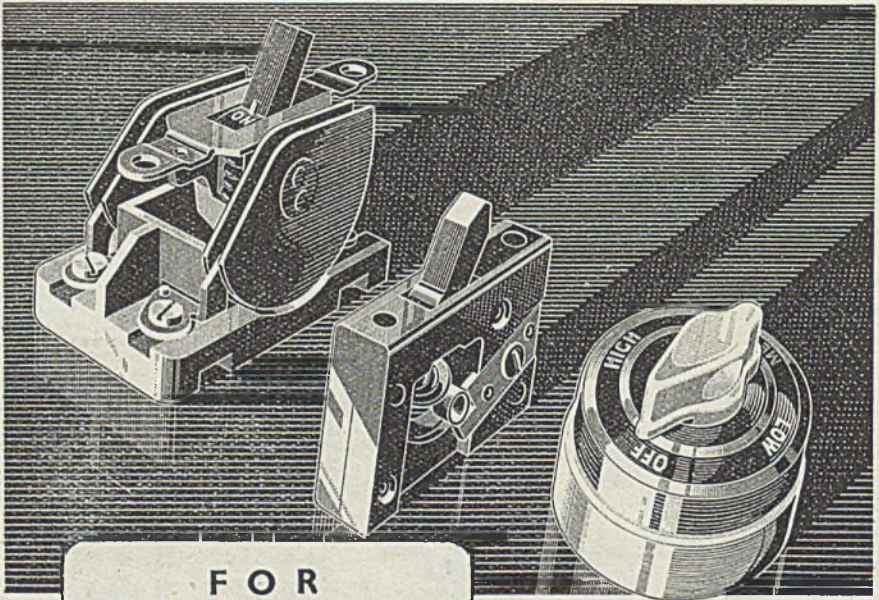
110-kV Switching Station at
FINAGHY

AIR-BLAST SWITCHGEAR

REYROLLE

HEBBURN-ON-TYNE

ENGLAND



FOR
DOMESTIC
APPLIANCE
CONTROL

Arrow offers the largest range of Precision Built Switches for every

specific need in the industrial and domestic field.

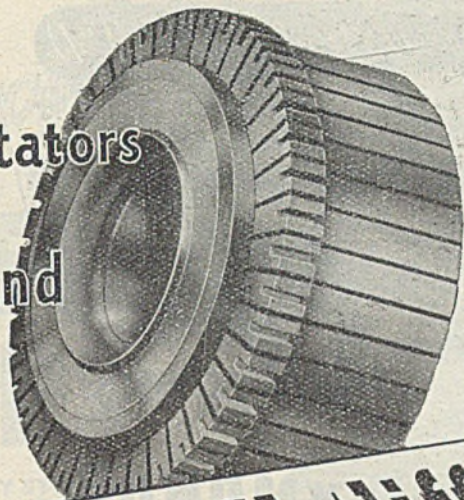
Tumbler switches from 1 to 60 amp. rating, and rotary switches in all circuit combinations from 5 to 35 amps. 250 volts.

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

for
Commutators
of all
types and
Sizes



Consult Watliff



A commutator made by Watliff is expertly produced and gives no trouble in service.



Advice from commutator experts is always available to users of our products.



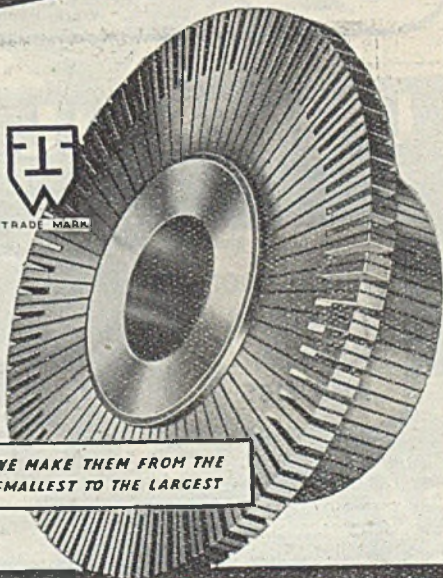
We recommend that designers should use our standard sizes (full details on request) wherever possible, but we can always supply specials to customers' exact requirements where needed.



We have been making commutators and slip rings for over 25 years and are confident that we know our business.



We produce over one million commutators yearly and we are still growing.



**WE MAKE THEM FROM THE
SMALLEST TO THE LARGEST**

WATLIFF

**MANUFACTURERS OF COMMUTATORS
FOR OVER 25 YEARS**

TELEPHONE: LIBERTY 1181-1182-1183
TELEGRAMS: WATLIFF, PHONE, LONDON

CO. LTD. LOMBARD ROAD, MORDEN ROAD, SOUTH WIMBLEDON, LONDON, S.W.19

TAYLOR 574

The Process of Wire Drawing (No 4)



Strip DRAWING

Copper Strip of soft, hard and medium qualities, are finished in either straight lengths, wound on drums, in coils and pads, or to any other specification required.

R. H. SYMONDS

Ltd.

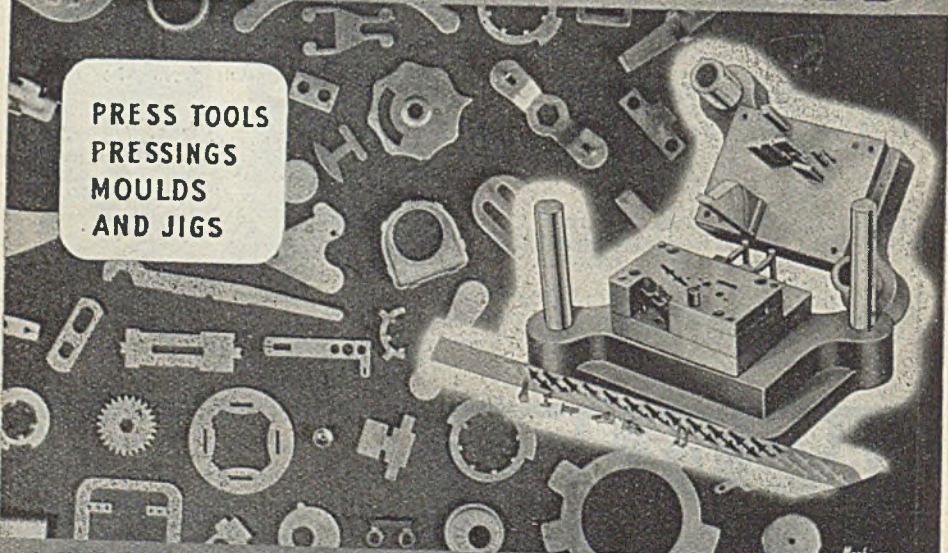


47 Victoria Street, Westminster, LONDON, S.W.1
Telephone : ABBey 2771 (Pte. Br. Ex.)
Works : Enfield, Middlesex.

 E. 22

UNIVERSAL TOOLS LTD

PRESS TOOLS
PRESSINGS
MOULDS
AND JIGS



TRAMWAY PATH · MITCHAM · SURREY

Shockproof NETTLE

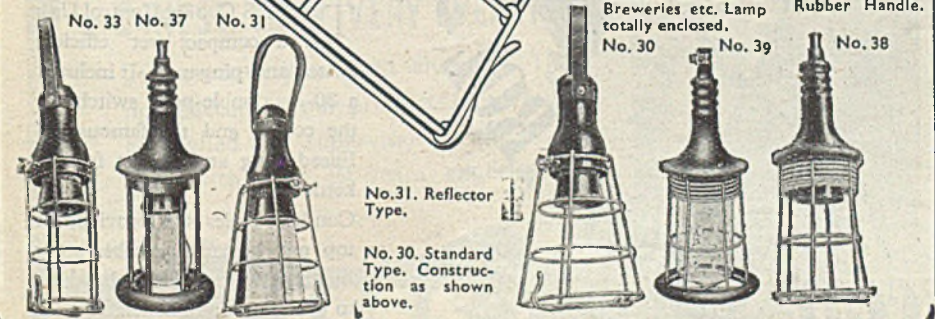
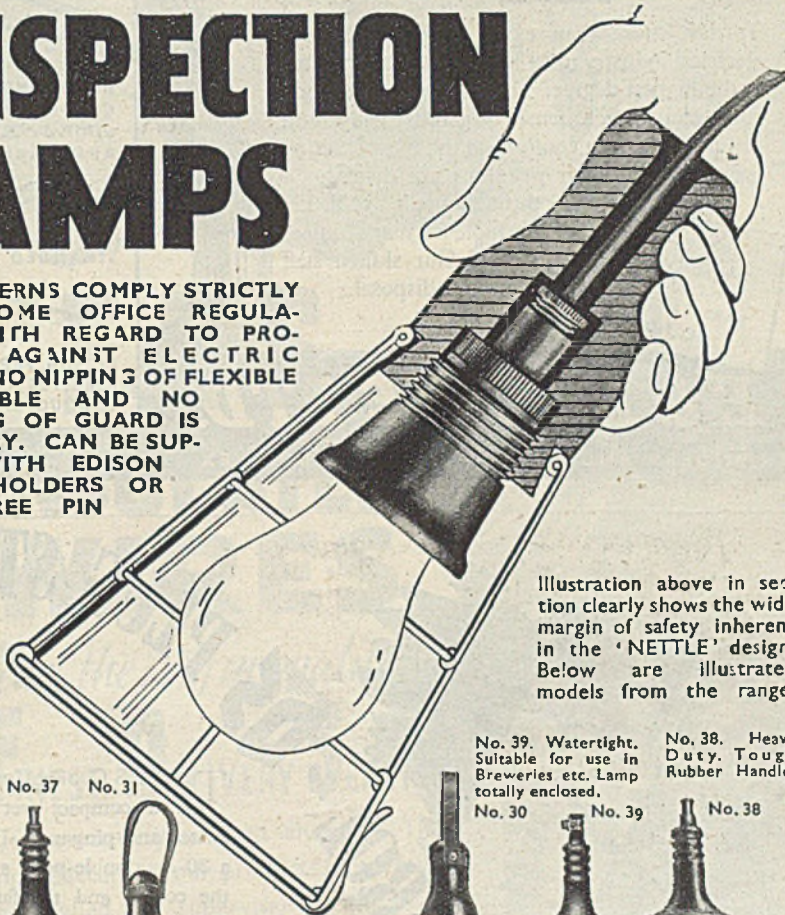
INSPECTION LAMPS

ALL PATTERNS COMPLY STRICTLY WITH HOME OFFICE REGULATIONS WITH REGARD TO PROTECTION AGAINST ELECTRIC SHOCK. NO NIPPINGS OF FLEXIBLE IS POSSIBLE AND NO EARTHING OF GUARD IS NECESSARY. CAN BE SUPPLIED WITH EDISON SCREW HOLDERS OR FOR THREE PIN LAMPS.

No. 33 Width 3½ In. For use where space is restricted.

No. 37. All-Insulated. For use near Switch-gear, Electric motors, etc.

Illustration above in section clearly shows the wide margin of safety inherent in the 'NETTLE' design. Below are illustrated models from the range.



No. 33 No. 37 No. 31

No. 39. Watertight. Suitable for use in Breweries etc. Lamp totally enclosed.

No. 38. Heavy Duty. Tough Rubber Handle.

No. 30 No. 39 No. 38

No. 31. Reflector Type.

No. 30. Standard Type. Construction as shown above.

VICTOR H. IDDON Ltd.

HARPER ROAD
WYTHENSHAW
MANCHESTER

For Reliability Specify



COPPER CONDUCTORS

To-day, more than ever, materials used in electrical industry must be accurate and reliable to the highest degree. This is especially true of conductors, where tensile, ductility, gauge and conductivity must conform to the most exacting specifications. Our products are distributed throughout the world. Let us quote for *your* requirements. Our skilled staff is at your disposal.

We also manufacture
ALUMINIUM AND
LIGHT ALLOYS IN
BARS, TUBES AND
SECTIONS



HIGH CONDUCTIVITY
COPPER WIRE AND
STRIP, SUPPLIED PLAIN
AND TINNED

STRANDED WIRE

COTTON, PAPER AND
ASBESTOS COVERED
CONDUCTORS

E. & E. KAYE LTD.

PONDERS END · ENFIELD · MIDDLESEX

Telephone..... Howard 1601
Telegrams..... Cuiwire, Enfield

TAYLOR 1215

COOKER CONTROL - DS PLUG STYLE

COOKER DS CONTROL

THE DS Cooker Control Unit is a compact yet efficient switch and plug unit. It includes a 30-A double-pole switch for the cooker and the famous DS Fused Plug and Socket for the kettle. Conduit Holes are provided at top and bottom for cable entry but may be provided elsewhere to special requirements.

Announcement of D.S. Plugs Ltd., Manchester, London, Glasgow.

E 1046

F.D.S. INSULATED WIRES

lead the way in quality &

FINEST **D**ELIVERY **S**ERVICE

Let us have your next enquiry. The manufacture of our products is carefully controlled and supervised by practical men with over 20 years' experience.



F.D.SIMS Limited
HAZELHURST WORKS • RAMSBOTTOM • LANCs.

PHONE
RAMSBOTTOM
2213-4

PRECO

**MOULDED AND EXTRUDED
PORCELAIN INSULATORS
AND REFRACTORIES**

**PRECISION EQUIPMENT CO
(CERAMIC DEPARTMENT)
175 BEDFORD AVE · SLOUGH**

SCREWS · TERMINALS · PRESSWORK



*If it's threaded
— we make it!*

DATIM

DAVIS & TIMMINS LTD
 Head Office: BILLET ROAD · WALTHAMSTOW · LONDON · E.17
 TELEPHONE: LARKWOOD BUS QUE LINES

TURNED PARTS & INSERTS

A SCREW THAT USES ITS HEAD



The Phillips Recess Screw prevents burrs, with a much stronger head.

The Phillips Screw prevents wobbling starts, giving first-time straight assemblies.

Drivers cannot slip. The Phillips Screw, once on the bit, stays on.

THE PHILLIPS RECESS HEAD SCREW fits firmly and snugly on to the 4-winged driver bit to form a single rigid straight line unit. Once applied it screws home quickly and cleanly first time and every time. The driver bit cannot slip out of the Phillips engineered Recess to score work surfaces or injure workers' hands. Try Phillips Recess Head Screws on your assemblies. Watch your production figures climb; watch your work improve; and notice how you save on costs as you cut out waste.

A Booklet on the Phillips Screw giving more details is available. Write to Linread, Ltd., Dept. (P5), Sterling Works, Cox Street, Birmingham, 3, for a copy. We are always pleased to advise on fastening problems.



Linread Phillips Screws



ELEPHANTIDE

REGISTERED

The **BRITISH MADE**
PRESSBOARD INSULATION

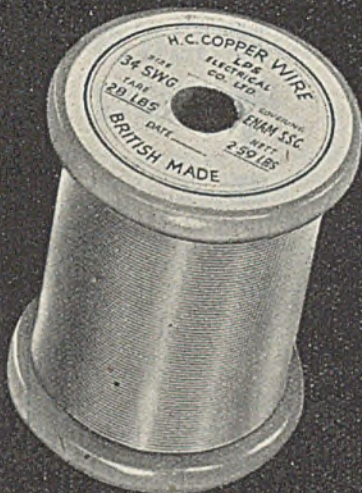
for
**TRANSFORMERS
SWITCH GEAR
MOTORS**
and all other
**ELECTRICAL
APPARATUS**

B. S. & W. WHITELEY LTD.
POOL - IN - WHARFEDALE · YORKS.

Telegrams: "WHITELEY, POOL-IN-WHARFEDALE"
Telephone: ARTHINGTON 98 and 99

LONDON OFFICE: 104 HIGH HOLBORN, W.C.1
Telephone: CHAncery 7646

Insulated WIRES AND CABLES



INSTRUMENT WIRES : STRANDS & BRAIDS

TELEPHONE & RADIO CORDS & CABLES

RESISTANCE WIRES : GLASS COVERED CONDUCTORS

P.V.C. TUBINGS



LPS Electrical Co Ltd

ALPERTON · WEMBLEY · MIDDLESEX

TELEPHONE: PERIVALE 5621-2

TELEGRAMS: ENGINEYOR, PHONE, LONDON

**H
O
P
K
I
N
S
O
N**

**MOTORS & ELECTRIC
COMPANY LTD.**

*Manufacturing Engineers
of Electric Motors & other
Electrical Equipment*



**HEAD OFFICE:
GRANGWAY • KILBURN
LONDON • NW6**

Telephone:

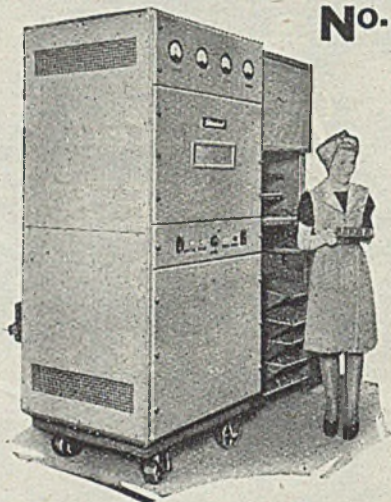
MAIDA VALE 9306 (3 LINES)

Cables:

ORIGIMOTOR LONDON

Fusing Facilities

No. 4



Good all-through insulation

Homogeneous (Chem.) . . . a system in which the chemical composition and physical state of any physically small portion are the same as those of any other portion. (*Chamber's Technical Dictionary*). Which aptly describes, and accounts for the remarkable strength of, SLYDLOK Fuse mouldings, the result of balanced design, fitness-for-purpose powder and a moulding technique employing H.F. pre-heating equipment, a unit of which is illustrated above. Hence one of the reasons for the outstandingly good performance of

The New

SLYDLOK

5 to 100 amp. FUSES

Wilcox
EDWARD & CO. LTD.
SHARSTON ROAD • WYTHENSHAW
MANCHESTER

dm EW9

Dainite
MOULDED
RUBBER PARTS

Inquiries are invited for special mixings for Electrical Motor Car, and General Trade purposes.

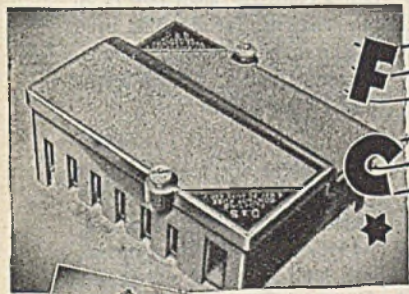
THE HARBOROUGH RUBBER CO. LTD. MARKET HARBOROUGH

MEICO

CHOKES for FLUORESCENT LIGHTING

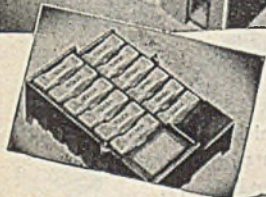
MEICO'S up-to-date facilities include the most modern coil producing machinery available—vacuum impregnating equipment for wax and varnish—completely automatic production test apparatus. MEICO Chokes are precisely wound—meticulously assembled—thoroughly impregnated and carefully finished. Continuous inspection and quality control ensure maximum uniformity and silence in operation.

AVAILABLE FOR PROMPT DELIVERY
MICRAMATIC ELECTRICAL INSTRUMENT CO. LTD.
 MEIGO WORKS: CONGLETON : CHESHIRE
 TELEPHONE: CONGLETON 607



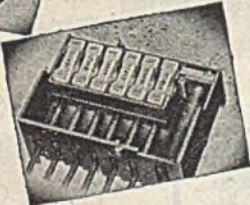
FLOATING CONTACT

★ *the NEW distribution*



- Dimensions only 7 $\frac{3}{8}$ " x 6 $\frac{1}{2}$ " x 4 $\frac{1}{4}$ ".
- 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

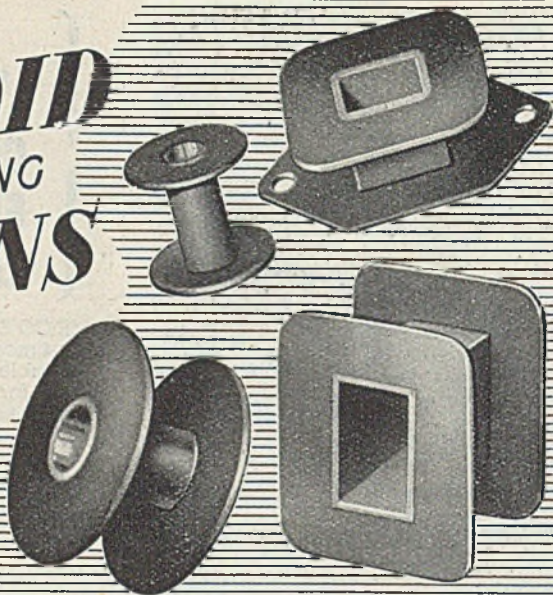
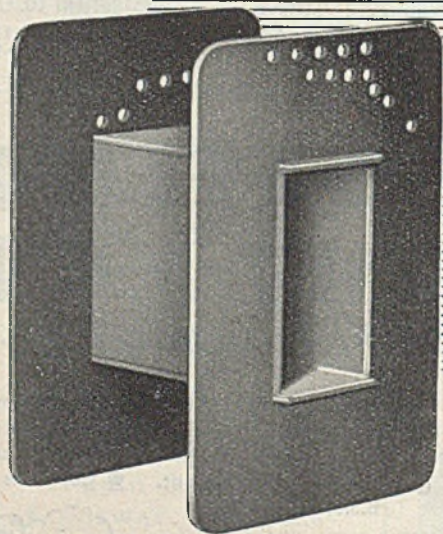


The NEW House will need it...!

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

EIF46

PIRTOID COIL WINDING BOBBINS



Our extensive range covers all requirements for Bobbins used in the manufacture of Transformers, Chokes, Relays, Solenoids, No-Volt Coils, etc.

The Bobbins are manufactured by us in both "Pirtoid," which is a Laminated Bakelite Product, and "Presspahn." They possess both high Electrical and Mechanical strength.

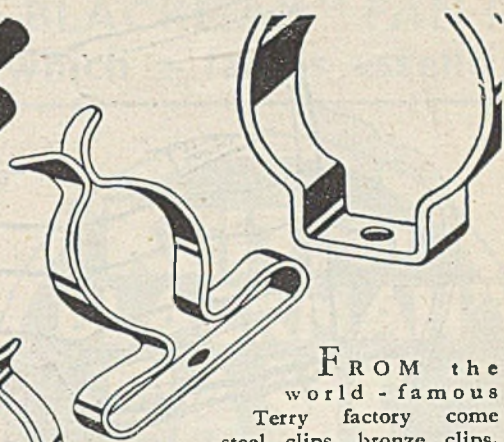
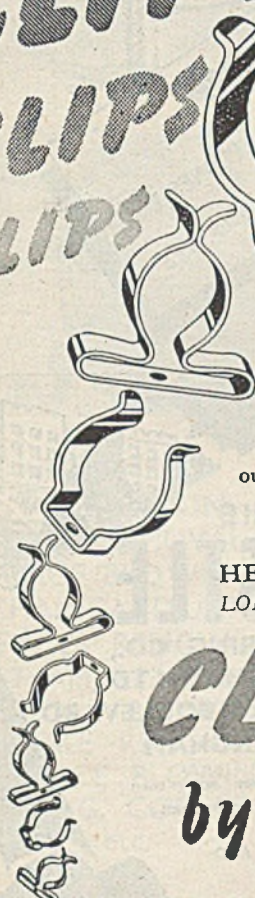
Ask for "ATLAS" Bobbin Card M.12391 which covers all the requirements of the Small Mains Transformer Industry.

H. CLARKE & CO.,
(MANCHESTER)LTD.
PHONE : ECCLES 2001 - 2 - 3 - 4 - 5
GRAMS : Pirtoid, Phone, Manchester



ATLAS WORKS
PATRICROFT
MANCHESTER

CLIPS
CLIPS
CLIPS
CLIPS



FROM the world-famous Terry factory come steel clips, bronze clips, stainless clips, big clips, little clips, wide clips, narrow clips — in fact clips in every conceivable shape and size.

Illustrated here are two of our stock patterns, 80 and 81, made in a range of sizes to grip from $\frac{1}{4}$ in. to $1\frac{1}{2}$ in.

Maybe a clip of special shape would be necessary for the job you have in mind. Well, we can help you because we make clips for hundreds of uses. We can make to print or specification, or our Research Department will design for you.

Our knowledge of clips has advanced side by side with our 91 years' spring-making experience.

Sole Makers:
HERBERT TERRY & SONS LTD., REDDITCH
 LONDON MANCHESTER BIRMINGHAM

CLIPS
 by **TERRY SPRINGS**

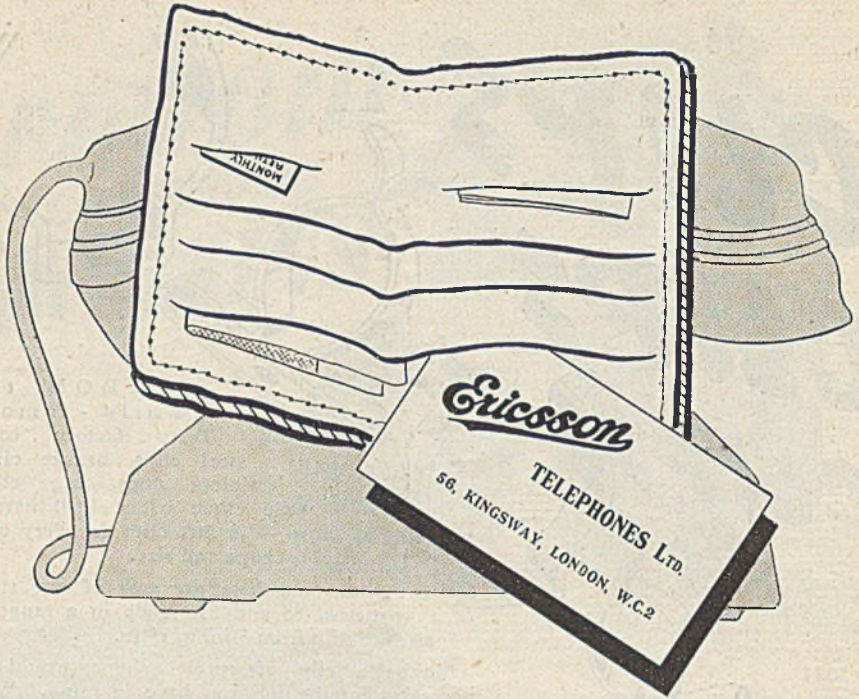


Established 1855

★ and just a few special shapes we have made to order.



T.C.4

A collection of detailed illustrations of various mechanical fasteners and components, including bolts of different sizes, nuts, a threaded rod with a spring, and a large threaded fitting. In the background, a large, multi-story building is depicted.

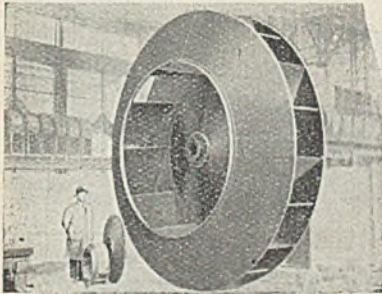
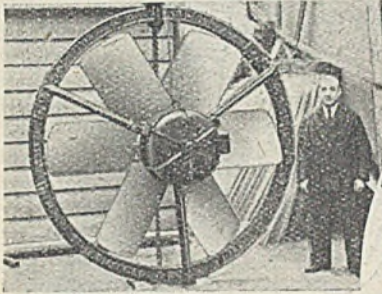
**THE
CASTLE**
ENGINEERING CO.,
(NOTTINGHAM) LTD.
HASLAM ST., CASTLE BOULEVARD,
NOTTINGHAM

'PHONE: NOTTINGHAM 46068 (3 Lines)
'GRAMS: CAPSTAN, NOTTINGHAM

ON AIR MINISTRY, ADMIRALTY AND
WAR OFFICE LISTS

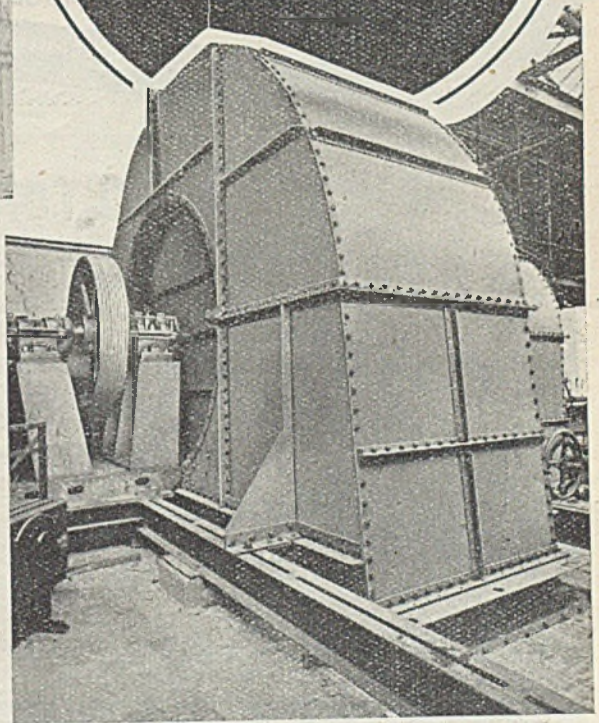
**REPETITION WORK
IN ALL METALS**

There is a "KEITH-BLACKMAN" FAN for every purpose for which a fan is essential.



"KEITH-BLACKMAN" FANS

HEATING
VENTILATION
DUST REMOVAL
FORGE BLOWING
MECHANICAL DRAUGHT
FUMES REMOVAL
STEAM REMOVAL
CUPOLA BLOWING
SMOKE REMOVAL
FURNACE BLOWING
DRYING, COOLING
etc.

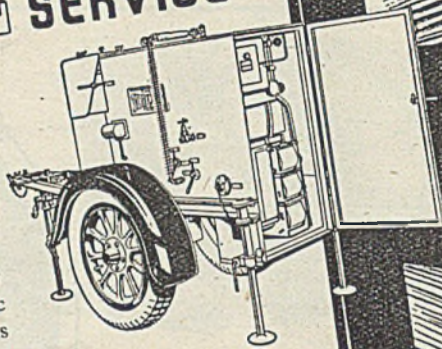


"GRAMS KEITHBLAC, PHONE, LONDON."

We invite your enquiries.

AN ESSENTIAL SERVICE

The largest Power Companies, the best known Electrical Manufacturers and users of electricity large and small throughout the world employ the Stream-Line Filter to raise the insulating value of the oil in transformers and switch gear to over 60 K.V. in a single passage. Fully portable, weatherproof and automatic plants from 5 gallons to 500 gallons per hour.



STREAM-LINE FILTERS LTD.
HELE-SHAW WORKS, INGATE PLACE, LONDON, S.W.8

TELEPHONE: MACAULAY 1011

**IMMEDIATE
DELIVERY !
BUT
ORDER EARLY**

MOTOR SLIDE RAILS

We are pleased to be able to introduce the new steel "ROGERAIL" which is vastly superior to the standard cast iron rails; they are:—

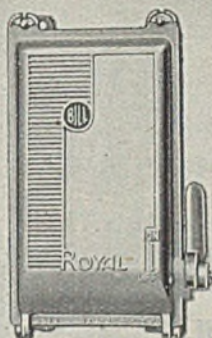
- ▶ STRONG IN CONSTRUCTION
- ▶ EASY TO FIX
- ▶ MADE TO ANY SIZE
- ▶ LIGHTER THAN CAST IRON
- ▶ UNBREAKABLE

Please advise length in slide required or give particulars of motor when ordering

SPECIAL TERMS TO STOCKISTS

MOTOR SLIDE RAILS EX STOCK FROM

THE LONDON SHAFTING & PULLEY CO. LTD.
"COLLINGWOOD" IRONWORKS, NORTHDOWN ST,
KINGS CROSS, N.1. *Tel:- TERMINUS 4731*



WE REGRET OUR INABILITY TO KEEP OUR FRIENDS
FULLY SUPPLIED WITH
Ⓟ SWITCH AND DISTRIBUTION GEAR
WE HOPE TO MORE THAN SATISFY EXISTING DEMANDS
WHEN THE CERAMIC POSITION IMPROVES
IN THE MEANTIME PLEASE REMEMBER THAT WE ARE
DOING OUR BEST UNDER DIFFICULT CONDITIONS

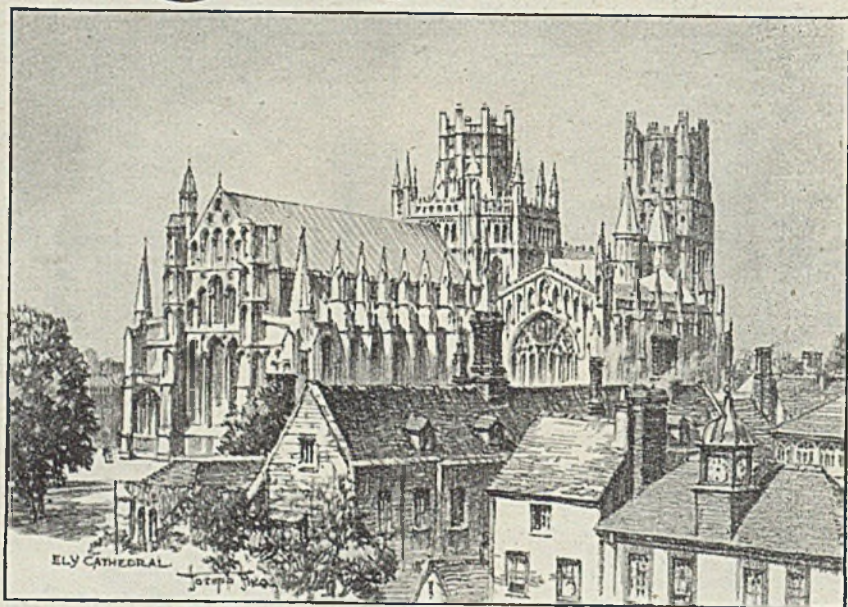
MANCHESTER
H. H. POLLARD,
BRAMHALL

BILL SWITCHGEAR LTD
ASTON LANE, PERRY BARR
BIRMINGHAM · 20

LONDON, GLASGOW,
BELFAST,
BURTON-ON-TRENT

PHONE: BIRCHFIELDS 5011. GRAMS: BILSWITCH, BHAM.

Landmarks of Britain

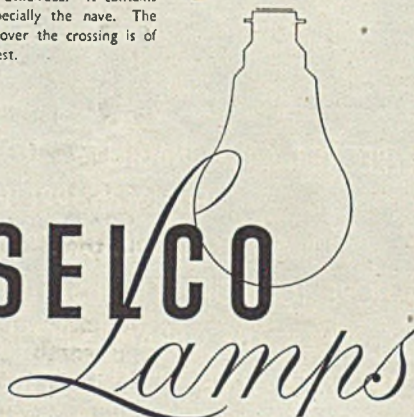


ELY CATHEDRAL

Originally founded by St. Ethelreda. It contains much Norman work, especially the nave. The octagonal Lantern Tower over the crossing is of unique architectural interest.

CRYSELCO

MADE IN ENGLAND



FIFTY YEARS OF
QUALITY & SERVICE

Branches

BIRMINGHAM
BRIGHTON
BRISTOL

BURY ST EDMUNDS
CARDIFF
GLASGOW

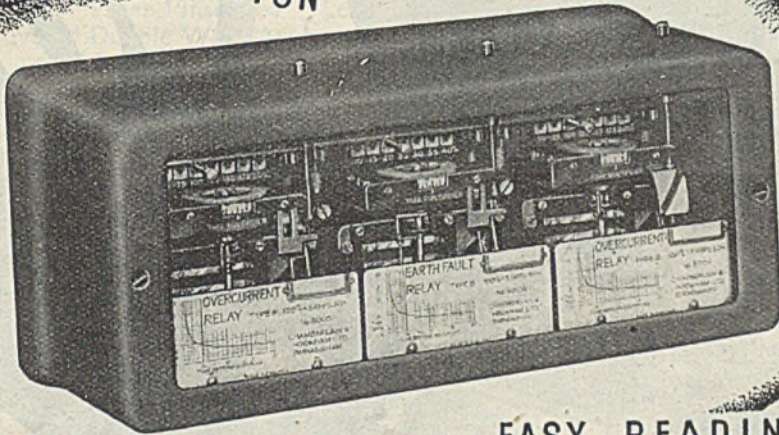
LEEDS
LEICESTER
LIVERPOOL

LONDON
MANCHESTER
NEWCASTLE



CRYSELCO LIMITED, KEMPSTON WORKS, BEDFORD

LOW CONSUMPTION HIGH SENSITIVITY



HIGH TORQUE READY ACCESSIBILITY EASY READING

Protective RELAYS

A NEW RANGE OF INSTRUMENTS expressly developed by Chamberlain & Hookham Ltd. to meet the needs of today, and tomorrow, for highly efficient, simple and versatile protective devices.

The example illustrated is an over-current and earth leakage relay in which high sensitivity, high torque, accessibility and other valuable features are very pronounced.

Apply for full information to :

CHAMBERLAIN & HOOKHAM LTD., BIRMINGHAM

AVO
REG. TRADE MARK

MODEL 7
UNIVERSAL
AvoMeter

MODEL 40
UNIVERSAL
AvoMeter

THE "AVO"
TEST
BRIDGE

THE "AVO"
VALVE TESTER

THE ALL WAVE
"AVO" OSCILLATOR

Write for Pamphlet descriptive of the "Avo" Instruments illustrated above.

THE world-wide use of "AVO" Electrical Testing Instruments is striking testimony to their outstanding versatility, precision and reliability. In every sphere of electrical test work they are maintaining the "AVO" reputation for dependable accuracy; which is often used as a standard by which other instruments are judged.

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.
WINDER HOUSE · DOUGLAS STREET · LONDON · S.W.1 · TELEPHONE VICTORIA 3434-7

ENSURE THE SUPPLY

3-Core Paper Insulated Lead Covered Double Wire, Armoured to B.S.S. No. 760-1943.

4-Core Pliable Armoured Trailer Type No. 21 to B.S.S. No. 708-1940.



5-Core Trailer, 3 Power Cores, each Individually Screened (Cord and Copper), Pilot Core of same cross sectional area built up to same diameter, all laid round a Centre Bare Earth Conductor in contact therewith and sheathed overall, Type G.A.

5-Core Drill Cable, Type No. 30 to B.S.S. No. 708-1940.

USE

GLOVERS MINING CABLES

W. T. GLOVER
& Co. Ltd.



TRAFFORD PARK,
MANCHESTER, 17

RIPAULTS

fine range of:-

**DOMESTIC
CABLES AND
FLEXIBLES** /

cables

Ripaults Ltd, Southbury Road, Enfield, Middlx.

POWERFUL AIDS

to Peak Production . . . Lower Cost

*Lighter and More Compact, these Sturdy Tools
Speed Fabrication, Assembly and Installation*

Thor

**PORTABLE
ELECTRIC
TOOLS**

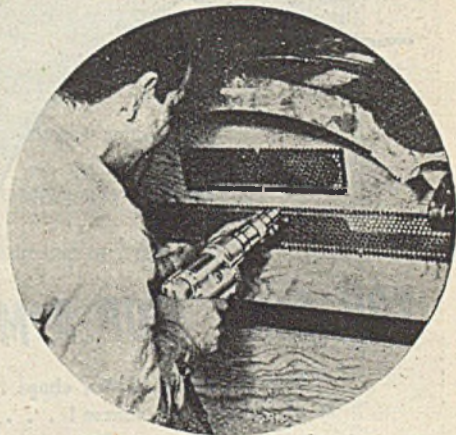
Smaller in size and lighter in weight for greater handling ease, Thor Electric Tools today have high-efficiency motors that provide more power-per-pound than ever before. Virtually impossible to stall, they make short work of tough jobs . . . and *stay on their job* day after day.

The *complete* Thor line of portable electric tools includes drills and tappers; screwdrivers and nutsetters; grinders, sanders and polishers; hammers, nibblers and saws—all in a wide range of styles, speeds and capacities for light or heavy-duty service to meet any requirements.

INDEPENDENT PNEUMATIC TOOL CO., LTD.
40 Broadway London S. W. 1, England



"FINGER-POINT" ACCURACY at 2500 r.p.m. is what you get with this $\frac{1}{4}$ " cap. Thor No. U14AP drill. Other Thor drills up to $1\frac{1}{4}$ " in steel.



AN AUTOMATIC ADJUSTABLE CLUTCH enables this Thor U16CP Screwdriver to drive screws to uniform tightness at top speed.

Thor

PORTABLE POWER

TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS



YOU CAN'T STOP A MAN WITH A GOOD IDEA

'Sorry to let you down, chaps . . . Got an idea that will pull! — make it of plastics, of course! . . . Simply must speak to Lorival NOW.'

- ★ *All our resources are at the disposal of manufacturers who may require components, complete articles or packaging. In consultation with us they can obtain the benefit of our wide experience and specialized knowledge. Our service includes design as well as manufacture in plastics, rubber and synthetic rubbers.*

LORIVAL PLASTICS



UNITED EBONITE & LORIVAL LIMITED
LITTLE LEVER, NEAR BOLTON, LANCs

Smiths

INSTRUMENTS & EQUIPMENT

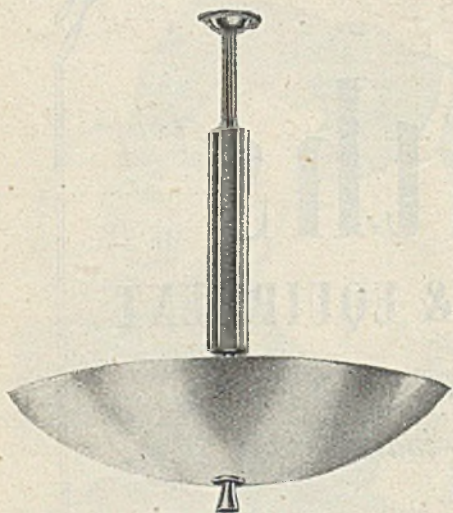
*Used wherever accuracy and
durability are indispensable*

A. T. HAND TACHOMETERS	PRESSURE GAUGE MECHANISMS
MAGNETIC & ELECTRIC TACHOMETERS	INDUSTRIAL 'DESYNN' (System of remote indication)
A. T. RAILWAY SPEEDOMETERS	INDUSTRIAL PETROFLEX
A. T. INDICATORS	BELLOWS AND THERMOSTATS
A. T. COUNTING DEVICES	HOBS AND CUTTERS
PRESSURE GAUGES	ESCAPEMENTS



SMITHS INDUSTRIAL INSTRUMENTS LTD.
CRICKLEWOOD WORKS, LONDON, N.W.2

The Industrial Instrument Division of S. Smith & Sons (England) Ltd.
Associated Companies: A. T. Instruments Ltd., David Harcourt Ltd.



NOT TO HANG IN YOUR SHOP!

This attractive pendant, representative of the whole GLECO-PLASTICA Range, is not designed to hang in your shop or showroom . . . it is designed expressly to have a quick sale. The sheer beauty and excellent workmanship of GLECO PLASTICA products attracts custom from far and wide . . . no sooner have you unpacked your latest delivery and displayed them than they are gone to the homes of well satisfied customers.

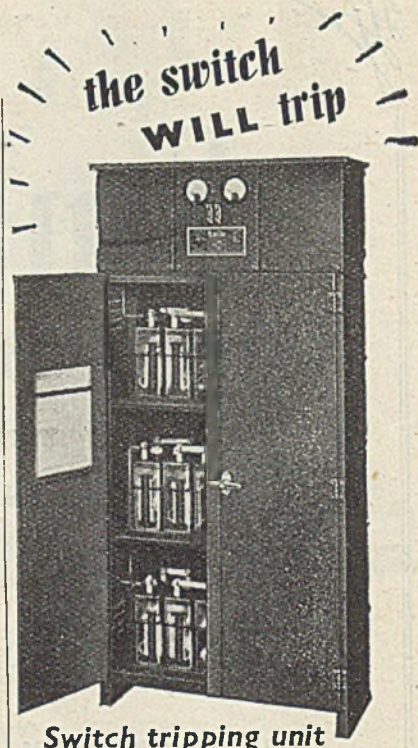
Write to-day for full details of this attractive range.

GLECO-PLASTICA *Products*

A NEW CONCEPTION IN DISTINCTIVE LIGHTING

GENERAL LIGHTING EQUIPMENT COY. LTD.,
99, GREAT EASTERN STREET, LONDON, E.C.2.

Telephone: CLErkenwell 7744/5.



Switch tripping unit

Angle iron and sheet steel construction, designed for floor mounting or wall fixing. The cabinet consists of a main battery compartment enclosed by steel doors with three shelves and a trickle charge rectifier compartment located at the top. Wood cabinets can be supplied if preferred.

Trouble develops somewhere on the network: the fault-finding relay locates the trouble: a battery trips the switch. That is the system. An infallible system — if battery and equipment are infallibly reliable.

Exide Switch Tripping equipment achieves complete reliability. Each self-contained unit comprises a battery of lead-acid cells, a trickle-charger, a load-test device and instruments from which test-readings can be taken under load. With this equipment installed, you *know* the switch will trip.

Exide

SWITCH TRIPPING EQUIPMENT

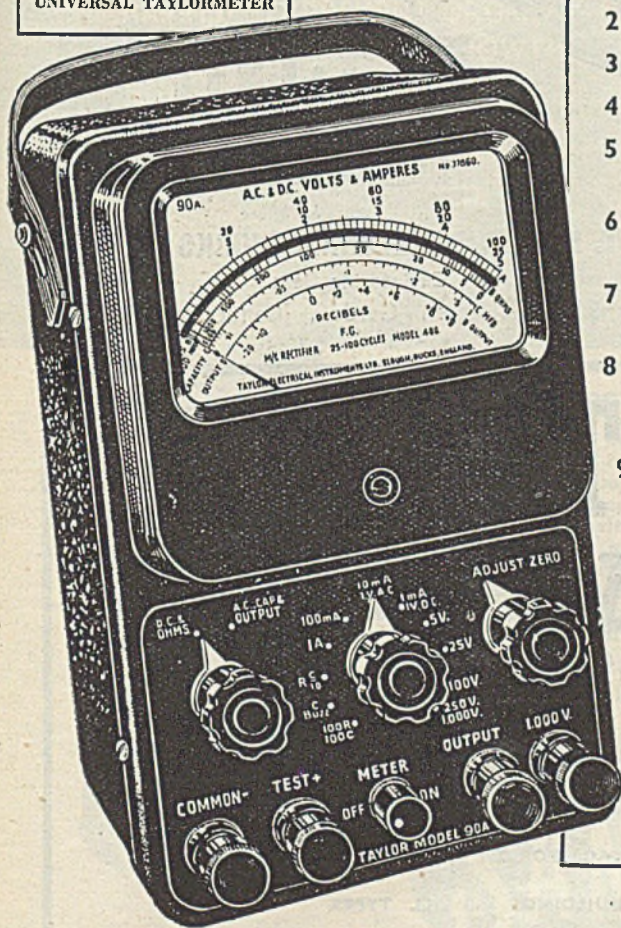
THE CHLORIDE ELECTRICAL STORAGE COMPANY LIMITED
Stationary Battery Dept., 77 King Street, Manchester. 2
Tel. Blackfriars 4731

TAYLOR *for the Best* *in Test Equipment*

Model

90_A

UNIVERSAL TAYLORMETER



- 1 First Grade Accuracy.
- 2 40 Ranges.
- 3 1000 ohms per Volt.
- 4 Four-inch meter scale.
- 5 Mirror and Knife edge pointer.
- 6 Buzzer for Continuity Tests.
- 7 Automatic overload protection.
- 8 Self-contained Resistance measurements from 1 Ohm up to 1 Megohm.
- 9 Three Self-contained capacity ranges with external A.C. Supply.

Supplies
are now available
for quick deliveries.

Price

£15.15.0

Please write for technical brochure.

Taylor Electrical Instruments Ltd.
419-424 MONTROSE AVENUE, SLOUGH, BUCKINGHAMSHIRE
Tel: Slough 21381 (4 lines)
Grams: "Taylias" Slough

Connections
housed at
end of handle
-away from
the heat!



There's no corrosion of the connections in the Solon Electric Soldering Iron. Tucked neatly away at the end of the handle, the heat can't get at them! Efficient rubber sleeve cord grip prevents sharp bending of the flexible. The heating element is inside the copper bit—giving constant heat; no waste of current; features that make Solon soldering quicker, cleaner, safer! All Solon irons are supplied with 6 ft. of Henley 3-core flexible. Made for the following standard voltages—200/220, 230/250.

Illustration shows standard 240-watt model! Other types and sizes for various specialised jobs.



Made in England

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.

Engineering Dept.

51-53, Hatton Garden, London, E.C.1

BRITANNIC CABLES



AN INDEPENDENT COMPANY, MAKERS OF E.H.T. AND L.T.

PAPER MAINS' CABLES, VARNISHED CAMBRIC C.T.S. MINING

TRAILING, "IVERITE" INSULATED CABLES AND THERMO-

PLASTIC CABLES (P.V.C.) FOR 250 VOLT LIGHTING CIRCUITS

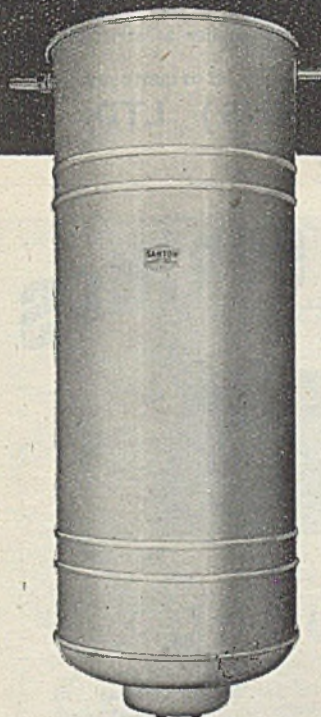
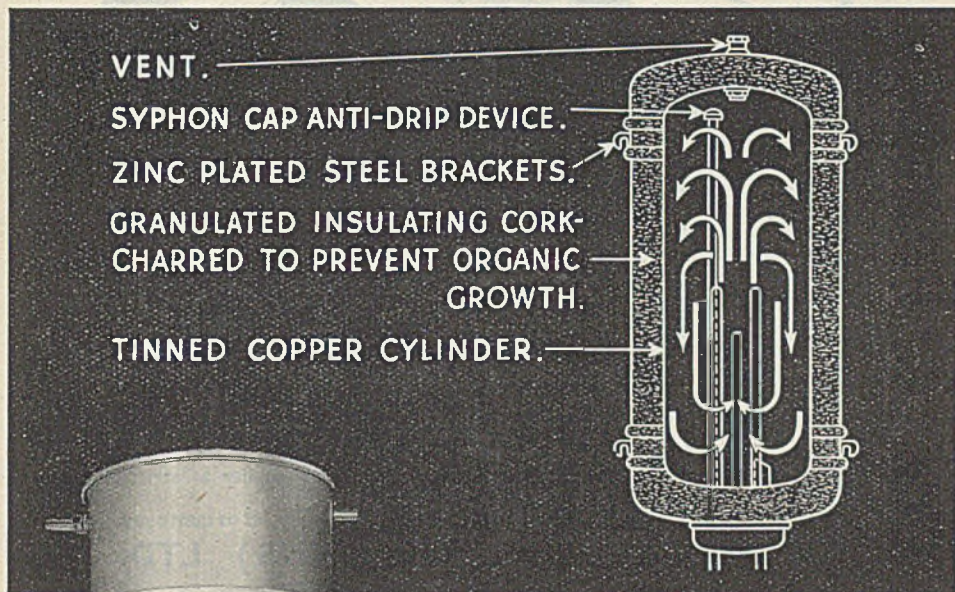
FOR BUILDINGS OF ALL TYPES.

BRITANNIC ELECTRIC CABLE AND CONSTRUCTION CO. LTD.
IVER, BUCKS.

Telephone :
IVER 491

Telegrams :
"BRITANNIC, IVER."

Why it pays to specify "SANTON"



(4) Santon Elements reduce scale ..

Scale formation is best prevented by the elimination of hot spots. In SANTON heaters, localised boiling is reduced to a minimum by adjusting the length of elements or increasing their number so that the watt density of the wetted area of any SANTON element never exceeds 16 watts p.s.l. Other points of SANTON superiority are reliable, withdrawable sheath type elements, greatly increased thermal efficiency and the most complete service in the industry.

Write for your copy of the new SANTON Data Book, to Santon Ltd., Newport, 15, Mon.



ELECTRIC WATER-HEATING

Trade Mark "SANTON"

Above: Cistera Type (D.F.) Supplies hot water to several points. Can be connected direct to water mains. No expansion pipe required. Operates on variable volume, constant temperature principle.

9934C



For sixty years we have maintained our reputation for accuracy and efficiency, and in this, our Diamond Jubilee Year, we are proud to offer to the trade, refractories of the highest quality at strictly competitive prices.

If you require insulators of guaranteed reliability and efficiency, let us quote you.

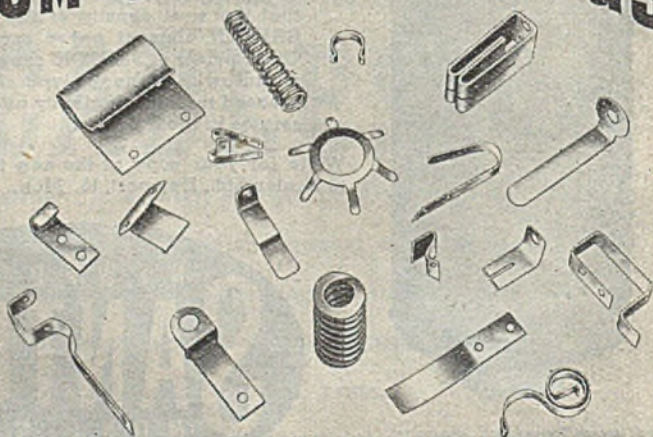
WILLIAM KENT (PORCELAINS) LTD.

Wellington Street, Burslem, Stoke-on-Trent
Telephone Stoke-on-Trent 84237/8

BERYLLIUM COPPER SPRINGS



Specialists in Springs and Press Work for every known purpose in Electrical Engineering. Technical leaders since 1821!



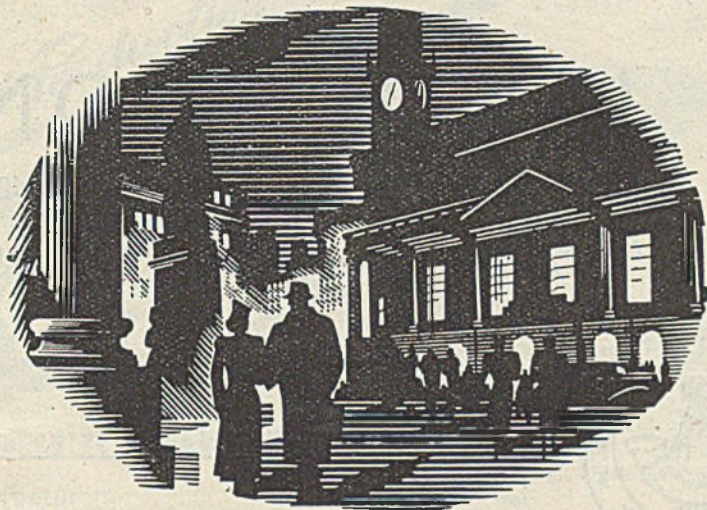
ROBERT RILEY LTD.

TELEPHONE: ROCHDALE 2237-8

MILKSTONE SPRING WORKS
ROCHDALE LANCASHIRE

TELEGRAMS "RILOSPRING"

INCREASINGLY, IN PUBLIC SERVICES & PRIVATE ORGANISATIONS



the Modern
ELECTRICITY
is carried universally via

METALLIC

pioneers of the
CONDUIT TUBE

In the myriad of purposes to which, in the modern City, electricity is co-ordinated, more and more essential services are being safely conducted by Metallic Conduit Tubes because of its consistent quality and high reputation for accuracy.



THE METALLIC SEAMLESS TUBE CO. LTD.

Ludgate Hill, Birmingham. Phone: CEN. 7167. Grams: "Flask", Birmingham. Sales Depots: London: 88 Goswell Rd., E.C.1.
 Newcastle-on-Tyne: St. John Street. Leeds: 5 York Place. Swansea: 1 Grove Place. Glasgow: 137a St. Vincent Street.

E BONITE & RESILON
LAMINATED BAKELISED MATERIAL
for
INSULATION

RAW MATERIAL IN SHEETS, RODS AND TUBES
OR
MACHINED, TURNED, CUT AND DRILLED
TO DRAWINGS

Apply

UHLHORN BROS. LTD.

53, CITY ROAD, LONDON, E.C.1
CLERKENWELL 2333-4



ESTABLISHED
1887



There's wires and wires

And, of course, there are pitfalls and snares, which trip up the unwary, particularly when it comes to Electrical Resistance Wires.

We have specialized on this one subject for a long time, and what we know about it may, in consequence, be very helpful to you.

Your problems will be welcome.



ELECTRICAL RESISTANCE WIRES

A. C. SCOTT & Co. Ltd., CROMALOY HOUSE, CITY RD., MANCHESTER.

d.m. A.S.I.



Superspeed

CORED SOLDER

Sole Manufacturers

H. J. ENTHOVEN & SONS LTD., 230 THORNTON RD., WEST CROYDON, SURREY

Superspeed Special Cored Solder is essential to the Radio and Electrical trades because—

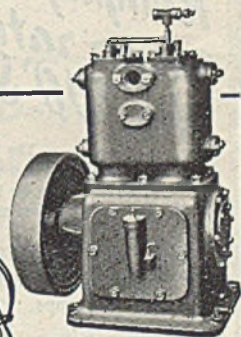
- It can be used for rapid work at moderate bit temperatures thus reducing risk of damage to delicate components.
- It speedily removes oxide film from copper conductors and soldering tags eliminating high resistance faults caused by dry joints.
- The flux residue is hard, dry, non-conducting and absolutely non-corrosive.

"POWERED BY HOWELLS" No. 2

TILGHMAN'S

A Tilghman's
Single Acting
AIR COMPRESSOR

Powered by
HOWELLS



Courtesy of
TILGHMAN'S
PATENT SAND
BLAST CO. LTD.



HOWELLS (ELECTRIC MOTORS) LTD.

YORK ST. - HANLEY - STOKE-ON-TRENT

Branches at LONDON : MANCHESTER : BRISTOL
BIRMINGHAM : : : GLASGOW

dm H.E.4



The new type
50B

'VARIAC'

REGULATING TRANSFORMERS

*Roughly triple the
power rating of
the '100' Series*

The Type 50 B Variac, handling 7 kVA at 230 V in, represents valuable addition to the Variac range, and will find many applications in industry.

50 B 7kVA Input 230 V (tap at 115 V), output 0-230 or 0-270V. Rated current 20 amps. Max. 31 amps.

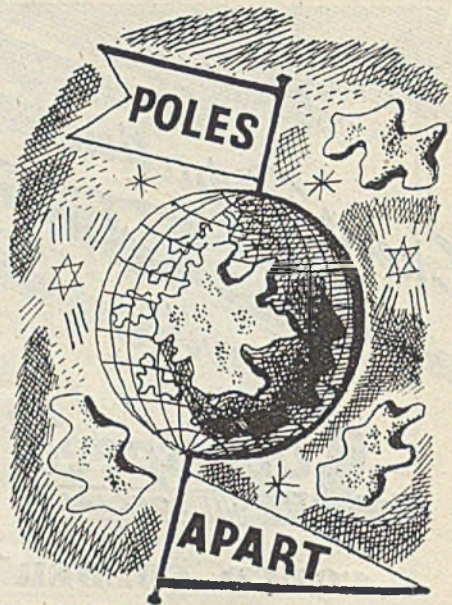
Excellent deliveries can be arranged. Most types are in stock. Other Variac types range from 165 watts to 7 kW. Write for bulletin 424 E and circular 146 E for complete data.

Claude Lyons LTD

ELECTRICAL AND RADIO LABORATORY APPARATUS ETC.

180 Tottenham Court Road, London, W. 1
and 76, Oldhall Street, Liverpool, Lancs.

THE ELECTRICIAN



Single, double or triple pole design, if the switch is a LUNDBERG it makes all the difference in the world. Patented quick make and break movements, positive action, one-piece contact springs and rugged construction—all these points stress the LUNDBERG superiority, and there are specialised features to every one of nearly 1000 LUNDBERG designs

LUNDBERG



A COMPANY

A. P. LUNDBERG & SONS LTD. (Established 1882)
491-493 Liverpool Road London N17

14 FEBRUARY 1947

Makers of Synthetic RESIN PAPERS

(IMPREGNATED AND COATED)



CAMBRIDGE BEAUTY
Regd. Trade Mark

for the
MANUFACTURE
of LAMINATED
SHEETS and
TUBES

SAMUEL JONES & CO. LTD

16-17 NEW BRIDGE STREET, E.C.4
PHONE: CENTRAL 6500

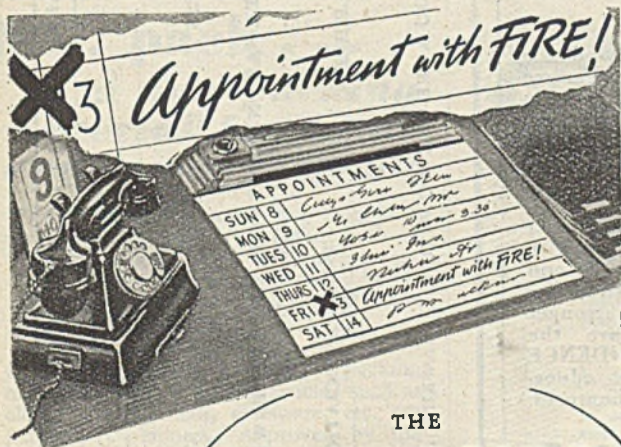
THE MODERN *Speedy* WAY OF MAKING SOLDERED JOINTS ON ELECTRICAL EQUIPMENT

You don't require extra flux when you use Ersin Multicore Solder. It contains 3 cores of super-active non-corrosive Ersin Flux. Ensures rapid melting and flux continuity, thus speeding up soldering operations and eliminating waste, with freedom from dry or H.R. joints. Sound joints can readily be made on oxidised surfaces.



ERSIN MULTICORE

MULTICORE SOLDERS LTD.
MELLIER HOUSE, ALBEMARLE ST., LONDON, W.1
Tel.: REGent 1411 (P.B.X. 4 lines)



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

WRITE FOR
ADVICE ON
YOUR OWN
PARTICULAR
RISKS

THE NATIONAL FIRE PROTECTION

COMPANY LIMITED.

ARGOSY WORKS
KINGSTONE ROAD
LEATHERHEAD · SURREY
Telephone: LEATHERHEAD 2208

CREATIVE PIONEERS

in

TECHNICAL TRAINING

The INTERNATIONAL CORRESPONDENCE SCHOOLS made history when they founded the now world-famous method of giving sound practical Courses of Technical Instruction by post. Fifty-five years ago they opened the Gates of Opportunity to millions of ambitious men and women, and cleared the way to new vistas of life.

The success of the Correspondence System originated by the I.C.S. was from the outset so remarkable, it revolutionized so many lives, it proved itself to be such an immense educational boon, that many universities, scientific institutions, and private organisations adopted it for their own teaching purposes.

To-day there are Correspondence Schools of all kinds. Some of them are doing excellent work. But there is only one I.C.S.—the first in time and prestige, the greatest in educational work already accomplished, and the largest in teaching staff and number of students.


Creators and still leaders, without a peer in fame that has spread to every land, with graduates who have succeeded beyond their hopes in at least fifty countries and provinces, and with ever stronger and wider activities—such are the INTERNATIONAL CORRESPONDENCE SCHOOLS, forming the largest educational institution of its kind in the world.

INTERNATIONAL CORRESPONDENCE SCHOOLS, Ltd.

Kingsway, London, W.C.2.

Instruction Centres also in
SYDNEY, WELLINGTON, CAPE
TOWN, MONTREAL, BOMBAY,
CAIRO, SCRANTON, MADRID,
MEXICO CITY, BUENOS AIRES
AND OTHER CITIES.





*L. G. Hawkins
& Co., Ltd*

Please fill up the form below and send to us so that we may put your name on our mailing list. We will then keep you informed of our developments. L. G. Hawkins & Co. Ltd., 30/35, Drury Lane, London, W.C.2

PLEASE USE TYPEWRITER IF POSSIBLE

NAME

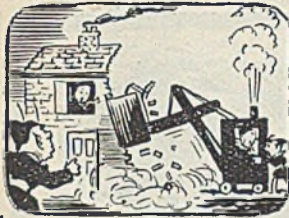
ADDRESS

DELETE AS NECESSARY RETAILER-WHOLESALE-
MANUFACTURER

YEAR ESTABLISHED

TRADE ASSOCIATIONS
MEMBER OF

HAD YOU A PRE-WAR A/C WITH L. G. HAWKINS & CO., LTD. ?
YES—NO



The "Fluxite
Quins" at work
"Digging's mere
child's play"
poohed EE
"With one of
these things,
you'll agree,
Fixed her right
with FLUXITE"

"Yelled O!" "Well
you might start
fixing our house!
Look and see!"

For all **SOLDERING** work—you need **FLUXITE**—the paste flux—with which even dirty metals are soldered and "tinned." For the jointing of lead—without solder and the "running" of white metal bearings—without "tinning" the bearing. It is suitable for **ALL METALS**—excepting **ALUMINIUM**—and can be used with safety on **ELECTRICAL** and other sensitive apparatus. With **FLUXITE** joints can be "wiped" successfully that are impossible by any other method. Used for over 30 years in Government works and by leading Engineers and Manufacturers. **OF ALL IRONMONGERS** in tins—10d., 1/6 and 3/-. The **FLUXITE GUN** puts **FLUXITE** where you want it by a simple pressure. Price 1/6 or filled 2/6.

FLUXITE

SIMPLIFIES ALL SOLDERING

Write for Leaflets on Case-Hardening Steel and Tempering Tools with **FLUXITE**, also on "Wiped" Joints. Price 1d. each
FLUXITE LTD. (Dept. ERN), Barmgndsey St., S.E.1

H.C. pack . . .

a new packing material for home and export goods

In 1943 we introduced Flax Rug as a packing agent. Since then thousands of tons have been used by Government Departments and Commercial Undertakings. It has proved excellent for the purpose.

Outstandingly resilient under great pressure, it is eminently suitable for packing machinery parts. Fragile articles such as electrical equipment, glassware, etc. are perfectly cushioned. Approved by the B.O.T. and M.O.S. Delivered pressed packed. Samples and prices from:—

HENDERSON CRAIG & CO., LTD.
PROCESSORS

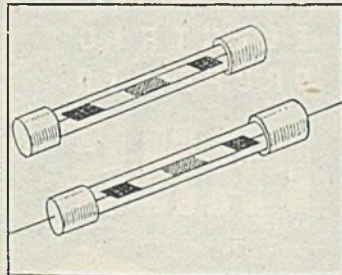
19 SURREY ST., STRAND, LONDON, W.C.2
Telephone: Temple Bar 1637 * Telegrams: Craig, London

FOR QUALITY & SERVICE
LOOK FOR THE (H.C.) TAG

HIGH ACCURACY CARTRIDGE MICROFUSES

10mA.—1 Amp.

with Gold Film Fuse Link



Colour indication of blown fuses or Neon Indicators if preferred.

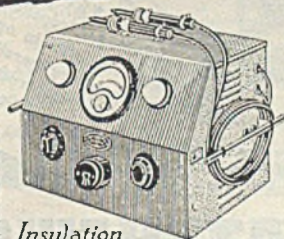
Pamphlet C.M.18 on request.

MICROFUSES LTD

KANGLEY BRIDGE ROAD,
LOWER SYDENHAM, S.E.26

TEL. SYD. 5129

Flash Testing up-to-date



Insulation
FLASH TEST EQUIPMENT
with "VARIAC" Control.
Booklet on request.

It's a **ZENITH**
product!

The **ZENITH ELECTRIC Co. Ltd.**

Sole Makers of the well-known "Zenith" Electrical Products
Zenith Works, Villiers Rd., Willesden Green, London, N.W.2
Phone: Willesden 4087-8-9 Grams: Voltaohm, Phone, London

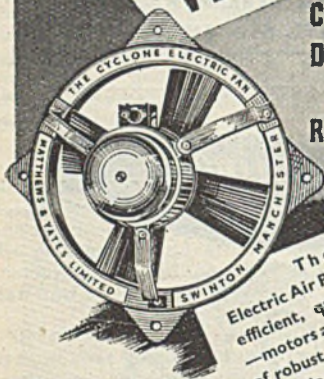
CYCLONE

ELECTRIC
PROPELLER

FANS

FOR EFFICIENT

VENTILATION



COOLING
DRYING
FUME
REMOVAL
Etc

The "Cyclone"
Electric Air Propeller is highly
efficient, quiet in operation
—motors are liberally rated,
of robust construction, re-
versible, built to B.S.I.
standards.

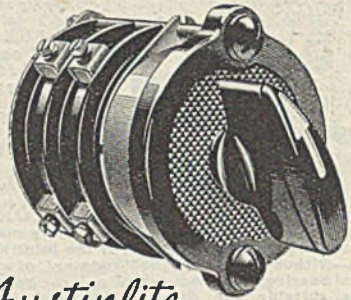
Write for illustrated
Technical Data quot-
ing our Ref E/11.

MATTHEWS & YATES LTD

SWINTON (Manchester) & LONDON

Telephones:
Swinton 2273 (4 lines)
London, Chancery 7823 (3 lines),

also at
GLASGOW · LEEDS · BIRMINGHAM
CARDIFF



Austinlite

ROTARY SWITCH

A new, heavy-duty 30 amp. switch of robust construction suitable for multi-circuit operations and capable of giving a long and trouble-free life. Can be built up into 1, 2, 8, 4 or 6-cell units providing a large range of contact combinations. Send for folder giving full particulars.

Made by
Austinlite Ltd.
(Department
Lighthouse Wks.
Smethwick
Birmingham)



Proprietors: CHANCE BROTHERS LTD

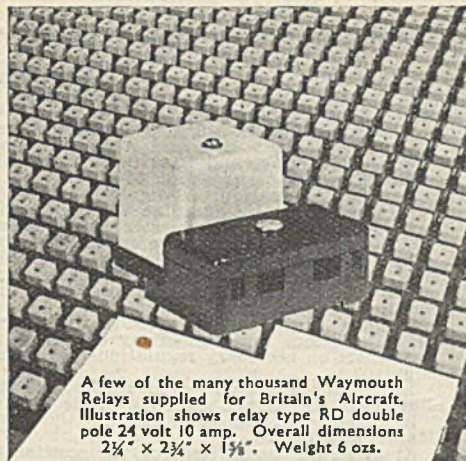
Litholite

40 Years
of
Plastic
Moulding

LITHOLITE INSULATORS &
ST. ALBANS MOULDINGS LTD.

WATFORD

PHONE: WATFORD 4494



A few of the many thousand Wymouth Relays supplied for Britain's Aircraft. Illustration shows relay type RD double pole 24 volt 10 amp. Overall dimensions $2\frac{1}{4}'' \times 2\frac{3}{4}'' \times 1\frac{1}{2}''$. Weight 6 ozs.



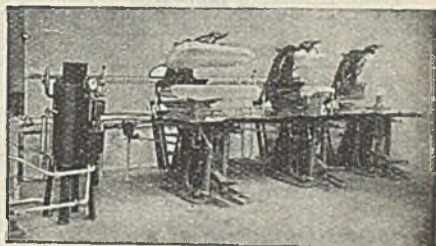
WYMOUTH GAUGES & INSTRUMENTS LTD.

Electrical Relays and Switches : Aircraft Fuel Gauges : Electrical Indicators : Diaphragm Pressure Gauges and other instruments.

STATION ROAD, GODALMING, SURREY.

★ You can SEE
why they use

ELECTRODE BOILERS



30 K.W. Boiler supplying steam for three pressing machines

Electrode boilers are the cleanest and most convenient sources of heat available. They need no boiler house, no chimney, no fuel store. There is no difficulty with fuel supplies and where supply companies have favourable rates, "B. & A." boilers show great over-all economy.

FOR STEAM SUPPLY

FOR HEATING & HOT WATER

(6)

BASTIAN & ALLEN LTD., 11 BEDFORD SQUARE, W.C.1
Northern Office: 62 Robertson Street, Glasgow, C.2

ELEMENTARY VECTORS

FOR ELECTRICAL ENGINEERS

By G. W. STUBBINGS, B.Sc. (Lond.), F.Inst.P., A.M.I.E.E. Students and Engineers who do not take kindly to the mathematics of electrical technology will find just what they need in this book, which presents clearly and concisely the fundamental principles of vector theory, well illustrated by many explanatory graphs and diagrams. Second edition. 6s. 6d. net.

INDUSTRIAL HIGH VOLTAGE DISTRIBUTION AND PUBLIC SUPPLY

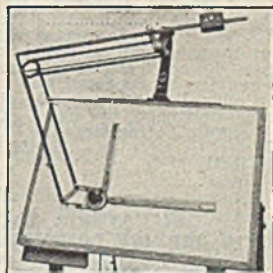
By E. J. BARROWS, A.M.I.E.E. A book of immense value to works engineers, foremen and charge-hands in industrial plants, explaining the basic principles of high voltage distribution, and how the assessment of short circuit values can be made from normally available system data and with a minimum of mathematics. 15s. net.

PITMAN

Parker Street, Kingsway, London, W.C.2.

Perfect balance at any slope. Take any board. Ball Bearing. Perfect parallel movement . . .

No drawing office should be without "MAVITTA" DRAFTING MACHINES.



The nearest to perfection in drawing office equipment—"MAVITTA" DRAFTING MACHINES made of steel tube with adjustable ball-bearings. Main angles located automatically, intermediate angles by lock.

Scales have inlaid celluloid edges and divided to order on two edges.

B.I.F BIRMINGHAM—STAND D.712

**THE MAVITTA DRAFTING
MACHINES LTD.,**
Anchor Works, Park Road, ASTON,
BIRMINGHAM, 6.

Tel.: EAST 482 Telegrams: MAVITTA Birmingham.

MISCELLANEOUS ADVERTISEMENTS

TENDERS

CITY OF WINCHESTER.

MERCURY VAPOUR STREET LIGHTING.

TENDERS are invited by the City Council for the supply, delivery and erection, in the City, of 30 steel lighting columns and one wall bracket, complete with fittings, for Mercury Vapour Discharge Lighting.

Form of Tender, Specification and plan showing position of the columns and the bracket may be obtained from Mr. P. H. Warwick, M.I.M. and Cy.E., M.T.P.I., City Engineer and Surveyor, Guildhall, Winchester, on payment of a deposit of Two guineas, which will be returned on receipt of a bona-fide tender.

Tenders, in envelopes which bear no indication of the names of tenderers, should be delivered to the undersigned not later than Saturday, 8th March, 1947, and endorsed "Lamp Columns."

F. W. KEMPTON,
Town Clerk.

Guildhall, WINCHESTER.
28th January, 1947.

CITY AND COUNTY BOROUGH OF BELFAST, ELECTRICITY DEPARTMENT.

Tenders are invited for:—

- (a) Supply, Delivery and Erection of 6.6 kV Armoured Switchgear and Cabling for Harbour Power Station (Specification No. G.76).
- (b) Supply, Delivery and Laying of 33 kV, 6.6 kV and Auxiliary Cabling at Step-Down Sub-Stations (Specification No. G.77).

Specifications and Forms of Tender may be obtained from the City Electrical Engineer and General Manager, East Bridge Street, Belfast, on deposit of five guineas for each specification. (Cheque to be made payable to the Belfast Corporation Electricity Department.) This deposit will be refunded provided a bona fide tender has been sent in and not withdrawn. Extra copies may be obtained at three guineas each, which sum will not be returnable.

Sealed tenders, endorsed with the name and address of the firm tendering, and marked "Tender for" to be lodged in, or posted so as to arrive at, my office not later than 4.0 p.m. on Friday, 7th March, 1947.

The lowest or any tender will not necessarily be accepted.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

JOHN DUNLOP,
Town Clerk.

City Hall,
BELFAST.
6/2/47.

SITUATIONS VACANT

CIVIL SERVICE COMMISSION, DUBLIN, POSITIONS VACANT.

Assistant Engineers (6) in the Department of Posts and Telegraphs, Dublin.

REGARDING previous advertisements concerning the above posts, the attention of intending candidates is directed to the facts that (1) the latest time for receiving completed application forms has been extended to 5 p.m. on the 7th March, 1947; (2) the following consolidated salary scale should be substituted for those previously announced: Man—£350-£650 a year, inclusive; Woman—£350-£600 a year, inclusive.

Successful candidates with approved experience of value for the posts may enter these scales at a point up to £525, in the case of a man, or £470 in the case of a woman.

Application forms for, and particulars of the posts may be obtained from the Secretary, Civil Service Commission, 45, Upper O'Connell Street, Dublin.

SITUATIONS VACANT

BLACKBURN CORPORATION ELECTRICITY UNDERTAKING.

APPLICATIONS are invited for the following appointments:—

Meter Superintendent.

Applicants must be suitably qualified meter engineers, possess a sound technical and practical training, and have had a wide experience in the organisation of a Class "A" meter testing station.

They must also be familiar with I.T. and L.T. single and polyphase meter combinations and have a good knowledge in the keeping of meter records, the maintenance and calibration of various types of electrical instruments and protective relays, also the care and use of standard instruments.

Candidates must be experienced in the testing of installations and the giving of advice to consumers on necessary regulations governing supply.

The salary will be in accordance with the National Joint Board schedule, Grade 6, Class "H," at present £571 per annum.

Mains Assistant.

Applications are invited for the position of Mains Assistant from persons who have had considerable experience in the construction, operation and maintenance of transmission and distribution systems, overhead and underground, ranging up to 33 kV.

The salary will be in accordance with the National Joint Board schedule, Grade 7, Class "H," at present £538 per annum.

Preference will be given in each case to corporate members of the Institution of Electrical Engineers, and the persons appointed will be required to pass a medical examination in accordance with the provisions of the Local Government Superannuation Act, 1937.

Applications, accompanied by copies of three recent testimonials, must be endorsed appropriately and delivered not later than first post Friday, February 23rd, 1947, to:—

R. H. HARRAL, M.I.E.E.,
ENGINEER AND MANAGER,
ELECTRICITY OFFICES,
JUBILEE STREET,

BLACKBURN.

CHARLES S. ROBINSON,
Town Clerk.

Town Hall,
BLACKBURN.

MANCHESTER CORPORATION ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following appointments:—

TWO SHIFT CHARGE ENGINEERS, at a salary in accordance with Class J, Grade 7, of the N.J.B. Schedule (£563 p.a. to commence).

Candidates must have served a workshop apprenticeship and have at least the Higher National Certificate in Electrical or Mechanical Engineering. Training and experience in boiler operation essential.

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

Applications, giving full particulars of age, technical training and experience, together with copies of recent testimonials, must be endorsed "Shift Charge Engineer," and addressed to the Chairman of the Electricity Committee, Town Hall, Manchester, 2, and be received not later than 10 a.m. on Monday, 3rd March, 1947.

Canvassing, directly or indirectly, will disqualify.

PHILIP B. DINGLE,
Town Clerk.

Town Hall,
MANCHESTER, 2,
February, 1947.

SITUATIONS VACANT
THE MUNICIPALITY OF SINGAPORE.
ELECTRICITY DEPARTMENT.
Assistant District Engineer.

THE Municipal Commissioners of Singapore invite applications for the appointment of Assistant District Engineer on the staff of their Electricity Department; the appointment in the first instance to be on a three years' agreement on the Salary Scale of Class IV of the Senior Officers' Salary Scheme.

Applicants should be unmarried and be graduates of the Institution of Electrical Engineers or have the equivalent qualifications 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 and Low Tension overhead lines, Switchboards, Transformers, Protection, etc.

The selected candidate must pass a medical examination.

Salary:—\$5 400 (£630), \$5 700 and \$6 000 per annum respectively for the three years of agreement, rising thereafter (if service be continued) by annual increments (of \$25 p.m. to \$600 and thereafter by increments of \$40) to a maximum of \$8 400 (£980), plus Cost of Living Allowance as may be approved from time to time by the Municipal Commissioners. (At present \$140 monthly for a single man and \$160 if married.)

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.

Applicants stating age, birthplace, details of education, qualifications, training and experience, accompanied by copies of three recent testimonials, must be lodged with Messrs. Peirce & Williams, 1, Victoria Street, London, S.W.1 (Agents to the Municipal Commissioners), not later than 28th February, 1947.

Further information if desired can be obtained from the Agents or the Municipal Electrical Engineer, Singapore.

BOROUGH OF RADCLIFFE.

ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following vacancy in the above Department:—

Installation Inspector: Applicants must be conversant with the Regulations published by the Institution of Electrical Engineers, and have experience in the inspection, testing and connecting up of consumers' installations. Wages will be in accordance with the National Joint Industrial Council Agreement.

A "Z" zone rate, at present 2s. 8d. per hour, for a 47-hour week.

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 experience and accompanied by copies of not more than three recent testimonials or references, endorsed "Installation Inspector," should reach the undersigned not later than the 26th February, 1947.

Canvassing either directly or indirectly will be a disqualification.

H. A. FOX,
 Town Clerk.

Town Hall,
 RADCLIFFE,
 6th February, 1947.

YOUNG Electrical Engineer, B.Sc. honours, required for development laboratory of large electrical concern, S.W. London area. Some experience electronics essential. Apply in writing, stating age, experience and salary required, to—Personnel Manager, 45, Nightingale Lane, S.W.2.

SITUATIONS VACANT
BOROUGH OF WALTHAMSTOW.
ELECTRICITY UNDERTAKING.

Appointment of Technical Assistant.

APPLICATIONS are invited for the permanent position of Technical Assistant at a salary in accordance with Class "G," Grade 6, of the National Joint Board Schedule, at present £567 per annum.

Applicants should possess technical qualifications admitting to Corporate Membership of the Institute of Electrical Engineers and must have had a sound technical training with practical experience in the technical planning of E.H.T. and L.T. underground distribution systems, substations and large scale applications of electricity supply.

The appointment will be subject to the Local Government Superannuation Act, 1937, to the Council's Sick Pay Regulations, to the successful candidate passing a medical examination, and to termination by one month's notice on either side.

Canvassing in any form will be deemed a disqualification and applicants must disclose any relationship to any member of the Council or holder of any senior office under the Council.

Forms on which applications must be made can be obtained from the Borough Electrical Engineer and Manager, Electric House, Church Hill, Walthamstow, London, E.17, and when completed, should be forwarded, together with copies of three recent testimonials, in envelopes endorsed "TECHNICAL ASSISTANT" to reach the undersigned not later than the 24th February, 1947.

G. A. BLAKELEY,

Town Hall,
 WALTHAMSTOW,
 28th January, 1947.

WORKS MANAGER for Wire Mill in Manchester. Must be a practical man with experience in drawing Nickel Chrome. Excellent prospects for man with initiative. Box L.D.Z., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

DESIGNER required by British National Electrics Ltd., near Glasgow (Johnson and Phillips Ltd.). Experience in design of modern electric cookers essential. Applications in writing stating age, experience and salary required to be addressed to Johnson and Phillips Ltd., Charlton, London, S.E.7.

ARMATURE Winders required, also Charge-hand or Foreman, also Improvers for fractional motors up to 50 h.p. Standard rates, good prospects.—D.C. Engineering, Sherborne, Dorset.

APPLICATIONS are invited for the position of physicist in a television laboratory. Qualifications of applicant must include experience of radio or electronic engineering, a B.Sc., or equivalent, and at least 4 years' industrial experience, preferably in television. Knowledge of optics desirable. Salary £450/700, according to age and qualifications. Age 25-35. Apply, to Ref. TEL/VLH, Personnel Manager, P. R. T. Laboratories Ltd., Commonwood House, near Chipperfield, Herts.

ADMINISTRATION.—Advertiser offers services in administrative capacity in charge of electrical appliance service department or in similar technical appointment. Acustomed to responsibility and control of technical staff, stores, and correspondence. A.M.Brit.I.R.E., 6 years Electrical Officer in Royal Navy, mostly in charge of department. Age 30, single, and has accommodation in London. Salary reasonably commensurate with qualifications and experience. Now demobilised and free. Please write, indicating nature of appointment: BM/PASO, London, W.C.1.

SITUATIONS VACANT

COUNTY BOROUGH OF ROCHDALE.

ELECTRICITY DEPARTMENT.

Deputy Chief Engineer and Manager.

APPLICATIONS are invited for the above appointment with salary conditions in accordance with Grade 1, Class "H," of the National Joint Board Schedule, at present £388, rising to £935 per annum.

Applicants should be Corporate Members of the Institution of Electrical Engineers and should be fully experienced in the management and administration of a large electricity undertaking, including generation, distribution, and commercial development.

The appointment would be subject to the provisions of the Local Government Superannuation Act, 1937. The successful candidate would be required to pass a medical examination and should not be over 45 years of age.

Canvassing directly or indirectly will disqualify and any relationship to senior officers or members of the Council must be disclosed.

Applications, endorsed "Deputy Engineer and Manager," should give age, details of education, and technical training, experience and qualifications, accompanied by copies only of recent testimonials, should be addressed to the undersigned and delivered not later than the 3rd of March, 1947.

W. G. COATES,
Engineer and Manager.

Electric House,
Smith Street,
ROCHDALE.

WORKS MANAGER required by Electric V Control Gear Manufacturers. Engineering and electrical experience essential, also ability to organise and control production. London accommodation necessary.—Reply giving age, experience and salary required to Box L.E.A., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

EXPERIENCED DRAUGHTSMEN required for the mechanical design of large D.C. and A.C. machines by Mather and Platt, Ltd., Park Works, Newton Heath, Manchester, 10. Write c/o Employment Department.

DESIGNER wanted by manufacturer of electric motor driven and heating appliances, with artistic ability, knowledge of press tools, and mass production methods essential. Please write giving full details of age, experience and salary required.—H. Frost and Co., Ltd., Fieldgate, Walsall.

FOR SALE

GERWOOD BOARDS WITHOUT LICENCE OR RESTRICTION, 3 in. by 47 in. by 46 in. Send stamped addressed envelope for sample and prices.—N. Gerver, 2-10, Mare Street, Hackney, E.8. Telephone: AMEHerst 1131-2.

CROMPTON Generators, direct coupled, 230 v., 125 amps.; 120 v., 60 amps. D.C., at 1 0/75 revs. 32 yds. (3 lengths) 127/103 single-core C.M.A. Taped, Cotton, Braided and Compounded, new. What offers? Pudney, Peirson's, Halstead, Essex.

INDUSTRIAL light shades and fittings, Benjamin type, large quantity of new and good second-hand. Watertight fittings.—Edward James and Co., Ltd., 5, Heaths Court, Newcastle-on-Tyne, 1. Tel.: 23613.

ONE complete set Ship's luxury ELECTRICAL FITTINGS and shades. Inspection at Ed. James and Co., Ltd., Newcastle 23613 and Stillington 77.

GOOD quality torpedo switches, assorted colours, 26s. dozen; good quality pear switches, 2-way, assorted colours, 40s. doz.; electric bed-warmers, 30s. each plus 10s. purchase tax.—Reigate Electrical Co., 61, London Road, Reigate.

EMPIRE TAPE, 72 yd. Coils by 1 in., 60s. dozen. Varnished sleeving, 740 yards, large sizes, up to 1 in., £10 the lot.—Wolsey Television Ltd., 107, Brixton Hill, S.W.2.

FOR SALE

30 H.P. A.C. slipring motor, 220 v., 3 phase, 50 cycles, with Ellison oil immersed starter. 2 1/2 h.p. D.C. motors, 400 v., 3 phase, 50 cycles, with starter, running at 1200 revs.—H. D. Douglas and Co., 2, Caxton Street, S.W.1. Abbey 6344.

WRITE for descriptive Folders of well-known range of Commercial Decorative 80 watt Fluorescent Lighting Fittings which can be supplied complete and ready for use. A large range of Commercial and Domestic Electrical Light Fittings also available. Illustrations on request to Superlighting Electrical Co., 146, Upper Richmond Road, S.W.15. 'Phone: Putney 6908.

"SELCO" Industrial and Commercial Fluorescent Lighting Fittings, complete. 5 foot 80 watt Trough, Swallow and Strip Types ready for use. Limited quantity available for early delivery, also limited quantity of 4 foot 40 watt Industrial Fittings available.—Superlighting Electrical Co., 146, Upper Richmond Road, S.W.15. 'Phone: Putney 6908.

A VERTICAL Crossley Paraffin Engine, 650 r.p.m. high tension magneto ignition and arrangements for "V" belt drive, coupled to alternator, by Fyfe Wilson, single-phase, 25 kVA, 50-cycle, 230-volt, 1500 r.p.m. with overhung exciter, serial number 8336; dimensions overall 9 ft. 6 in. long, 5 ft. 7 in. high, 3 ft. 8 in. wide, weight about 5 tons. Can be viewed at Gruneisen Road Depot.—Apply G. A. Day, Ltd., London Road, Portsmouth. Also large quantity Gravity Roller Conveyors for sale.

FOR SALE.—Small Tube Benders. Can be carried in toolbag; suitable for plumbers, electricians, etc.—Write C.S. Ltd., Staffa Works, Staffa Road, E.10.

OIL HYDRAULIC TUBE BENDERS and Formers. New condition. Packed in wood or metal carrying boxes.—Write C.S. Ltd., Staffa Road, Leyton, E.10.

SECTIONAL Wooden Buildings, suitable for Bungalows, Garages, Garden Sheds, Offices, Workshops, etc.; buildings made to your specifications; write for list.—Philip Stowe, Joiner and Sectional Wood Builder, Cross Stone Road Works, Halifax Road, Todmorden. 'Phone 136, Lanes.

FUSES, 35-amp. 3s. doz., 30s. gross; cash with order, post paid.—Gerhard, 5, Milton Road, Ickenham, Uxbridge, Middx.

ALL LARGE BUILDINGS SOLD.—We can offer a few new timber-framed asbestos-clad huts, sizes 8 ft. to 5 ft., 16 ft. by 8 ft. and 20 ft. by 12 ft. Full particulars on request. No purchase licence required.—D. McMaster and Co., Mount Bures Works, 21c, Bures, near Colchester. Telephone: Bures 351/2.

14 300 amp. G.E.C. Oil Circuit Breakers, 3 300 volt 3 phase: 12 120/5 Current Transformers; 30 50/5 Current Transformers; 8 120/5 Ammeters; 1 3300/110 volt Chamberlain and Hookham type 7 P 3 Potential Transformer.—Box L.D.V., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

REGULAR supplies now available. Bowed Type Fire-bars, 104 in. fixing centres by 3 in. face. Finest quality elements. Wired 200 v. and 230 v. Terms for quantities.—L. Bunce (Electrical) Ltd., 87/88, King Street, Dudley, Worcs.

1 H.P. Ransomes D.C. Electric Motor with 2 starter. Revs. 950, voltage 230, price £10.—Arnold and Son, Leatherhead.

DULCABLE; 10 ft. lengths, 4-core, 14-36 (1.5 mm. o/d, black), yellow, green, brown and white, separate screen, white and brown.—Stevens, 163, Mackenzie Road, Beckenham.

LARGE quantities NEW DURALUMIN SHEETS for sale, all sizes and gauges; also quantity Duralumin in coils, 12 1/4, 16 inches wide, various gauges from 16/24—minimum half ton lots.—Apply F. W. Harris (Birmingham) Ltd., 132, Hurst Street, Birmingham.

FOR SALE

2—E.A.C. Automatic Contactor Operated Slip Ring Induction Motor Starters fitted with Isolator and Ammeter, in practically new condition, suitable for use with 400 volts 3 phase 50 cycles Slip Ring Motors, 100 h.p., rotor volts, 330, rotor amps 145. Heavy duty against 100 per cent. full load torque.—Oldfield Engineering Company Limited, 96, East Ordsall Lane, Salford, 5.

SCEMCO LTD., FLUORESCENT LIGHTING SPECIALISTS, have Distribution Rights of the new BI-UNI Press Button Domestic and Industrial Lighting Switch. Delivery four weeks. Apply for details—Scemco Ltd., Scemco House, 6/7, Soho Street, W.1.

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

FLUORESCENT LIGHTING.—CHOKES, extra quality, elongated, 4 ft., 40 W., tapped 200/250 V, silent working, each unit guaranteed, measurements 1½ in. by 1½ in. by 8½ in. Price £1 5s. each, net. Carriage extra.—Write Scemco, Ltd., 6/7, Soho Street, London, W.1. Phone: GERard 1461.

FLUORESCENT FITTINGS.—If he is electrically wise, it's Scemco he buys. For details of Fluorescent fittings, apply: Scemco, Ltd., 6/7, Soho Street, London, W.1. Tel.: Ger. 1461.

FLUORESCENT LIGHTING.—Constead units for sale, dispenses with all starter gear and gives instantaneous lighting, prevents maintenance worries; each unit guaranteed.—Apply Scemco Ltd., 6/7, Soho Street, London, W.1. Tel.: Ger. 1461.

FLUORESCENT LIGHTING FITTINGS.—Extensive range including Trough and Flush type fitted with "All in one" Constead Unit," and complete with tubes.—Write Scemco, Ltd., 6/7, Soho Street, London, W.1. Phone: GER. 1461.

STEAM Generating Set, Belliss and Morcom twin-cylinder engine, speed 448/495 r.p.m., complete with condenser, coupled to Siemens generator, 150 kW, 220 volt D.C., 660 amps., No. 30921; also Steam Generating Set, Allen twin-cylinder engine, speed 400 r.p.m., complete with condenser, coupled to E.C.C. generator, 100 kW, 220 volt D.C.—Edgar G. Rees, Great Western Dock, Llanelli.

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, Ensom, Surrey.

5000 GOOD strong Crates, inside measurements 29 in. by 9½ in. by 9½ in., ½ in. thick, batted all round, at 1s. 9d. each, ex works.—L. Goldsair and Sons, 14a, Rectory Square, London, E.1 (Tel.: Stepney Green 2550).

ELECTRIC MOTORS.—1/3 h.p. 3 000 r.p.m. D.C. 110 V. Also 220 V Stock Delivery. 26 15s. each.—John E. Steel, Clyde Mills, Bingley, Yorks.

DYNAMO & MOTOR REPAIRS LTD., Wembley Park, Middlesex. Telephone: Wembley 3121 (4 lines). Also at Phoenix Works, Belgrave Terrace, Soho Road, Handsworth, Birmingham. Telephone: Northern 0898

REBUILT MOTORS AND GENERATORS Long deliveries can often be avoided by purchasing rebuilt secondhand plant. We can redesign or replace surplus plant of any size. SEND US YOUR ENQUIRIES. OVER 1 000 RATINGS ACTUALLY IN STOCK HERE.

FOR SALE

BUS-BARS: 1 350, 12 ft. sections, with 6 tappings per section, of ½ in. copper rod, completely cased in, and complete with connectors. Also TAPPING-IN FUSE BOXES for BUS-BARS. SWITCH GEAR: 2 Feeder Units complete with 13 switches as 3—660-volt, 60-amp.; 7—660-volt, 150 amp.; 3—660 volt, 300-amp.; 1 Main Feeder Unit, with 8—660-volt, 60 amp. Sub-Switches; 6 Main 3-phase and neutral 1 000-amp. Switches; 2 Distribution Units with 8 outgoing 660-volt, 150 amp. Switches; 12—660-volt, 60-amp. Main Switches and Fuses 3-phase with cable trough; 1 Bus-Bar Unit with 3—660-volt, 150-amp. 3-phase Switch and Fuses; 14—660-volt, 150 amp. 3-phase Switch and Fuses; 10—660-volt, 300-amp. 3-phase and neutral Switch and Fuses; 3 Main Cable 300-amp. Link Boxes; 1 "Igranite" Control Unit complete with Bus-Bar Chamber 4—60 amp. and 1—150-amp. Switch and Fuses. FLUORESCENT FITTINGS: 100 Twin Tube Fluorescent Fittings, complete with chokes and condensers, £6 each. DUAL FITTINGS: 102 Dual Fittings, Complete as new, £6 each; 6 Dual Fittings, complete with chokes, condensers and lamps, £6 each. Apply: C. J. Rice, 137, Mayplace Road West, Bexley Heath, Kent. Phone: Bex. Heath 3222.

9 IN. Pencil Bar Elements for Electric Fires, immediate delivery. Supplied as plain bars, wound, or complete with end fittings. Send 2s. 9d. for wired sample, or call Dicas (London) Ltd., 20, Mackenzie Street, Slough, Bucks.

FIRE Elements.—Good quality, pencil type. Wound nichrome wire. 9½ in., 1 kW, 48s. dozen; 500 lots, 3s. 7d. each; 1 000 lots, 3s. 6d. each; 5 000 lots, 3s. 3d. each; 8 in., 750 w., 42s. dozen; 500 lots, 3s. 1d. each; 1 000 lots, 3s.; 5 000 lots, 2s. 9d. Quotations for other sizes. Immediate delivery all sizes. Carriage paid 500 and over, otherwise 4s. 2d. per 100 extra. Samples 5s. each.—The Welco General Supplies, Knebworth, Herts.

"COLD NIGHTS"—"Snug" new improved Electric Bed-Warmer; lasts a lifetime; no leaks, simple, safe and effective; complete with flex; thousands in use; sample carriage paid; price 16s., inc. P.T.—Wycomware Ltd., 39, Piccadilly, Manchester, 1.

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

AUTO BULBS. Side and Tail and Head Bulbs, prompt delivery. Wholesalers send purchase tax number for samples and price.—J. N. Somers, Ltd., 10/12, Cricklewood Broadway, London, N.W.2. (Tel.: GLA. 3005.)

SOCKS and Bags in excellent condition for all commodities, as low as 4d. each. Write: John Braydon, Ltd., 230, Tottenham Court Road, W.1. Tel. No. Museum 6072.

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

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

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

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 4922.

FOR SALE

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

A C.D.C. Motors and Switchgear can be supplied from stock or at short notice. Send your requirements to John Phillips and Co. Electric, 31, Fortune Green Road, N.W.6. Telephone: Hampstead 8132.

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.

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.

SUPERIOR Type Builders' Ladders now in production; also Steps, Trestles and Extension Ladders.—Phone: Shaftesbury Ladders, Ltd., 453, Katherine Road, E.7. Grangewood 3363/4.

250 000 YARDS of Cable, 1/052 V.R. 250 Volt, Grade Ref. 4101. Taped Cotton Braided and compounded. Flame-proof Black (Craipark) in 500 yards Coil or on Non-Returnable Reels. Price 37s. 6d. per 500 yards, or 70s. per 1,000 yards. Offered subject to prior sale.—Wm. Hurlock, Jnr., Ltd., High Street, Thames Ditton, Surrey. Phone: Emberbrook 4011.

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

9-ELLISTON EVANS AND JACKSON Electro-Magnetic Brakers, size I.B.G., 84, foot lbs. torque, with 9 in. diameter braking device.—Oldfield Engineering Company Ltd., 95, East Ordsall Lane, Salford, 5.

FOR SALE—New Threaded Steel Rods, 2 ft. 3 in. long overall, threaded for 2 ft. B.S.F. diameters $\frac{1}{2}$ in. and $\frac{3}{8}$ in. Also Rods 2 ft. 3 in. long, $\frac{1}{2}$ in. diam. threaded 4 B.A. Large quantities in new condition available for prompt despatch. Apply—Thos. Jenkins and Son (B.F.) Ltd., 4/6, Exchange Buildings, Port Talbot.

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

WANTED

WANTED—Several K.W.H. Meters, 3 phase, 4 wire, unbalanced load, 50, 100 and 150 Amps, 400 Volts 50 Cycles.—Dennison Watch Case Co. Ltd., Handsworth, Birmingham.

L.M.K. Mfg. Co. Ltd., Harlequin Avenue, Great West Road, Brentford, Middx. (Telephone EAL 1858). 20,000 prs. M. and E.A. No. 29 E. and I. Laminations (or equivalent), 1 per cent. to 4 per cent. silicon.

POWER Guillotine up to 14 gauge, a Deep-Back Fly Press, 7 to 10 cwt., and Angle Bender, 16/14 gauge.—T. R. and T. Ltd., 23, Newton Road, Kingskerswell, Newton Abbot.

RESISTANCE Frames for vat control and other plating sundries.—Garlick, 656, Grand Buildings, W.C.2.

C.R.C.A. and Electrical Steel STRIP or off-cuts required. .013/.036 in. thick by 3 $\frac{1}{2}$ in. wide or nearest over. Any quantity.—C.V.A. Jigs, Moulds and Tools, Ltd., Portland Road, Hove, Sussex.

WANTED

200 kVA (or near), three-phase, 50-cycles, 415 volts Alternator and Exciter, for direct coupling to engine. Speed 428 r.p.m.—Thos. Marshall and Co. (Loxley), Ltd., Storrs Bridge Works, near Sheffield.

WANTED—5 h.p. Electric Motors, 400/440 V, 3 ph. 50 cye. or 380 V, 3 ph. 50 cye. 950 r.p.m. new or reconditioned. Six required. 15 h.p. ditto, 1440 r.p.m. Six also required. With or without starters.—Box L.E.B., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4. **WE** are purchasers of Modern A.C. MOTORS, suitable for either 230 volts, single phase, 50 cycles, or 400/440 volts, 3-phase, 50 cycles. Slip ring or squirrel cage. Any speed and horse-power not below 1/2 D.C. motors are NOT OF INTEREST. Please state full details and price.—Stanley Engineering Co., Bath. Phone: Bath 4294/5. Grams: "Trius," Bath. Established 1910.

WANTED—Ball and Roller Bearings, also loose balls, commissions arranged for introduction to transactions. Licensed Buyers. W. Ball Ltd., Blackburn Road, Accrington. Tel.: 2200.

REQUIRED for export to India purchase for early delivery up to 500 dozen Edison Screw Lampholders, $\frac{1}{2}$ in. brass, with ring type or similar.—Write Box L.D.R., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

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.

WANTED urgently, 1 and 3 phase MOTORS, S/C or totally enclosed, $\frac{1}{2}$ h.p., $\frac{3}{4}$ h.p. or 1 h.p., 1425 or 2800 revs.—F. W. Kubach, 12, Sylvan Road, London, S.E.19. Phone: Livingstone 3311/2.

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

LAMINATIONS—Large types required in reasonable quantities. T's and U's. Also 7's and 4A's.—Cornercroft, Fallibroome Road, Macclesfield.

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.

WORK WANTED

FLUORESCENT Lighting. If your installation gives trouble during the "voltage cut" consult Zodiac Electrical Products, Springfield Road, Guiseley, Leeds.

FLUORESCENT Lamps. We can "reprocess" a percentage of your 5-ft. by 80-watt lamps which have failed after normal service. Send these to use in quantities of twelve or more.—Zodiac Electrical Products, Springfield Road, Guiseley, Leeds.

PERSPEX, Radio Dials, Panels, Display Plates, Advertising Matter, manufactured to your order and colour printed.—B.I. Productions Ltd., Victoria Mill, Trafalgar Street, Burnley. Phones 3189-3180.

JIG and Tool, Light Mechanical and Structural Design, Tracing and Detailing.—Fraser-Hayes and Son, 7, Kenilworth Road, Othead Heath, Stockport.

CAPSTAN capacity immediately available, 6 BA to $\frac{1}{2}$ in. Brass or Steel. Large stocks of raw material in hand.—Chiswick Engineering, Ltd., 7, High Road, Chiswick, London, W.4. Chiswick 3595.

WORK WANTED

"CLEFA" Small Accessories. Copper Earth Clips, Upright Gimbals and other metal parts made to order. Good deliveries.—Central London Engineering (Fabrications) Ltd., 120, Old Street, E.C.1.

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

FOR REWINDING ELECTRIC MOTORS. Fractional, up to 100 h.p. Transformers, Chokes, etc., contact Electrical Engineering Construction Company, Ltd., Seymour Wharf, Totnes, Devon. Phone 3222.

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

BRISCOE PLATING CO. LTD., now have available capacity for silver and nickel plating and quantity production of electrical and household products in which we are specialists. Enquiries invited to 3-5, Maddox Street, London, W.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.

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 (ENAMELERS), LTD., PYRO WORKS, CHESTERFIELD Phone: 5305

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

MISCELLANEOUS

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.—Rumbaken Electrical Products, Manchester, 1.

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.


AGENCIES

MANUFACTURERS of and dealers in Electrical Machinery, Wiring Accessories and Cables interested to make contact with an experienced engineering firm of 25 years' standing, for sale, export and representation of their products in India, are asked to correspond with—R. Cardew, Kileren, Tresowes Ashton, near Helston, Cornwall.

WELL-KNOWN and influential importing house having very good connections and a vast field of clientele desires sole representation of all electrical goods. Please contact Vyas Brothers, Post Box 2036, 53, Nanabhai Lane, Churchgate Street, BOMBAY.

PATENT AGENTS

KINGS PATENT AGENCY, LTD., B. T. King, A.I.Meoh.E. (Patent Agent), 146A, Queen Victoria Street, London, E.C.4. ADVISOR, Handbook, and Consultations free. Phone: City 616L.



Endorsing Friends...

Sole Manufacturers:
DURATUBE & WIRE LTD
FELTHAM · MIDDXX

DURATUBE
DURASTRIP
DURASLEEVE
DURATWINTAPE
DURATWINFLEX
DURATHREEFLEX
DURATHREECABLE
DURATWINCABLE
DURATWINFLAT
DURATHREEFLAT
DURAWIRE
DURACABLE

BARLECTA FLUORESCENT FITTINGS



LIST NO. FD 101 FOR 5 FOOT TUBES
£7 - 19 - 6

Price less Tube Subject (No advance)
PROMPT DELIVERY

Price includes:—

- RADIO SUPPRESSOR ● CHOKE
 - CONDENSOR ● STARTER SWITCH
- (No Extras)

Other types now available and
also in course of production
Full details sent on request

BARRIES

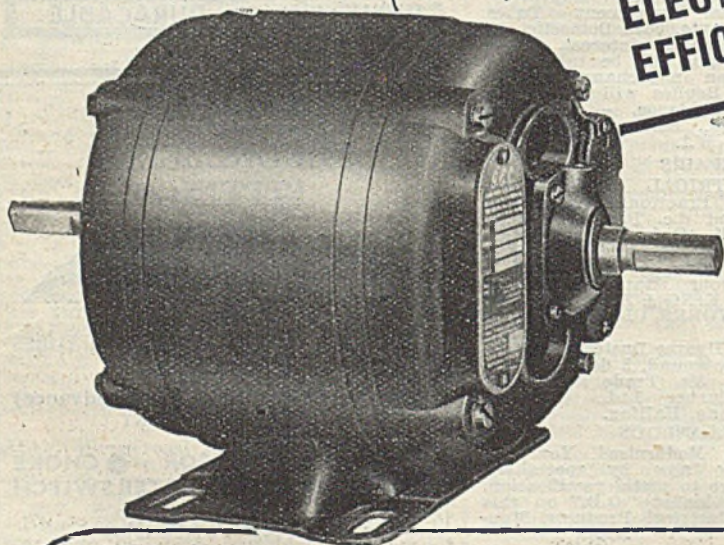
ELECTRICAL AGENCIES LTD.
KING STREET, BRIGHTON, 1

Telephone: Brighton 8366 (7 lines) P.B.X
Telegrams: "Barlecta" Phone Brighton

USED "BY THE MILLION"
IN ESSENTIAL
ENGINEERING PRODUCTION

USED WHEREVER SMALL
POWER UNITS ARE
NEEDED FOR ARDUOUS
AND RESPONSIBLE
DUTIES

USED FOR THEIR
STURDY STRENGTH
INHERENT RELIABILITY
AND OUTSTANDING
ELECTRICAL
EFFICIENCY



G.E.C. FRACTIONAL H.P.
MOTORS



THE

ELECTRICIAN

ESTABLISHED 1861

Bouverie House - 154 Fleet Street - London EC 4

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

Editor: STANLEY G. RATTEE, A.M.I.E.E.

Publisher and Manager: JOHN VESTEY

Number 3585

14 FEBRUARY 1947

Vol CXXXVIII No 7

CONTENTS

<i>Views on Current Affairs</i>	493
<i>The Fuel Crisis</i>	496
<i>The January Cold Spell</i>	498
<i>Engineers' Appointments Bureau</i>	499
<i>Electrical Personalities</i>	500
<i>Inside of Electrical Machines</i>	501
<i>Answers to Technical Questions</i>	506
<i>The Grid in War-time</i>	507
<i>Industrial Information</i>	510
<i>Electricity Supply</i>	513
<i>Contracts Open</i>	514
<i>Company News</i>	515
<i>Commercial Information</i>	516

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

ANNUAL SUBSCRIPTION

HOME AND OVERSEAS 3cs.

Fuel Crisis

THE grave statement made by the Minister of Fuel last week with respect to coal revealed to the public a condition of things, about the coming of which Mr. SHINWELL has been warned by the electrical engineering industry, not once or twice but many times.

In September last, Mr. SHINWELL said that "talk of rationing of electricity this winter is a lot of nonsense," and "perhaps the critics had better hold their breath until the end of the winter." In THE ELECTRICIAN of September 20, we expressed the hope that the Minister would not regret in January and February having used the word "nonsense" so thoughtlessly in September, and we explained the reason why. In reply to criticism in the following month, he said: "There is not going to be a crisis in coal, if by crisis you mean that industrial organisation is going to be seriously dislocated," and in THE ELECTRICIAN of November 1, attention was drawn to the false sense of security which such words were likely to create.

The industry's concern, last summer, with regard to electricity and coal supplies this winter was based, not on any exclusive data but on information as readily available to the Minister of Fuel, namely, shortage of generating capacity, loss of efficiency in existing plant due to unsuitable fuels, the increasing demand for electricity supplies and the ever-growing consumption of coal for generation purposes. The Minister was at the time informed of these conditions by those responsible to him, by the technical Press

and by the electrical industry itself. In the circumstances, therefore, it is not unreasonable to wonder how far Mr. SHINWELL'S preoccupation with the preparation of the Electricity Bill contributed to his misjudgment of the true state of affairs. In any case, there can be no doubt of the task which should have received the Minister's first attention.

Coal and Production

THE snow-storms of recent weeks may have hastened the coal crisis, but the breakdown was inevitable whether the snow came or not, in that the increase in the coal production figures, as pleasing as they may be, bear little relation to the production necessary to meet the demand. The manufacturing capacity of the country has been enjoined to increase its flow of goods, to expand its export trade, to increase output per man-hour; in other words, to raise production levels. This is being done no less successfully than in the electrical industry, but—as even the most non-technically-minded will understand—carried in its wake is an increased demand for raw materials, including coal, electricity and other fuels. That Mr. SHINWELL is aware of these conditions cannot be in doubt, for in the House on February 7, he revealed that the weekly estimates of the Central Electricity Board have been rising from 340 000 tons to 560 000, then 570 000 to 600 000 tons, until in the last week of January actual consumption was 720 000 tons; other coal consuming industries have been equally demanding.

Shortage of Plant

OTHER circumstances affecting electricity supply—for which Mr. SHINWELL cannot be held wholly responsible but which are nevertheless, born of Government handling—are concerned with generating capacity, the present shortage of which was forecast by the Central Board as long ago as 1940. The cold spells of last month and this have caused many domestic consumers to increase their electricity consumption in attempts to make the most of the meagre coal supplies permitted them, and this increase in load, coupled with the heavier industrial demand due to increasing output of our manufacturing capacity, has built up a figure which outstrips the kilowattage of available

generating plant. As an indication of the position, we give in this issue some details of the conditions existing on January 30, when the generating capacity of the country was short by 1 535 MW, compared with 170 MW in the same month last year.

Outages Due to Fuel

THOUGH the rated output capacity of the supply industry has by comparison with last year been raised by 139 MW to 10 666 MW, the industry is still suffering from conditions created by unsuitable fuels, and on January 30, 374 MW were denied the industry from that cause. There were at that date, 914 MW of plant out of action due to breakdown, and bearing in mind the operational strain which the burning of unsuitable fuel puts upon the efficiency of a power station, some appreciable percentage of this figure must therefore be added to the 374 MW, the inactivity of which was directly attributable to fuel trouble. Plant outage due to unsuitable fuel on January 21 last year was about 241 MW, which suggests that in the intervening twelve months the distribution of suitable fuels has so deteriorated that though 139 MW of new plant was added to the industry's output capacity during the year, 133 MW of that capacity was on January 30 not available to the industry due to deliveries of coal of the wrong type.

Cost of Inefficiency

ONE of the disturbing features born of Mr. SHINWELL'S inability to appreciate the effect of delivering unsuitable fuel to power stations, received further publicity at the I.E.E. last week when Mr. J. W. J. TOWNLEY, electrical engineer and manager of the West Ham undertaking, during a discussion on the grid system in war-time, referring to the loss of capacity through bad fuel, said we were to-day using over a million tons of steam fuel per annum in generating stations at a cost to the industry of £2 million more than would be required if the 1939 quality had been maintained. These facts have been put before the appropriate Minister, but they do not seem to have had the slightest effect. Calorific value, Mr. TOWNLEY pointed out, was an entirely unsuitable yard-

stick by which to measure the value of fuel for steam raising purposes; the physical characteristics of fuel were much more important. The Central Board's analysis of fuel supplied to selected stations, he added, showed that in 1944 eight million tons of fuel supplied would have passed through an $\frac{1}{8}$ in. mesh. Such fuel was almost useless to stoker-fired boilers. In these days when it is so vitally necessary to ensure that plant is operated at maximum capacity it is nothing less than sheer stupidity, apart from waste of time, labour, transport and money, to send to power stations consignments of coal that cannot be used, when simple planning would ensure their getting fuel suitable for their requirements.

A Welcome Decision

NEVERTHELESS, some encouragement may be gained from the evident determination of those responsible to avert a similar disaster next winter. At the Ministry, on Tuesday, a representative of THE ELECTRICIAN raised with Sir GUY NOTT BOWER, deputy secretary of the Ministry, the all-important question of unsuitable fuel supplies, drawing attention to the statement of the Central Board that 50 per cent. more capacity was being lost this winter than last as a result of unsuitable or poor quality fuel. Both the Government and the National Coal Board, he was assured, were determined to make the distribution of suitable coal their first priority during the coming months.

C.E.B. Estimates

INTERESTING light is cast by Mr. H. HOBSON, Chairman of the Board, on the discrepancy between the C.E.B.'s estimates of coal consumption and the actual figures, referred to by both the Prime Minister and the Minister of Fuel. The Board's estimates, we understand, were based on the assumption that solid fuel allocations to domestic consumers would be maintained. Shortages of domestic coal, however, aggravated by the severe weather, resulted in an altogether unprecedented use of electric heating. Since the Central Board presumably had good reasons for believing that domestic allocations would be met, this seems to remove from them the charge of bad planning. The same can-

not, however, be said for the Ministry, which must have known of the situation.

First Results of Cuts

THE first indications of the effectiveness of the restrictions upon coal consumption were not altogether encouraging. On Monday cuts gave an estimated saving of 22 550 tons, about 33 per cent. of previous daily consumption, but it was disquieting to learn that the 9 a.m. drop in load—so far the most accurate barometer of the efforts of domestic consumers—fell from 2 720 MW, on Monday, to only 2 290 MW on Tuesday. Since the weather was considerably colder on Tuesday, it is permissible to assume that the additional consumption was due, at least in part, to an increased use of heating appliances during the prohibited periods, and this, in turn, suggests that despite the Prime Minister's broadcast statement on Monday, the extreme gravity of the situation had not been grasped. How critical matters have now become is evidenced by the Ministry's announcement that on Tuesday, 125 colliers, carrying 190 000 tons of coal, were storm-bound in the Tyne alone, while on the same day, only three ships, carrying 8 000 tons, reached London.

How Will It End?

THE setting up of the "Coal Cabinet," the extension of domestic restrictions over the whole country, the introduction of penalties, cuts in street-lighting and the lowering of statutory voltage limits are signs that the gravity of the situation has been grasped. The eventual restoration of supplies will now, it appears, be by a gradual extension of the lift of "essential" consumers. No estimate can be given of the degree of restocking considered advisable before supplies are resumed. The decision must be taken, it is stressed, not only on the basis of the coal at the power stations, but of that in transit and at the pits. Plainly worried about the wider implications of the situation, Mr. HOBSON is, however, well satisfied with the technical ability of the supply industry as a whole to meet the problems raised by the daily cuts. The midday peak, he said, was no worse than the normal early morning demand, and the sudden shut-down during Armistice Day silence before the war was far more of a test for plant than anything experienced this week.

The Fuel Crisis

The Minister's Statement on Rising Electricity Demand

FORTY minutes after he had begun to speak in an adjournment debate on the fuel situation, the Minister of Fuel and Power, on Friday, February 7, gave to the country the first intimation of the impending restrictions. Necessarily limited by space, an account is given below of his speech, and of those preceding and following. On Monday afternoon the Prime Minister made a statement in the House, and this was followed, after Opposition pressure, by a debate on the crisis, which we have also summarised. On Tuesday, an official of the Central Electricity Board announced that, so far, no generating stations had been forced to close completely as a result of the shortage, nor, he thought, was this likely to happen. At a conference held by the Ministry of Fuel and Power, it was stated that a policy of long term restrictions on the use of fuel, extending beyond the present crisis, was now under consideration by the Government. The questions of limiting the manufacture of electric fires and other appliances came within the scope of the discussions.

THE first news of the compulsory closing down of power stations and cuts to industrial and domestic consumers was given by Mr. Shinwell, Minister of Fuel and Power, during the debate on the adjournment, on February 7.

Earlier, Mr. Prescott had raised the question of the closing of the Lancashire cotton mills and said that the responsibility for the coal situation and the closing down of industries rested fair and square on the shoulders of the Government.

After further debate, during which Mr. Blackburn discussed the closing down of the Austin factory, Mr. Eden said that we were confronted in this country with the gravest industrial crisis for the last 20 years. The Government had completely misjudged the situation by taking too optimistic a view of the gap which had to be bridged between the national industrial demand and the available supplies of coal. When they did agree upon a plan—which was now known as the Cr.pps plan—it was too late. If the Electricity Bill had been postponed to some remote date, he wondered whether the Minister and his department might have been able to find rather more time to attend to the pressing needs of the nation.

Replying, Mr. Shinwell said that the Government had made statement after statement and had held conference after conference. Did they not present to the House a coal budget indicating what the gap was going to be and the steps they proposed to take in order to bridge the gap? Last winter, the Minister continued, there was a little trouble due to coal shortage, but, generally speaking, there was no dislocation. They assumed that with rising output, and provided that consumption did not rise unduly, they would escape difficulty. What were the facts? They were faced with a consumption posi-

tion such as they had never had before.

The estimates presented to him by the Central Electricity Board rose from 540 000 tons of coal required a week for electricity to 560 000 tons, then to 570 000 tons, then to 600 000 tons, and, last week, to 720 000 tons. It was impossible to prepare plans, and foresight was of little value when the demands made on the fuel produced were so excessive.

After describing the way in which the weather of the previous ten days had destroyed the organisation for industrial coal allocations, Mr. Shinwell came to his announcement of the impending cuts. Last week, he said, the London electricity undertakings consumed the unprecedented figure of 150 000 tons of coal. The result was that some of them had only a week's supply left. Shipping was held up and in these circumstances they had had to improvise.

"The result has been," Mr. Shinwell went on, "that the electricity stations are now in the grave situation of being unable to say whether they are able to carry on for the next week or ten days. We have supplies in to-day, but we cannot take risks. So I have to tell the House, much to my regret, that we shall have to curtail in the next few days, at any rate, probably beginning on Monday, supplies to industry of power in particular areas." It would not be possible for power stations operating in the London, South-Eastern, Midland and North-Western districts to be kept fully supplied with coal to meet the present consumption of electricity. There were some districts which would be unaffected, the North-Eastern district, Yorkshire—which included the Sheffield iron and steel trades—and several others.

"May I mention," Mr. Shinwell said, "the position in the London area, where electricity consumption is particularly

heavy on the domestic side and far in excess of the industrial consumption? In the Midlands area it is the other way round. For several months now I have been considering whether it was possible to curtail the supply of electricity for domestic purposes, but in fact it has not been possible. One can cut and shed, but to ration is a very difficult problem. The whole matter is still being considered and it may yet be possible to provide a scheme for the coming months.

"A number of power stations in the districts I have specified will have to cease operation, and supplies will have to be operated through the medium of the grid from the remaining stations, which will be kept in operation as far as possible. This will mean that supplies of electricity throughout these areas will be at a much reduced level, and it will be necessary, therefore, to make drastic cuts in consumption to avoid the possibility of a complete breakdown of electricity supplies, which would be disastrous. The position is that if we do not keep the large power stations running with such coal as is coming in and as we are likely to get next week, there is bound to be a collapse. The smaller stations will have to close, but the essential thing is to keep the vital services running on electricity supplied."

The Government had therefore decided that, as from Monday, no electricity should be supplied to any industrial consumer in the areas specified, and that supplies to domestic consumers should be cut off during the hours from 9 a.m. to noon and 2 till 4 in the afternoon. The Electricity Commissioners would send a circular to electricity undertakings in these areas, notifying them of this decision and asking them to maintain supplies only to essential services.

"We have had to take this step," the Minister concluded, "only with the greatest reluctance and only because the emergency is so critical that there is no alternative. As soon as the coal stocks reach the power stations, these conditions will be mitigated or removed. I hope that after a week or two we shall recover from the present plight and restore full electricity."

At the end of question time, on Monday, Mr. Attlee made a statement

in reply to Mr. Churchill. The country had started the winter with only 11 000 000 tons in stock, he said, against 14 000 000 the year before. As to immediate steps being taken, all Government departments concerned, the National Coal Board and the shipping, transport and electricity authorities had been continuously engaged in moving coal to the power stations in London and the South-East, the Midlands and the North-West. In the prevailing weather conditions, loading at docks and staithes had been difficult and slow, and ships from the North-East Coast and South Wales had been delayed by gales and fog. Railway traffic had been disorganised by the accumulation of loaded waggons, freezing of points, and in some cases by the blocking of tunnels and lines with snow.

The technical difficulty of separating essential services from the other consumers, the Prime Minister continued, had made it necessary in the main to rely on the co-operation of consumers in effecting the necessary reduction in consumption. It was this which had always prevented selective cuts in consumption by compulsion.

Later, on the motion for the adjournment, Mr. R. S. Hudson claimed that Mr. Shinwell had failed consistently throughout the summer and the winter to provide adequate supplies of coal or even the minimum supplies that were required.

Replying, Mr. Shinwell said that he had disclosed the serious gap between production and consumption in his coal budget, last June. In the face of estimates the Government had received from public utilities experts, they were justified in proceeding on the assumption that if they could secure economies they could manage to scrape through the winter. The opinions of the experts—the Central Electricity Board and the Electricity Commissioners—had to be accepted. Up to Christmas, the estimated consumption was

557 000 tons a week.

These estimates had to be reviewed in November, when it was discovered that 648 000 tons a week were wanted until the end of January, 1947. That was a vast difference.

He was hoping, the Minister went on, that they would be able to keep going the electricity stations in the London area, which depended mainly on sea-borne coal.

OUR NEXT ISSUE

Following a conference between the Ministry of Fuel and Power and the Periodical Proprietors' Association on Monday afternoon, it was agreed that trade and technical periodicals dated up to February 15 should be produced and issued as, in many cases, the printing of these journals was well advanced. After February 15 the production of these journals is to be suspended for at least two consecutive issues.

The ELECTRICIAN will not, therefore, be published in the coming fortnight and the next issue will be in readers' hands if all goes well on March 7 next.

The January Cold Spell

Demand Outstripping Plant Capacity—1 500 MW Load Shed

ABOUT this time last year reference was made to the effect on the grid system of the cold spell of January 21, 1946, and though at that time few of the public were inconvenienced, experience since has been such that the whole country is aware of the inadequacy of our generating capacity. The cold weather which has lately visited the country has brought further evidence of our need for power station extensions and the load on the grid system on January 30, was such that had the generating plant been adequate to meet the demand, the figure of 10 920 MW would have been reached. The plant available for output purposes to meet this demand was 9 092 MW, which was overloaded to the extent of 295 MW by allowing the frequency to fall from 50 to 48.4 cycles. At this stage the load continued to grow until 1 535 MW were shed in the various areas of the Board by amounts ranging from 25 down to 10 per cent.

This compares with a load shed of 170 MW made on January 21 last year, when the maximum available generating capacity for output purposes was 8 831 MW and the demand met was 8 906 MW—75 MW by overloading.

A comparison of the plant conditions existing on January 29 this year when the highest generation was recorded; on January 30 when the highest demand was set

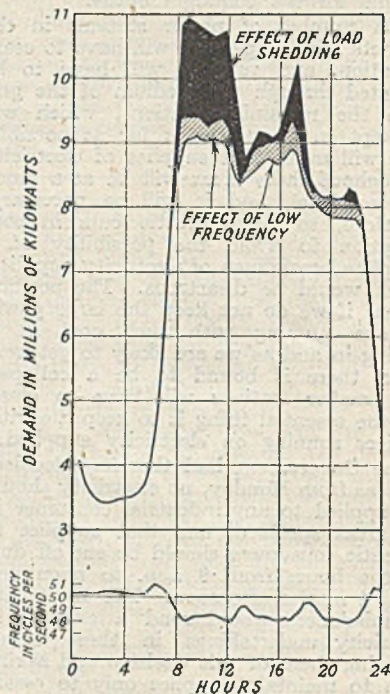
	Jan. 29, 1947.	Jan. 30, 1947.	Jan. 21, 1946.
	MW.s.o.*	MW.s.o.*	MW.s.o.
Rated max. output capacity ...	10 666	10 666	10 527
Output capacity not available due to:			
Breakdown ...	852	914	652
Overhaul ...	207	204	439
Unsuitable fuel ...	347	374	237
Other causes ...	99	150	352
Circuit restrictions	9	9	16
Total reductions ...	1 514	1 651	1 696
Rated capacity of available plant	9 152	9 015	8 831
Load actually met ...	9 261	9 092	8 906

* Preliminary figures only.

up on the Board's system, and on January 21, 1946—the day of the maximum demand of the winter of 1945/46—is tabulated above.

It will be noted that since January 21, 1946, the loss due to breakdown of plant has increased by some 50 per cent., and that the losses of capacity due to overhaul and other causes have been reduced by more than 50 per cent. The loss due to unsuitable fuel has been increased by more than 50 per cent. Operating conditions for the past three months have

been exceptionally severe, as will be seen from the fact that generation has been maintained at a level higher than 9 000 MW since the beginning of December, without any respite on plant which in many cases is well over 20 years old, and under



The national load curve on January 30. The blackened portion shows the load shedding and the shaded part the effect of low frequency

normal conditions would have been scrapped years ago as inefficient. About 15 per cent. of the generating plant now running is over 20 years old.

The difficulties of carrying out load shedding up to values as high as 25 per cent. are extreme and call for the greatest care in dealing with the heavy transfers of energy which are introduced on the grid network. Difficulties arise not only during the peak load periods between 8 a.m. and 6 p.m. when there is insufficient plant to meet the total load in the country, but also later in the evenings and on Sundays when generation has on occasion to be restricted in order to avoid dangerous overloading of transmission lines. Sustained operation at low frequency for long periods has made it impossible to carry out

the necessary clock correction during the night period and in present circumstances correction of synchronous electric clocks has had to be discarded. Load shedding has had to be a feature of normal daily operation as will be seen from the following table, and reached a maximum

	No. of days on which load was shed
October, 1946	6
November, 1946	9
December, 1946	19
January, 1947	19

on January 30 when the load shed was 1 533 MW.

The curve reproduced on opposite page shows (a) the load met on generating plant, (b) the load which would have developed if normal frequency had been maintained and (c) the additional load which would have had to be met if no load shedding had taken place.

New plant already commissioned has enabled the output to be increased, but the programme providing for the installation of 6 million kW of plant at a cost of £200 million by 1950, is very much behind schedule, due to the combined shortages of materials, particularly steel, and skilled

labour. The general position regarding steel supplies for power station extensions is bad and is likely to be even worse in view of restricted coal supplies to the producers. The labour position has improved, and it is not so much the supply as the quality that is lacking.

As a result of the programme for the thorough overhaul of generating plant during the coming summer with the object of increasing the capacity to the maximum next winter, it is likely that there will be some load shedding throughout the year.

At a conference held by the Central Electricity Board on Thursday, February 6, it was stated that the position in regard to coal in the Thames area was dangerous. The coal stocks at power stations were at a critically low level, and unless the flow of coal into the Thames could be re-established immediately, there would have to be drastic widespread restriction of electricity supplies. Conditions already critical, have been aggravated by the bad weather. While the Thames area was affected most acutely, conditions for the rest of the country were by no means easy. This position led to the statement made by Mr. Shinwell in the House of Commons on Friday.

Professional Engineers' Appointments Bureau

APPLICATIONS are invited by the Bureau for registration for employment from members who, by reason of their engineering qualifications, belong to the Institutions of Civil, Mechanical, or Electrical Engineers, or persons whose engineering qualifications for election or admission to one of those bodies have been approved by the respective Councils. Forms may be obtained on application to the Registrar of the Bureau, at 13, Victoria Street, Westminster, S.W.1, a stamped addressed foolscap envelope should be enclosed, and the registrar will interview applicants who have completed the necessary form by appointment only.

Employers of professional engineers are invited to submit details of positions vacant on their staff, indicating any special requirements, and salary range offered. Any details necessary for the guidance of the bureau which it is desired should be kept confidential should be indicated accordingly.

During 1946, the average number on the register was 964, 184 being primarily civil, 390 mechanical and 390 electrical engineers. Employers supported the bureau during the year by notifying 1 155 vacancies, a number of the applications being for more

than one engineer. In general, nominations have been made within 7 days of the vacancy being notified.

At least 217 engineers have obtained posts with the employers to whom they were nominated by the bureau. This is above the estimate of the results anticipated for the first year of operation, but actual results may well be higher, as information has not yet been obtained on a number of the nominations made.

The salaries at which posts have been filled range up to £2 000 per annum and the age of the candidates placed up to 65. Considerable difficulty has, however, been found in placing engineers over 40 years of age; though where possible the bureau has tried to influence employers not to specify low maximum age limits.

Registration and appointment fees received during the year totalled £478, and £1 025 respectively. Further donations amounting to £1 238 were also received, due to the generosity of employers' organisations, firms, and members of the three institutions. The sum of £264 which had to be withdrawn from the capital originally subscribed, to cover the balance of the cost of operating the bureau, is less than was anticipated.

• 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. F. COALES, late of the Admiralty Signal Establishment, is now in charge of the new



MR. J. F. COALES

research laboratories set up by Elliott Brothers (London), Ltd., at Borehamwood, Herts. He is a member of the I.E.E., and from 1930 to 1937 was engaged on research into radio direction finding for the Admiralty, a subject to which he made a number of original contributions. With the advent of radar Mr. Coales was put

in charge of a research team working on decimeter waves, and throughout the war he was responsible for the development of radar for gunnery purposes in H.M. ships. He was awarded the O.B.E. for his services.

MR. A. WILSON, of Leeds, has been appointed by Dewsbury Electricity Committee as installation engineer.

MISS CAROLINE HASLETT, director of the E.A.W., is to be a member of the Crawley Development Corporation appointed by the Minister of Town and Country Planning in connection with the creation of a satellite town in Sussex.

MR. H. H. ASTON has been appointed a director of the Simplex Electric Co., Ltd., a subsidiary of Tube Investments, Ltd. Mr. Aston is general works manager of the new factory at Blythe Bridge, Staffordshire.

MR. E. HOWLETT is retiring after 46 years' service with the British Thomson-Houston Co., Ltd. He joined the company in 1901 as an apprentice, and in 1907 was transferred to the outside construction department, becoming district engineer. In 1919 he was made sales engineer attached to the Manchester office, from which position he now retires. He has written many articles for the technical Press, and hopes to continue that work.

MR. H. H. SPENCER has relinquished his position as branch manager of the London plant division of Crompton Parkinson, Ltd., to take over special duties in the sales director's department. He has been

succeeded by Mr. J. B. Scott, formerly branch manager of the Manchester plant division, which position is now held by Mr. R. Spiers, who was previously with the London plant branch. Mr. T. A. Littlewood, who has been acting branch manager of the Birmingham plant division for the past year, is appointed to that position as from February 3.

MR. A. McVIE has been appointed commercial director of Standard Telephones and Cables, Ltd., in succession to Mr. C. W. Eve, who is retiring. Mr. McVie, who was recently re-elected chairman of the British Radio Equipment Manufacturers' Association, relinquishes his position as general manager of Kolster Brandes, Ltd., but remains a director of that company.

MR. REX BATE has been appointed general sales manager of the Brush Electrical Engineering Co., Ltd. Until recently he was manager of the transformer department. Mr. Bate received his technical education at Loughborough College, after which he was employed for three years by the Fuller Electrical and Manufacturing Co. From 1932 to 1935 he served in the technical and research department of the C.E.B., after which he spent twelve months as resident inspecting engineer at the works of Siemens and A.E.G. in Berlin. In 1937 Mr. Bate was appointed manager of the Calcutta office of Asea Electric, Ltd. He was commissioned in the Royal India Engineers in 1940 and served on the staff of the 14th Army. He joined Brush as manager of the transformer department in February, 1946.

Obituary

MR. C. E. EVANS, senior electrical charge engineer in the service of the Mansfield Corporation for 36 years.

MR. JOHN PLATT, J.P., a pioneer in the use of electrical machinery in Lancashire coal pits.

MR. JOHN EDMUND POWNALL, late deputy borough electrical engineer at Tunbridge Wells, on February 3, following an operation, aged 66 years. Mr. Pownall retired in April, 1945, from the position of deputy borough electrical engineer which he held for over 31 years. Prior to taking up the post at Tunbridge Wells, Mr. Pownall held positions with the Bolton, Dover, Hammersmith and Hampstead electricity supply undertakings.

INSIDE OF ELECTRICAL MACHINES

by R. H. ROBINSON, B.Eng., A.M.I.E.E.

IN this, Part XXI of the series,* are given details of the application of insulation to turbo-alternators for 11 kV and lower voltages.

Turbo-alternators are the crowning glory of the electrical machinery world. From

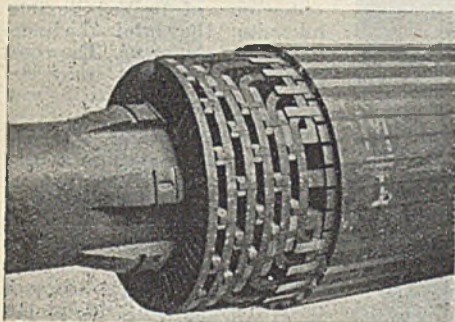


Fig. 1—Rotor winding for 36 300 kVA, 11 000 V, 3 000 r.p.m. turbo-alternator (General Electric Co., Ltd.)

the design point of view they demand the highest skill, not only because it is necessary to work most of the materials at the greatest possible stress consistent with mechanical and electrical safety, but also because a mistake in a machine of this nature is much too expensive in its result to contemplate. Only the most experienced workers are employed in their manufacture and it is always a pleasure to note the skill and craftsmanship they exhibit when working on these big machines.

Specification.—These alternators are manufactured to comply with B.S. 225-1925, Electrical Performance of Alternators of the Steam Turbine Type. Although this specification gives data for machines insulated for either Class A or B temperatures, they are nowadays made only with Class B insulation.

The high voltage tests stipulated are very brief: for the stator windings, 1 000 V plus twice the rated voltage (with a minimum of 2 000 V); for rotor windings, 10 times the excitation voltage with a minimum of 2 000 and a maximum of 3 500 V. The exciter armature and field windings are tested at the same voltage as the rotor which it excites.

The specification also gives the condi-

tions under which the tests should be made and stipulates that if further high voltage tests are required after erection on site, the voltage should be 75 per cent. of that previously applied. Other relevant information is similar to that given when quoting from B.S. 168 in Part XVII of this series, and need not be repeated.

Before the high voltage test is taken the insulation resistance in megohms should be not less than

Rated volts

$\frac{1\ 000 + \text{Rated output in kVA}}{10}$

measured with a d.c. voltage of about 500 V. A 500 V Megger is generally employed for this purpose.

Appendix VIII of B.S. 225 gives useful information about the measurement of voltage with spark-gaps. It is, however, too lengthy to reproduce here.

Turbo-Alternator Rotors.—Apart from its general appearance of bulk and weight.

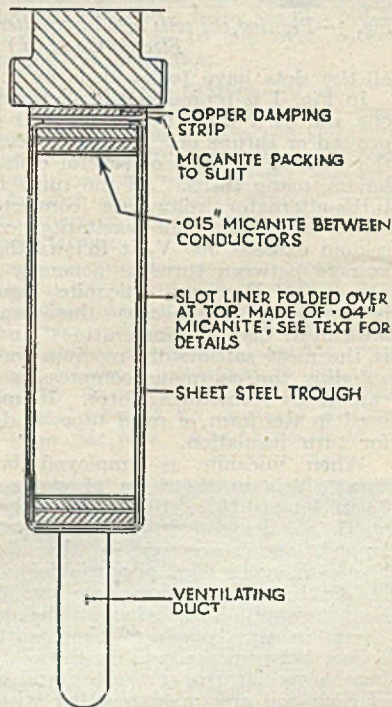


Fig. 2—Turbo-alternator rotor slot

which may be from about 40 tons to more than 100, there is not much about a finished rotor to indicate the tremendous work involved in its manufacture. As

* Parts I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVII, XVIII, XIX, XX, appeared in THE ELECTRICIAN of April 26, May 10, May 24, June 7, June 21, July 5, July 19, August 2, 16, 30, September 20, October 4, 18, November 1, 15, 29, December 13, 27, 1946, January 10 and January 24, respectively.

received at the works, it comprises, generally speaking, a forging of special steel and

backed on both sides with presspaper, may be employed. More frequently, especially in large rotors, moulded micanite troughs are used. These are often moulded inside sheet iron troughs, especially if there are longitudinal ventilating ducts beneath the slots, as shown in Fig. 2. Another alternative is to use troughs of two kinds; an inner of moulded micanite, and an outer one of backed flexible micanite, the total thickness remaining the same. The composite arrangement may be used in conjunction with sheet iron troughs.

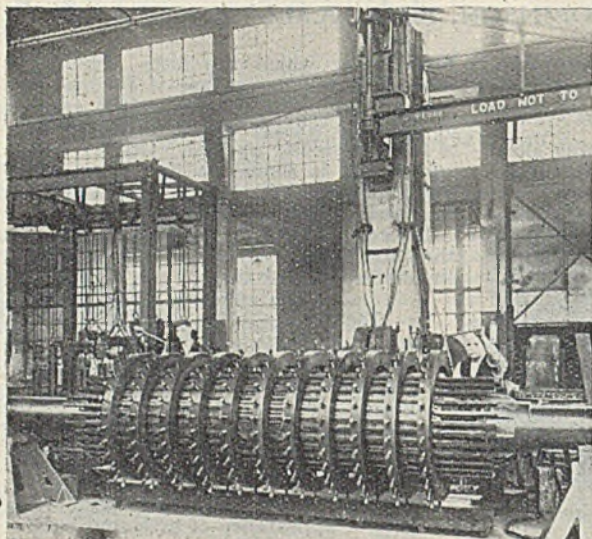


Fig. 3—Pressing the coils in a turbo-alternator rotor (General Electric Co., Ltd.)

all the slots have to be made by milling.

In Fig. 1 is reproduced a photograph of one end of a rotor before the end cap is pressed or shrunk on. It will be seen that the winding consists of several coils, each having many turns. All the turns in any turbo-alternator rotor are connected in series, and since the excitation voltage seldom exceeds 300 V, it follows that the voltage between turns is generally under one volt. However, micanite insulation is invariably used because these machines are run at Class B temperatures, and mica is the most satisfactory medium for withstanding the enormous compressive forces caused by centrifugal force. It may be used in the form of mica tape, if desired, for turn insulation.

When micanite is employed between turns, it is in the form of strips about 36 in. long, 0.15 in. thick and of the same width as the copper. Joints are overlapped, and staggered in the different layers to avoid local appreciable increases in depth, curved pieces are cut out of sheet micanite for fitting at the corners. Since, in the course of time, dirt may collect between the coils in the end windings, several turns at the top and bottom of each coil are taped together with mica tape to prevent leakage of current between coils, or to the body of the rotor.

There are several ways of applying the slot insulation. In small rotors, micanite bonded with a flexible varnish, which hardens during subsequent operations, and

The formed rotor coils are dropped into the slots a time, the inner coil of each group being inserted first. If bare strip is being used the micanite may be anchored to the copper with a spiral turn of cotton thread, or it may be dropped on the top of each turn in the slot. Everything is so proportioned that the copper is fairly tight across the slot, and it is

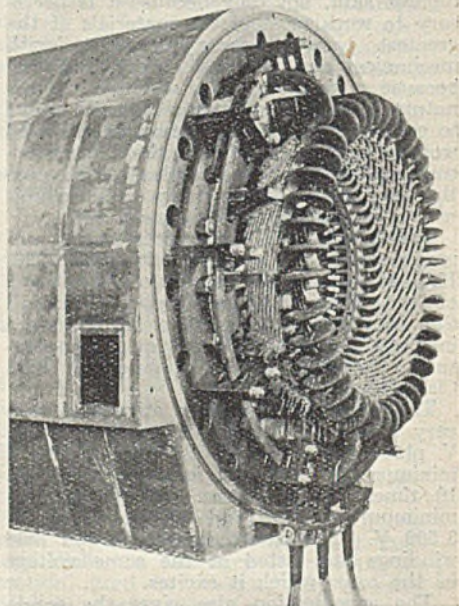
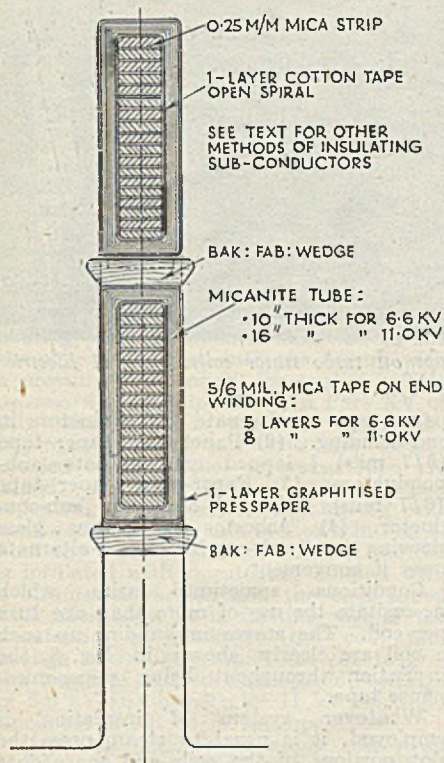


Fig. 4—Stator winding for 6600 V turbo-alternator, insulated throughout with mica-paper tape (B.T.H. Co., Ltd.)

usual to have to knock each turn down on to the one below.

It is important to avoid the copper becoming slack in the slots during service.



[Fig. 5—Section of turbo-alternator stator slot

This would occur if the bond in the insulation were to soften and flow. To prevent this the whole winding, after being connected up, is heated electrically to a much higher temperature than it will attain in service. Heavy steel bars are fixed on the top of every coil and pressure is applied

by the screws in the rings seen in Fig. 3. Immediately after this operation, the insulation liners are folded over on the top of the coils.

After the wedges have been inserted and the packing blocks put between the ends of the coils, the winding is again heated and the ends are pressed to a true shape. The packing blocks may be of Bakelised asbestos or fabric. Asbestos tape is generally employed where overall taping is needed for holding insulation in position. The winding is insulated from the steel

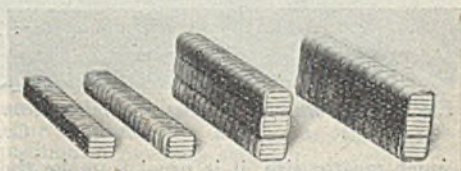


Fig. 6—Stages in the making of multi-turn stator coils (B.T.H. Co., Ltd.)

end rings by layers of micanite and leatheroid, the latter being on the outside to permit the rings to slip over without damaging the insulation.

Turbo-Alternator Stators.—Visitors to works where turbo-alternators are made invariably stop and admire the symmetry of the stator windings and the craftsmanship employed in making them, but what can be seen of a finished winding is only a small part of the total work involved in its manufacture.

These windings fall into two groups. One is known as a diamond or basket type, and is illustrated in Figs. 4 and 10. The other, known as a concentric winding, has an appearance something like the push-through winding illustrated in Fig. 5 of Part XV. It is rather more complicated than that referred to as there are two coil sides per slot. Also, because of the

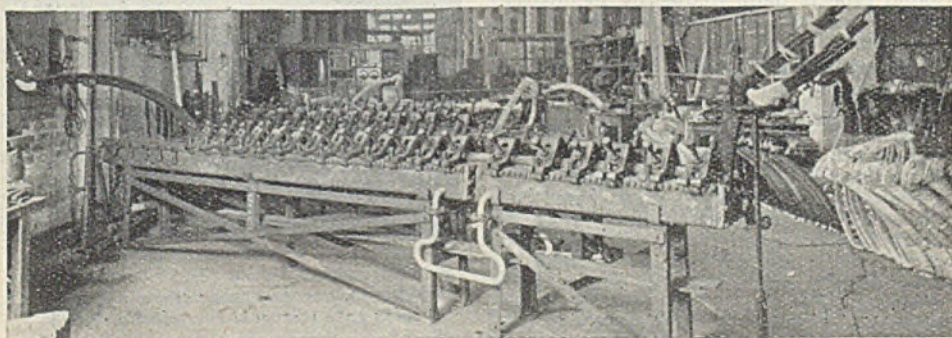


Fig. 7—Steam-pressing turbo-alternator stator coils (General Electric Co., Ltd.)

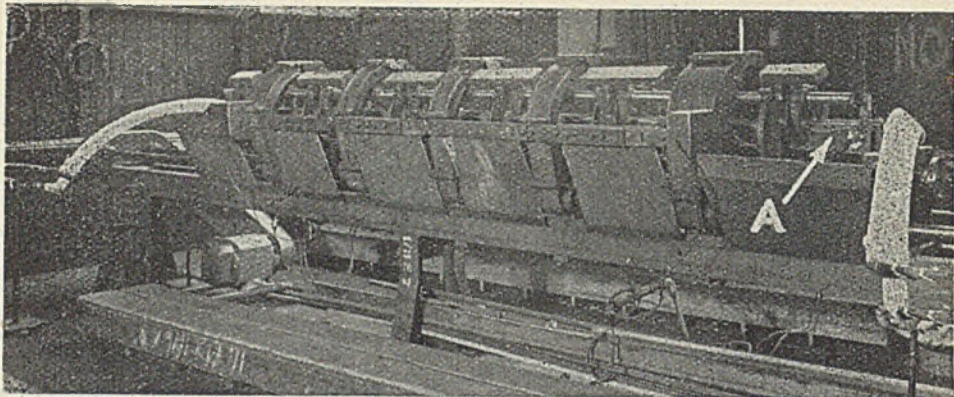
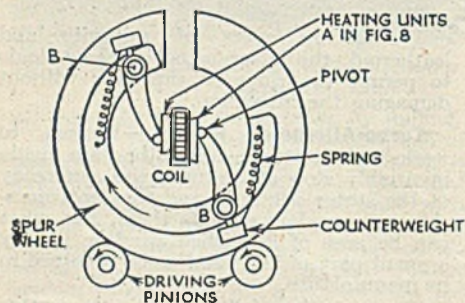


Fig. 8—Machine for ironing the micafolium wraps on turbo stator coils (General Electric Co., Ltd.)

much greater size, it is usual to make the slot portions as straight bars, the curved ends as separate items, and to connect



B. B. SHAFTS CARRYING HEATING UNITS AND REVOLVED BY SPUR WHEELS

Fig. 9—Mechanism for ironing wraps of turbo stator coils

them together after the bars have been put in their slots. The same methods of applying the insulation are applicable to both types of winding, and since the diamond type is more frequently made than the concentric, the descriptions below deal with the insulation of diamond coils.

Insulation of Turbo Stator Coils.—Some idea of the complexity of these coils may be obtained from an examination of Figs. 5 and 6. In the latter two half-coils are shown. The separate strips of copper are known as sub-conductors. For reasons which cannot be given here, it is necessary for the sub-conductors to be insulated from each other. If the section of copper is not too great it may be covered with an asbestos or fibrous glass covering. For larger sections there are several alternatives: (1) As Fig. 5, viz., .010 in. micanite between sub-conductors in the slot portion, and lapped rayon-mica-

paper tape on alternate sub-conductors in end winding. (2) Paper-mica paper tape (6/7 mils) $\frac{1}{2}$ lapped on alternate sub-conductors. (3) Paper-mica paper tape (6/7 mils) $\frac{1}{2}$ lapped on every sub-conductor. (4) Asbestos or fibrous glass sleeving on all sub-conductors, or alternate ones if convenient.

Conditions sometimes arise which necessitate the use of more than one turn per coil. The stages in building up such a coil are clearly shown in Fig. 6, the insulation throughout being paper-mica-paper tape.

Whatever system of insulating is employed, it is usual to steam press the slot portions of the coils and consolidate them before proceeding with the application of the overall insulation. Fig. 7 is reproduced from a photograph of a half-

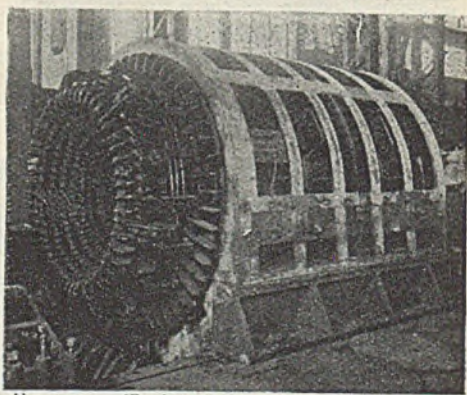


Fig. 10—Turbo-alternator stator winding, 30 000 kVA, 11.8 kV, 3 000 r.p.m., with slot insulation of micanite tube; end winding, rayon mica tape (General Electric Co., Ltd.)

coil being steam pressed. Steam is admitted to the base of the press, and

is at such a pressure as to heat the press to at least 150° C. After the temperature has been applied for the requisite time, half an hour for the first pressing, and up to two hours for subsequent mouldings, it is shut off and cold water is run through to cool the mould as quickly as possible. Even so, cooling off will take from one to two hours.

Two methods are available for applying the overall insulation. One is to apply layers of paper-mica-paper tape made with a bitumastic bond and as shown in Fig. 6. This tape goes from end to end and is applied by hand. When a few layers have been lapped on a number of half coils, they are put into a chamber and subjected to a vacuum of about $\frac{1}{4}$ in. of mercury for some time; after which high melting point bitumen is admitted to the chamber and forced into the taping with a pressure of 80 or 90 lbs./sq. in. This process was described fully in Part XV of this series. After removal from the impregnator, the half coils are steam-pressed before further layers of tape are added, and the whole process again repeated. A stator winding having coils insulated in this manner is shown in Fig. 4.

In the second method, the slot portion is insulated with mica-foil bonded with a bitumastic varnish and the ends taped with mica tape. The starting edge of the mica-foil is stuck to the coil, and enough is wrapped round the coil to give the requisite finished thickness for voltages of 6.6 kV and below; for 11 kV the total thickness is put on in two operations.

It is not possible to apply this wrap tightly by hand, and mechanical means have to be employed. This is accomplished by putting the half coil in an ironing machine of the type shown in Fig. 8. In this machine, it is held stationary under tension, by vices which grip it at each end of the slot part. Two long electrically-heated irons are pressed on the coil by springs and made to move round it. The end of one iron is indicated by the letter A in the illustration, and a diagram of the mechanism is given in Fig. 9.

The heat from the irons softens the bonding varnish, and their friction and rotation pull the wrap round until it is tight. It is so effective that the outer layer of paper will make at least two complete revolutions before the wrap is fully tight. The time taken to accomplish this is about half an hour. When tightening is complete, the half coil is removed and put into a hand-operated box-mould where it is allowed to cool and solidify in readiness for the steam press. Steam pressing is carried out in the manner already described.

If the coils are for 11 kV, the first tube is not made the full length of the slot

portion. Its ends are tapered and a number of layers of mica tape are lapped on, extending from the ends of the tubes for some distance along the curved ends, where they are gradually tapered off. The number of layers is such that when pressed they will have a thickness equal to that of the first tube. Mica-foil to make a second tube, and of the full length, is then wrapped on, ironed, cold pressed and steam pressed. The complete taping of the ends is then carried out.

After all the half coils have been assembled in the stator, the sub-conductors at one end are suitably joined by silver soldering to convert half coils into whole coils. At the other end they are suitably connected to make turns in multi-turn coils, or joined to the next coil or cross-connector as the case may be. Each sub-conductor is insulated from its neighbour at joints by taping, or the interposition of mica-rite strips.

Tapered blocks, clearly visible in Figs. 4 and 10, are wedged between the slot portions of the coils which are outside the core. These, and the blocks in the end winding are of hardwood, or synthetic resin paper board, and are held in position by string bands. The whole arrangement is designed to prevent movement of the winding if large forces come into play because of a short circuit.

(To be concluded.)

All-Welded Ships

OWING to the increasing interest in the subject of welded ships, the Institute of Welding has formed a panel of experts to answer questions relating to "Future Ships—Will They Be All-Welded?" The members are: Mr. W. G. John, D.N.C. Department, Admiralty; Mr. J. L. Adam, chief surveyor, British Corporation Register of Shipping and Aircraft; Mr. H. H. Hagan, Lobnitz and Co., Ltd.; Mr. C. Stephenson, Hawthorn, Leslie and Co., Ltd.; Dr. J. H. Paterson, Arc Manufacturing Co., Ltd.

Questions submitted to the panel at a meeting of the Institute in London on Wednesday, January 29, included the following:—

"What is the relative cost and weight between similar hulls, one all-riveted and the other all-welded, when built in suitably equipped yards, and are welding facilities generally are to the standard required? Can the experts envisage the possibilities of any basic or revolutionary changes in welding techniques as applied to ships' structures? Is it possible to build 'flexibility' into an all-welded hull? To what extent has the high longitudinal contraction stress in welds any effect on the finished structures?"

Answers to Technical Questions

We produce below the answers to a selection of questions which have been sent to us by readers. The co-operation of students and others in making this feature one of general interest is invited

What factors govern the choice of frequency for a ripple control system?

In the ripple control system a signal of considerably higher frequency than the normal 50 c.p.s. is superimposed on the normal voltage of a distribution system and is made to operate receiving relays tuned to operate at the particular frequency adopted. Such relays can be used for the control of street lighting, special loads such as water heaters and many other devices which require to be switched on or off intermittently and which can conveniently be controlled from a single central point.

As with many engineering problems the selection of frequency must be a compromise between various conflicting factors. If ripple control is to be used it will almost certainly be desired to transmit a number of different signals and each will require a different frequency to operate the particular relays for which it is intended. To avoid false operation of relays the frequency used should have a separation of 15 to 20 c.p.s. so that if, say, 10 separate control channels are required the whole frequency band required will be $10 \times 20 = 200$ c.p.s. Furthermore, adjacent systems may also desire to use ripple control and since some spill-over of the ripple current into such systems is unavoidable, the band of frequencies chosen for adjacent systems must be different. In order to accommodate the various frequencies, a fairly high value is therefore required.

The ripple current follows the path of the load current and the reactance of any inductance in the circuit will increase with frequency while the reactance of any condensers will decrease. The loads are generally inductive so that the system as a whole consists of a number of inductances shunted by the capacitance to earth of the supply cables; it is thus somewhat similar to a simple circuit consisting of a capacitance in parallel with an inductance—the current taken by such a circuit is a minimum, i.e., the power factor of the supply is near unity, when the circuit is tuned to resonance; a desirable frequency for the ripple is therefore one which gives such conditions, since this will result in a minimum size of generator. This tuning frequency is generally between 300 and 1 000 c.p.s., being usually lower for a larger network.

The actual losses due to a given ripple current increase with frequency, due chiefly

to eddy currents in various items of apparatus—for instance a published figure for a system having 160 MW load and consuming a ripple current of 250 A gave a ripple power absorbed by the system of 12 kW at 410 c.p.s. and 18 kW at 590 c.p.s.

As a result of these various factors, ripple frequencies between about 300 and 800 c.p.s. are usual. Within this range it is, of course, necessary to avoid any frequencies which are odd harmonics of the supply frequency since these may already be present or may arise under special operating or fault conditions and might inadvertently operate the relays. It is thus necessary on a 50 c.p.s. system to avoid frequencies which are within about 20 c.p.s. of 450, 550, 650 and 750 c.p.s. Even harmonics are not normally present in supply systems and so need not be avoided.—E. O. T.

B.B. Staff Dinner

THERE was a record attendance of about 340 at the annual staff dinner given by the directors of Benn Brothers, Ltd. (proprietors of THE ELECTRICIAN), and Ernest Benn, Ltd., at Grosvenor House, London, on February 7. The guests were received by Mr. Glanvill Benn (chairman, Benn Brothers, Ltd.) and Mrs. Glanvill Benn, Sir Ernest and Lady Benn, and Mr. John Benn (chairman, Ernest Benn, Ltd.).

The toast of "The Firm" was proposed by Mr. J. K. Lewis (manager of the firm's Midlands Office), who said that in the Benn journals was moulded all that was best in British enterprise.

Commander A. O. Gillett, R.N. (director), who replied, said that as a firm they were engaged in work of great national importance.

Mr. Norman French (managing director) proposed the toast of "The Staff," which was acknowledged by Mr. J. Vestey (chairman, Staff Association).

Miss Holder proposed the toast of "The Chairman," to which Mr. Glanvill Benn made suitable reply.

Amid cheers, Sir Ernest Benn was called upon to speak and in typically happy vein he congratulated the present board on beating his own record in selecting the right type of entrant to the firm.

Dancing followed the dinner.

Grid System in War-Time

Measures for Maintaining Supply Discussed at I.E.E. Meeting

THE part played by the British grid system in achieving victory in the late war and measures that were taken to maintain supply during air raids were recalled at the meeting of the I.E.E. on July 6, when a paper on "The British Grid System in War-time," by Messrs. J. Hacking and J. D. Peattie, of the Central Electricity Board, was read.

The paper described the pre-war preparations, such as operating procedure, provision of an alternative control organisation, protection of plant and the national pool of spares. The action taken on outbreak of war was outlined and the subsequent experience of the war years was surveyed in greater detail. Reference was made to change in the magnitude and distribution of loads and the resulting problems in the provision of generating capacity to supply those loads. The problems of plant availability, fuel supplies and war damage were discussed. The paper closed with an account of the development of the transmission system and the various classes of faults arising out of the war.

The main facts contained in the paper were published in *THE ELECTRICIAN* as they became available in the final stages of the war and subsequently.

MR. J. W. J. TOWNLEY (West Ham electricity department) said that this country had been criticised for being unready for war, but the paper showed that at least one public utility made excellent preparation for it. The decision to provide a pool of spares must have been a very difficult one to make, on account of the large expenditure involved and the determination of just what kind of spares should be purchased. The event showed that the spares had been well selected, and the absolute necessity for providing them. It was interesting to find that the grid, which was originally designed as an interconnecting system, had had to be used as a transmission system during the war; had it not been in existence the effect on war-time production, a great deal of which was concentrated in the south-west and in South Wales, would have been very serious. He hoped that the human story behind what had been achieved would one day be told. No organisation, however well prepared, could have maintained the unexpectedly high standard of service afforded by the electricity supply industry without the devoted attention to duty and courage of all ranks.

The loss of capacity due to bad fuel was something which still persisted. They were to-day using over 1 000 000 tons more fuel per annum in the generating stations of this country, at a cost to the industry of over £2 000 000 per annum, than would be required if the 1939 quality had been maintained. Those facts had been put before the appropriate Minister, but they did not seem to have the slightest effect. Calorific value was an entirely unsuitable yardstick by which to measure the value of a fuel for steam raising purposes; the physical characteristics of the fuel were much more important. The Board's analysis of fuel supplied to selected stations showed that in 1944 eight million tons of the fuel supplied to those stations would have passed through a $\frac{1}{4}$ in. mesh. Such fuel was almost useless with stoker-fired boilers.

MR. H. NIMMO (Electricity Commission) referred to the fact that following the Bradford inquiry before the war a Fire Risks Investigating Committee had been set up to consider the question of fire prevention and methods of dealing with fires. The adoption of the recommendations of that Committee, he said, together with the other precautionary methods taken, had done much to ensure the maintenance of supplies during the war. One of his war-time duties had been the compilation of a record of war damage. In September, 1940, in the London area alone 15 generating stations and four grid sub-stations suffered war damage, and at the end of that month 200 000 kW of plant was immobilised as a result of enemy action. In October, 11 generating stations and two grid sub-stations were damaged, and 266 000 kW of plant immobilised. That was the highest figure attained at the end of any month during the war. In November, six generating stations and three sub-stations were damaged. There had been no prolonged failure of supply to any important consumer, and even where interruptions had occurred the supply had been restored in a remarkably short time. This he attributed to the existence of the grid, the precautions taken by the C.E.B. and other undertakers, the provision of the national pool of spares, and the close co-operation between the Board and other undertakers in pooling resources and men, as well as to the devotion to duty of the engineers and workers in the industry. Adding the faults on

other undertakings to those on the grid, the total number due to war causes was about 6,000. More than fifty men were killed and over a hundred seriously injured. The total cost of the damage was about £10,000,000. In spite of this, and because of the existence of the grid, it could be said that in the provision of supplies to war factories and other important consumers, and in restoring supply after enemy damage, the service afforded by the electricity supply industry was never too little or too late.

MR. H. MIDGLEY (Plymouth electricity department) gave a graphic description of what happened at Plymouth on January 13, 1941, when a 500 lb. H.E. bomb crashed through the side of the switch-house of the generating station and exploded inside, starting a fire and severely damaging the switchgear, half of which was wrecked beyond repair, while the other half had to be reconditioned at the makers' works. The supply was entirely stopped. Happily the possibility of such a thing happening had been foreseen, and a supply was obtained from a large private generating plant to serve hospitals and control centres, and by connecting the leads from one of the grid transformers to one of the undertaking's step-up transformers they were able to commence restoring supplies to the city 24 hours after the incident, a second such connection being completed 24 hours later. Pool gear was at once obtained, 11 bays of pool gear being erected and commissioned 11 days after the incident. The first section of the reconstructed permanent switchgear was commissioned in September, 1941, and the remainder just over 11 months after the incident, when the whole of the pool gear was released. That experience showed that, but for the grid and the pool gear, Plymouth, an important naval and military centre, would have been without electricity for many months. It also showed the debt which the city, like many others, owed to the devotion to duty of the engineers and workmen, of which he could not speak too highly.

MR. J. F. FIELD (Edinburgh electricity department) said that before the war it had been indicated that the cost of the grid had almost been recovered by the saving on generating plant, so that had there been no grid there might have been, perhaps, 2,000,000 kW more generating plant than existed at the beginning of the war. Would that have been better than the grid? Had there been no grid, there would have been the necessity, when damage occurred to generating plant, of taking down other plant, transporting it across country and re-erecting it near the

debris of the previous plant. The difference between the two kinds of development was that with the grid it was possible to get the supply away again in an exceedingly short time compared with anything which would have been possible otherwise. The paper stated that for defence reasons the size of individual stations had been limited to 150 MW, except in special cases. The technique of bombing had been revolutionised during the war, and in his opinion that limit should be abolished and the construction of very much larger stations envisaged: the demand for electricity was going up, and within the next ten years a grid load of anything up to double the present load must be expected. Another question for consideration was how far energy was to be transported in the form of coal and how far in the form of electricity. He hoped the day would come when the cost of cable would be so low that it would pay to transport the energy entirely by cable.

MR. W. N. C. CLINCH (Northmet) paid a tribute to the courage and tenacity of purpose of all those concerned with electricity supply during the war. In the early part of the war he was at Brighton, which had a great attraction for tip-and-run raiders, and the way the men in the power stations stood up to those raids was amazing, and deserved more recognition than it had received. A great deal of initiative had been shown by the individual undertakings in order to be able to serve the grid properly, and he felt that the present paper was only part of a larger account which should be written dealing with the whole question of the supply of electricity during the war. The whole country, and not engineers only, should be told what the electricity supply industry had done to ensure victory.

MR. W. C. PARKER (Fulham electricity department) said that the paper made no reference to the steps which designers of power stations should take to deal with a possibility of war in the future. The situation if there should be another war would be totally different. The question of the right system to adopt for fire protection had not yet been solved. There were two main systems, the emulsifier system and that which prevented the access of oxygen, so that the fire could not burn. Both those systems had grave disadvantages as well as advantages. Another problem requiring solution was that of the great disparity between the day load and the night load—the urge for higher efficiency, with higher pressures and temperatures, on the one hand, and on the other the need to be able to start

up and shut down sets as quickly as possible. In view of the cost and shortage of labour, moreover, the layout of power stations from the point of view of the most economic use of labour might be becoming at least as important as securing high thermal efficiency.

MR. FORBES JACKSON (L.C.C.) observed that it was clear that the freedom from interruption of supply which this country enjoyed during the war was no accident, but was the result of first-class planning and co-operation throughout the whole industry. He suggested, therefore, that 652 copies of the paper should be sent to "another place."

MR. J. ECCLES (Liverpool electricity department) suggested that a logical conclusion to be drawn from the paper was that in any scheme of planning the planners must know more than the planned. If that was carried out in all spheres of planning, he said, the answer should be equally successful. The grid had made it easy to transport power from one place to another, so that war factories could be and were dumped down in the most isolated places with the knowledge that power would be available. No war factory had been prevented by 24 hours from going into production because of the absence of power. Because of the grid, it had been possible to send over 200 MW from the London area to South Wales and elsewhere. But for that, the equivalent amount of generating plant would have had to be installed there. That would have taken time, but it would have meant that to-day that additional plant would be available. When damage took place to the grid and to supply undertakings during the war, there had always been a compensating effect. With the loss of generating plant or cable, load had also been lost all round the area, and that had been a considerable contribution to the ability of the supply authorities to restore 100 per cent. supplies, since that 100 per cent. was probably only 50 per cent. of what had been there the day before. It had been mentioned that the maximum amount of plant put out of service by the enemy at any one time was 200 000 kW. If the voltage was changed in future from 230 to 240 without changing the apparatus, an immediate increase of almost exactly 200 000 kW would be put on the grid system, and that was something that the Board would have to bear in mind. Supporting Mr. Ciinch's request for a further paper which, with the present one, would form a record of endeavour and achievement in war-time, he mentioned, as just one example of the sort

of thing that had to be tackled, the cutting out with acetylene burners of a motor-van lifted by blast from an adjoining street, blown over the 20-ft. wall of a power station and jammed between two rotary converters.

MR. J. HACKING, in a brief reply, said that even if there had been no grid it would still have been necessary to site war plants in remote places, and plant would have had to be built to supply them. The country might have obtained more plant as a result, but the resources of the country would have had to be diverted to the manufacture of that plant, thereby diminishing the output of munitions and perhaps affecting the course of the war.

London Power Company

THE London Power Company celebrated its 21st anniversary at a dinner in London on February 5 at which some 400 of the staff were present. In the absence through illness of the chairman of the company, the Earl of Lytton, the deputy chairman, Major H. Richardson, presided.

The visitors included Miss Caroline Haslett, Lord Hyndley, Sir Edwin Herbert, Sir Giles Gilbert Scott; Sir Cyril Hurcomb, Sir John Kennedy, Mr. H. Nimmo (Electricity Commissioners); Mr. H. Hobson, Sir Johnstone Wright, Mr. J. Hacking, Mr. E. R. Wilkinson, Mr. J. N. Waite (Central Electricity Board); Mr. H. J. Randall (City of London Co.); Mr. J. W. Rodger, and representatives of the executives of the constituent companies of the London Power Company. Directors of the London Power Company present included, in addition to Major H. Richardson, the Hon. E. Butler-Henderson, Sir Leonard Pearce and Mr. H. T. Young.

In felicitous terms Major Richardson welcomed and proposed the toast of the visitors, and Lord Hyndley and Miss Caroline Haslett responded, and the latter's reference to the recent award of the Faraday Medal to Sir Leonard Pearce was warmly received.

Sir Edwin Herbert proposed the toast of the London Power Company, and in his response to the toast Sir Leonard Pearce briefly reviewed the company's achievements.

Sir Cyril Hurcomb proposed the toast of the chairman of the evening, and Major Richardson responded. A musical programme followed.

Industrial Information

The Biter Bit

Thieves broke into the radio showrooms of Philips Lamps, Ltd., at their head office in Shaftesbury Avenue, London, during the night of February 3, and got away with what they believed to be three radio sets priced at £17 17s. 3d. each. Their exploit showed no profit, as the "sets" were dummies consisting merely of cabinets and scales with false tuning knobs.

Synchronous Condenser for Palestine

The General Electric Co., Ltd., has built, at its Witton engineering works, a large synchronous condenser for power factor correction at the Reading power station of the Palestine Electric Corporation, where the load consists mainly of supplying a large number of small motors driving irrigating pumps. The equipment includes an automatic voltage regulator, oil and water pumps, instruments and starting gear, and is designed for remote control. The complete unit comprises the condenser, with its main and pilot exciters, starting motor and exciter, all the machines being mounted on one bed-plate and directly coupled together. The condenser is designed to operate at zero leading power factor. It is rated at 10 000 kVA, 6.3/6.9 kV, 1 000 r.p.m., and is run up to speed by a 500 h.p. synchronous induction motor, which is started by means of a liquid starter in the rotor circuit. For the condenser and starting motor, a closed circuit cooling system is employed, with fans mounted on the rotor shaft. The exciters are of the totally enclosed type, the main exciter having its own closed-circuit system, embodying a heat-exchanger incorporated in the bed-plate. The condenser is also able to deal with 4 000 kVA at zero lagging power factor so as to compensate for the capacity effect of the network when the external load falls to a low value.

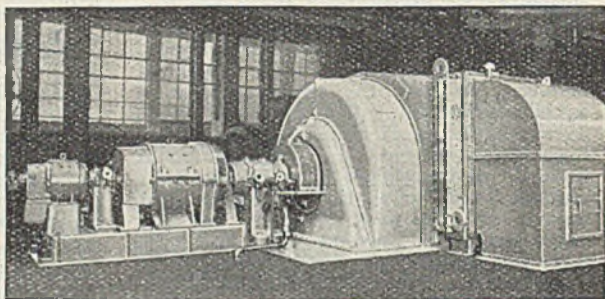
Marine Radio

In connection with the reference to the Shipwrights' Exhibition in our issue of January 31, our attention has been drawn to the fact that the International Marine Radio Co., Ltd., Cunard Building, Liverpool, exhibited a complete radio installation for a typical cargo or passenger ship,

and other subsidiary navigational equipments.

New Research Laboratories

New research laboratories have been set up at Elstree Way, Borehamwood, Herts., by Elliott Brothers (London) Ltd., who, since the foundation of the firm in 1800, have been responsible for many new advances in the field of measuring instruments. Up to the present the research laboratory has been in the Century Works, Lewisham. The new organisation, housed in a modern building with a floor area of 50 000 sq. ft., will undertake the development of all types of industrial and



A G.E.C. 10 000 kVA synchronous condenser for power factor correction at a Palestine power station

laboratory instruments and specialised equipment, and will develop new techniques for the control of manufacturing processes. The laboratories are in the charge of Mr. J. F. Coales, late of the Admiralty Signal Establishment, and the nucleus of a growing staff has already been formed.

B.I.O.S. Exhibition

The British Intelligence Objectives Subcommittee's Exhibition, which was held at the Board of Trade, Millbank, from December 10 to 19 last, is now touring the principal regional centres. The following dates and places have been arranged:—The University College, Cathays Park, Cardiff, February 17 to 21; Kelvin Hall, Glasgow, March 3 to 7; Chronicle Hall, Westgate Road, Newcastle, March 17 to 21; City Hall, Sheffield, March 31 to April 4; Manchester, April 14 to 18; Technical College, Belfast, May 5 to 9. This exhibition is designed to illustrate the methods by which German scientific and technical intelligence is gathered, and dealt with, and how the industrialist may avail

himself of the information he requires. In order to avoid infringing patent rights, firms interested in exploiting any particular item are advised to investigate the patents position in the United Kingdom before going into production. Similar investigations are also desirable before exports are made to any particular country abroad.

Extension of Philips' Hamilton Works

A large factory extension almost doubling the premises, is planned by Philips Hamilton Works, Ltd., Larkhall, Scotland. Designed for completion by 1950, this extension, itself taking about 240 000 sq. ft. on a 15-acre site, will bring the total area occupied by the factory to 405 000 sq. ft. Employment will be found ultimately for approximately 2 500 workers in the manufacture of radio receivers and components.

Belgian Engineering Centenary

In connection with the centenary celebrations of the Association of Engineers, which is an offshoot of the University of Liege, a congress and exhibition, to which engineers and industrialists are invited, will be held in Liege this year. The congress, entitled "Past, Present and Future of Our Industry," will open on August 30 and conclude on September 13. In one of the fourteen sections electricity will be discussed. The exhibition, entitled "International Exhibition of Scientific Research and Industrial Control," will take place in the three Institutes of the Faculty of Applied Sciences during August and September.

Conference on Films in Industry

The Scientific Film Association has arranged a one-day conference on films in industry to promote a pooling of ideas and experience between film producers and users. It will take place at Caxton Hall, Westminster, on Thursday, March 6. The morning session will be devoted to lectures and discussions on film production and the use of films and other visual aids in the classroom. These lectures will be illustrated by films and film strips. In the afternoon there will be discussions led by industrial education officers on the use of films as a part of training schemes. The final session will be an open forum at which a "brains trust" will answer questions.

British Radio Components

The British Radio Component Manufacturers' Federation has just published a comprehensive catalogue of products for distribution amongst overseas customers. It has been prepared as a joint endeavour of manufacturers, through the federation, by whom it is issued from their address at 22, Surrey Street, London, W.C.2. The

catalogue provides in its 184 pages a comprehensive and informative reference book for the whole British radio component industry which will prove invaluable to manufacturers and agents throughout the world. It is moreover a fine example of British printing. The contents include an alphabetical index to radio components and the names of manufacturers. Advertisers' announcements, occupying a large section of the book, and all printed attractively in colours, give detailed information on many products. The text is in English, French and Spanish. Views of many representative factories add to the impression of an extensive and expanding industry.

Fuel Efficiency

Fuel Efficiency Bulletin No. 48, issued by the Ministry of Fuel and Power Committee on the Efficient Use of Fuel, deals with fuel, power and heat costing and is intended to direct attention to the importance of knowing the real cost of fuel, power and steam, used on the works so that the full effect of fuel efficiency on production costs can be established.

"Bottleneck"

Under this title the Metropolitan-Vickers Electrical Co., Ltd., have issued an effectively illustrated publication describing the process of paint stoving and drying—one of the diverse applications of the Metrovick electric infra-red equipment. Others include pre-heating and curing of plastic materials, the evaporation of moisture from textiles, the drying of colours on wallpaper, decorative paper and serviettes, the extraction of moisture from balsa wood and the drying of dyes and pyropylin cement on shoes.

Electricity in Hospitals

How electricity will ease daily domestic life in our hospitals is the theme of the Hospitals (Domestic Aids) Exhibition, which has been organised by the British Electrical Development Association for the Ministry of Health, to be opened by Mr. Aneurin Bevan, Minister of Health, at the Tea Centre, 22, Regent Street, London, at 3 p.m. on February 18. The exhibition is primarily designed for hospital authorities, but it will be open to the public from 1-6 p.m. each day between February 19 and March 8. Morning sessions are being reserved for ticket holders who will be local authority and hospital representatives. There will be some seventy examples of electrical appliances.

Philips' Technical Review

The July number of "Philips' Technical Review," edited by members of the staff of the research laboratory of N.V. Philips' Gloelimpfabrieken, Eindhoven, Holland,

contains articles on "An Experimental Receiver for Ultra-short-wave Radio-telephony with Frequency Modulation," by A. van Weel; "High-voltage Rectifier Valves for X-ray Diagnostic," by J. H. van der Tunk; "Carrier-wave Telegraphy," by J. te Winkel; and "Velocity-Modulator Valves," by F. M. Penning. During the German occupation the Dutch edition of the Review was allowed to continue until July, 1942, when it was stopped. It reappeared in January, 1946. Copies may be obtained from the publications department of Philips Lamps, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

Metropolitan-Vickers New Factory

The Metropolitan-Vickers Electrical Co., Ltd., has acquired a factory with an area of 250 000 sq. ft. at Motherwell, Scotland. It is expected that employment will be found for 2 000 men and women.

Five-Day Working Week

Following the introduction of a five-day working week in their factories, similar arrangements have been made in all the offices of the British Thomson-Houston Co., Ltd. As from February 3, all the company's offices, in addition to the works will be closed on Saturday mornings.

Increase in Retail Prices

H.M.V. Household Appliances announce that due to further increases in labour rates and raw material costs the retail price of the H.M.V. model IC.4A iron has been advanced as from February 10, to 45s. for their a.c. model, and to 47s. 6d. for the a.c./d.c. model.

Sale of Radio Equipment

Sales by auction of radio and radar equipment, including a large variety of accessories and component parts, will be held on Wednesdays, February 19, March 5 and 19, and April 9, at the Ministry of Supply Stores at Aldenham on the Watford by-pass, just past the junction with the Edgware-Elstree Road (known as "Suicide Corner"). The goods will be on view on each sale day from 9 a.m. till 11 a.m. when the auction will commence.

Guarantee of Work Scheme

Protection against bad materials and workmanship is now available to customers of members of the Electrical Contractors' Association and its associated organisation, the N.E.C.T.A., Ltd., as a result of a guarantee of works scheme put into force recently. The scheme provides that the standards of good workmanship and material shall be those which comply with the I.E.E. Regulations, unless any modifications are approved for a given

class of work. If a customer considers that the quality of materials and/or workmanship of an installation is not in accordance with the standards laid down, he can make a claim on the N.E.C.T.A., Ltd. when the association will appoint an engineer to inspect, and report upon, the work. If an adverse report is received, the association will cause the defects to be rectified. If the complaint is unjustified, the cost of the investigation will be paid by the customer.

Aluminium Development Association

The Aluminium Development Association has prepared a printed statement setting forth the aims, activities, and organisation of the association and describing some of the work so far accomplished. In fulfilling its purpose of encouraging the correct and increasing use of aluminium and its alloys, the association has tended to remain in the background and the brochure gives information for which inquiries have been received.

Industry and Research

The first of a series of regional conferences on industry and research, sponsored by the Federation of British Industries, will be held at the Queen's Hotel, Birmingham, on Tuesday, March 25. The principal speakers will be Sir Edward Appleton, F.R.S., secretary of the Department of Scientific and Industrial Research, Sir William Larke, chairman of the F.B.I. Industrial Research Committee, and Sir Peter Bennett, M.P., chairman of the F.B.I. Midland Regional Council.

Trade Publications Received

An illustrated list, No. 120, in colours, issued by Electric Art Shades (1928), Ltd., Kevedon, Essex, displaying a limited range of shades for pendant lamps, table lamps and bedlights manufactured by them.

A leaflet just issued by the Bowthorpe Electric Co., Ltd., Goodtric Works, Brewer Street, Oxford, giving particulars of their new continuity tester, and also the "Testometer" insulation testing set.

Catalogue No. Z. 146, from Siemens Electric Lamps and Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4, dealing with the company's house service cut-outs and power fuse boxes, which are described and illustrated. A schedule of list prices is enclosed.

Leaflets issued by Standard Telephones and Cables, Ltd. (Telephone Division), Oakleigh Road, New Southgate, London, N.11, giving details of their 25-line and 10-line private automatic telephone exchanges—post-war additions to the company's range of private telephone exchanges.

Electricity Supply

Bermondsey.—Proposed plant extensions at Minto Street sub-station will cost £1 736.

York.—Refrigerators are to be installed in all future council houses. The weekly hire figure will be included in rentals.

Portsmouth.—Two colliers, to be used for taking coal to the generating station, have been ordered from S. P. Austin and Sons, Ltd., of Sunderland, at a cost of £132 594 for each vessel.

Birkenhead.—Arrangements are being made to convert another big section of street lighting from gas to electricity. To carry out the ten-year programme will cost about £140 000, including the installation of ripple relay control.

Rugby.—At an estimated cost of £15 000, the Group A and principal Group B roads in Rugby will be converted from gas lighting to electricity. The remaining side streets will be converted at a further cost of £15 000.

Birkenhead.—The 36 acre site for the new power station, which is estimated to cost about £8 000 000, on the bank of the Mersey between Bromborough and Eastham, was recently inspected by the Electricity Committee. There has been constructed on the site a concrete approach road three-quarters of a mile long and 1 000 yards of railway siding.

Chesterfield.—The Electrical Engineer is to report to the Electricity Committee as to certain switchgear reorganisation which is necessary at the generating station. Six months' notice has been given of the Corporation's intention to increase their authorised demand for current from the Derbyshire and Notts. Electric Power Co., Ltd., as from October 1, from 8 000 to 10 500 kW.

Carlisle.—The City Council has decided to enter into an agreement with the Central Electricity Board for the purchase of electrical energy on terms agreed upon recently at a meeting of owners of selected stations in the North-West. The City Electrical Engineer (Mr. Thistle) in advising the Council to adopt the agreement, said it would result in the Council gaining several thousands of pounds per annum.

Perth.—Complete conversion from d.c. to a.c. will take anything from 5 to 10 years and will cost probably about £200 000. Making this report to the Electricity Committee, Mr. J. N. Atkinson, the electrical engineer, said that a complete survey of the 8 000 consumers would have to be made and this would take some considerable time. The work of conversion had been begun. A high tension main was

being made, and when this was completed the change-over would begin. Some large consumers would be able to change over this year.

Finchley.—It was reported by the Electricity Committee that, as the cost of installation of immersion heaters at 60 flats at Red Lion Hill was being borne by the Housing Committee, it was now possible to fix the weekly rental for the apparatus at 2d. a week instead of 4d. which would have been charged had the installation been undertaken by the electricity department. Pending arrangements for laundries on the estate, it was agreed to loan wash boilers free of charge, subject to the Housing Committee bearing the cost of installation. Sanction has now been obtained for the change-over throughout the area. The Electricity Committee is seeking sanction to borrow £10 000 for mains and services, £5 000 for meters and £7 000 for transformers.

Birmingham.—A plan for staggering demand, the adoption of which on a national basis would, it is felt, go far to eliminate load shedding, has been drawn up by the city supply department, with the support of the Midland Regional Board for Industry, and advertised in the local Press. Mr. Lawton, chief engineer and manager, has sent us a copy of the advertisement, which states that in the event of factories and shops closing down one day per week, they will not necessarily be immune from electricity cuts on other days of the week, unless the total power demand each day is within the capacity of the generating plant. Heavy consumers in the Birmingham and Midland area are therefore urged, where practicable, to stagger their closed day in accordance with the alphabetical order of their names. This would have the effect of closing down an equal number of factories on each day of the week. Success of this plan, it is pointed out, depends entirely on the extent to which it is adopted, and firms are asked to notify the electricity department as and when they adopt short-time work, stating which is their closed day and, if possible, the saving of load effected.

[This plan was conceived before the fuel crisis, and though not applicable at the moment, could be brought into force when the coal position has been re-established. In view of the discussions now going on about the imposition of a rationing scheme, Mr. Lawton's suggestions may repay careful examination.]

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:—

Whitby, February 15.—Supply and delivery of two 1 000 kVA, 6 600-3 300/420/240 V three-phase transformers. Specification from Electrical Engineer and Manager, Electricity Department, 63, Baxtergate, Whitby.

Oldham, February 15.—Purchase and removal from stores of approximately 600 l.d. coin 5 A, 230 V, 50 cycles a.c. p.p. meters and 1 000 l.s. coin 5 A, 230 V, 50 cycles a.o. p.p. meters, mainly consisting of Ferranti, type f.c.b., fitted with 20 A switches. Particulars from Chief Engineer and Manager, Electricity Department, Oldham.

Stockport, February 17.—Supply and delivery to generating station of one medium-duty centralised control radial drilling machine. Specification from Borough Electrical Engineer, Electricity Offices, 23, Tiviot Dale, Stockport.

Birkenhead, February 17.—Supply and delivery of electric lamps over a period of 12 months commencing April 1, 1947. Specification from Borough Electrical Engineer, Craven Street, Birkenhead.

Hertford, February 17.—Colne Valley Sewerage Board will invite tenders from selected firms for provision and laying, with excavation in some cases, of 5 900 yds. of 0.15 in. 3 kV, 6 250 yds. of 0.25 to 0.007 sw. in. 460 V and 5 500 yds. of 10 to 3 core 460 V cables, 1 325 yds. of 0.25 and 0.05 bare copper conductor, 10 000 yds. of 250 V wiring, and fixing of distribution switch and fuse gear, lighting fittings, lamps and lamp columns. Selected list will be limited to 12-18 names, and qualified contractors are invited to apply for inclusion. Application forms from Consulting Engineers, Messrs. Stanford Fawcett and Partners, 53, Victoria Street, London, S.W.1.

Southampton, February 21.—Supply and delivery during year ending March 31, 1948, of: (a) p.i. cables up to 33 kV; (b) miscellaneous stores and materials; (c) domestic apparatus, including circulators, cookers, kettles, refrigerators, thermal storage tanks and wash boilers; (d) electricity meters. Particulars from Borough Electrical Engineer, Civic Centre, Southampton; deposit, 10s. 6d. each specification.

Manchester, February 22.—Supply, delivery and installation at various sub-

stations of: (a) 110 V batteries and charging equipments, and (b) 50 V batteries and charging equipments. Specification from Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2.

Manchester, February 24.—Supply and delivery, during 12 months ending March 31, 1948, of domestic electric cookers. Specification from Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2; deposit, £1 ls.

Heston and Isleworth, February 26.—Supply, during year ending March 31, 1948, of sheet steel kiosks; 600 kVA transformers with "on load" tap changing gear; c.h.t. and pilot cables; l.t. and service cut-outs; cab-tyre and v.i.r. cables and flexibles; cast iron service cut-outs; joint boxes; joint box compound; street lamp brackets and lanterns; street lamp columns; meter boards; insulating tapes; plumbers' metal; 11 kV switchgear. Forms of tender from Borough Electrical Engineer and Manager, 11, Staines Road, Hounslow, Middlesex.

Woolwich, March 1.—Supply of 6.6 kV switchgear, steel switch kiosks and 6.6 kV switch kiosk and ring main units assembly. Specifications from Borough Electrical Engineer, Electric House, Powis Street, Woolwich, S.E.18; deposit, £1 ls.

Kettering, March 3.—Two 11 kV, three-phase, 50 cycles, 150 000 kVA duplicate bus-bar, metal-clad switch units, as extension to existing type O.L.D. I.B. English Electric switchboard. Specification from Borough Electrical Engineer, Rockingham Road, Kettering; deposit, £1 ls.

Sheffield, March 3.—Supply, delivery and erection of one 55 MVA, 12.5 per cent., oil-immersed, copper shielded reactor. Specification from General Manager and Engineer, Commercial Street, Sheffield, 1; deposit, £2 2s.

Winchester, March 8.—Supply, delivery and erection, in the city, of 30 steel lighting columns and one wall-bracket, complete with fittings, for mercury vapour discharge lighting. Particulars from City Engineer and Surveyor, Guildhall, Winchester; deposit, £2 2s.

Sheffield, March 17.—Supply and delivery of three 1 000 kVA, 11 200/3 300 V, three-phase, transformers. Particulars from General Manager and Engineer, Commercial Street, Sheffield, 1; deposit, £2 2s.

Weymouth and Melcombe Regis.—Supply and delivery of p.i. cable for period of 12 months commencing April 1, 1947. Specification from Borough Electrical Engineer, Electric House, Westham Road, Weymouth.

Company News

ELECTRICAL AND INDUSTRIAL INVESTMENT LTD. Rept. for 1946 shows net prft. £27 284 (£22 112); to res. £2 224 (nil); div. 12% (same) on defd. ord., to undivided prfts. acct. £11 310 (£9 247).

INDIA RUBBER GUTTA PERCHA AND TELEGRAPH WORKS, LTD. Trdg. prft. after E.P.T. to September 30 £181 810 (£172 052). To deprecn. £54 017 (£53 255), deb. int. and fees £3 178 (£10 936), lvg. prft. £124 615 (£107 861). To inc.-tax £44 500 (£42 750), spec. deprecn. £10 000 (same), war dam. nil (£2 356). Pref. div. £7 219 (£6 875), contings. res. £50 000 (nil), genl. res. £50 000 (nil), deb. redemption prem. and exes. nil (£5 413), pref. ord. div. 8% (same), ord. div. 9% (same), fwd. £110 697 (£159 351). Cons. bleo.-sheet shows current assets £913 278, current liabs. £419 117, reserves and undistr. prfts. £492 661.

VICTORIA FALLS AND TRANSVAAL POWER CO., LTD. The following announcement was made on February 5 in the House of Assembly of the Union of South Africa: "Existing legislation regarding the supply of electricity in the Union by a licensed undertaking other than an undertaking of the Electricity Supply Commission, provides that, after a prescribed period, such undertaking can, on the authority of the Government, be expropriated by the Commission. After careful consideration, the Government has decided that on the expiry of the prescribed period, the steps referred to in the provisions of that legislation dealing with the expropriation of an undertaking, are to be taken under and in accordance with those provisions in regard to the Victoria Falls and Transvaal Power Company." The company therefore anticipates that two years' notice of the intention to expropriate the undertaking will be given at the end of 1948.

THOMAS DE LA RUE AND CO., LTD. Presiding at an extra-ordinary general meeting recently, Mr. B. C. Westall (chairman) said that the board had considered it desirable to raise half a million pounds in preference shares and to issue 116 000 ordinary shares at a price which still remained to be determined. This would provide approximately £1½ million, and it was intended that existing shareholders should be given first opportunity of taking up all the new shares. During the past 15 years, the chairman said, the considerable expansion which had taken place in the De La Rue organisation had been carried out almost entirely by its own resources. This process was no longer

possible, nor, indeed, desirable. In preparing their plans for expansion, their first thought was of their plastics business. Some time before the war, they had developed at Walthamstow a process of manufacture of laminated boards for electrical purposes, and by the end of 1939, were producing this material on a small scale. A new subsidiary company, called De La Rue Insulated, Ltd., was formed and during the war, a factory was purchased at Tynemouth, at which production of various laminated materials would commence in a few weeks time. The insulation company also had an established business for the manufacture of insulated wires and tubular sleeveings. In view of the development of these specialised plastics interests, Mr. Westall continued, the directors decided to sell the moulding part of their business, De La Rue Plastics Ltd., and this had now been done. This did not mean that they were giving up plastics. Indeed, the capital requirements of the insulations company for their expansion would exceed the sum derived from the sale of the plastics company by more than £300 000.

Metal Prices

	Monday, Price	February 10 Inc. Dec.
Copper—		
Best Selected (nom.)... per ton	£115 0 0	—
Electro Wire bars ... "	£117 0 0	—
H.C. Wire, basls ... "	£133 0 0	—
Sheet "	£158 10 0	—
Bronze Electrical quality		
1% Tin—		
Wire (Telephone) basls per ton	£154 15 0	—
Brass (60/40)—		
Rod basls "	1s. 0½d.	—
Wire "	1s. 5d.	—
Iron and Steel—		
Pig Iron (E. Coast Hematite No. 1) ... per ton	£8 19 0	—
Galvanised Steel Wire (Cable Armouring) basls 0.104 in. "	£34 5 0	—
Mild Steel Tape (Cable Armouring) basls 0.04 in.) "	£21 15 0	—
Lead Pig—		
English "	£70 0 0	—
Foreign and Colonial... .. "	£71 10 0	—
Tin		
Ingot (minimum of 99.9% purity) "	£384 0 0	—
Wire, basls "	per lb. 4s. 10½d.	—
Aluminium Ingots ... per ton		
£72 15 0	—	—
Speller "		
£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.*

D. B. MACKIE AND SWAFFIELD, LTD.—Richmond (Sy.), manufacturers of electrical equipment.—January 7, deb., to Lloyds Bank, Ltd., securing all moneys due or to become due to the Bank; general charge.

DOFF'S RADIO, LTD., London, E.C.—January 7, deb., to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge.

ELECTRICAL INSTRUMENT MANUFACTURING CO. (BEESTON), LTD., Basford.—January 7, £900 mort., to Nottingham Imperial Order of Oddfellows Friendly Soc.; charged on bldgs. and premises comprising slaughterhouse, coachhouse, bakehouse, etc., now office and workshops, situate off Duke Street, and Mount Street, New Basford.

R. J. KEMP AND CO., LTD., Coalville, electrical engineers.—January 6, three assignments securing to Lloyds Bank, Ltd., £3 000 (not ex.), £800 (not ex.) and £3 000 (not ex.); charged on certain contract moneys in respect of demolition of airfield lighting installations. *£6 000 (not ex.) Bankers, May 30, 1946.

MARRON ELECTRICAL PRODUCTS, LTD., Thornton Heath, electrical engineers.—December 31, debenture, to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *Nil. October 31, 1945.

L. NORMAN VIVIAN, LTD., Hayes (Mx.), electrical engineers.—December 24, charge, to National Provincial Bank, Ltd., securing all moneys due or to become due to the Bank; charged on St. Annes Works and Accacia, Uxbridge Road, Hayes. *£700. April 19, 1946.

County Court Judgments

NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be actions. But the Registry makes no distinction. Judgments are not returned to the Registry if satisfied in the Court books within 21 days.

MANDY, J. O. (male), 57, St. Thomas Road, Luton, Beds., electrical engineer. £17 17s. 6d. November 26.

BREARLEY, Herbert Marmaduke, 68, North Birbeck Road, Leytonstone, Essex, electrician. £24 7s. 10d. November 5.

LEWENT, H. M. (male), 51, The Avenue, Willesden Lane, London, N.W.6, electrical engineer. £16 8s. 6d. November 13.

STAINTON, B. W. (male), 27, Davis Avenue, Tipton, Staffs, electrical engineer. £45 17s. 9d. September 27.

HOGAN, Richard, 30, High Street, Gillingham, electrical engineer; HOGAN (ELECTRICAL) LTD., 30, High Street, Gillingham, electrical engineers. £24 17s. 3d. October 31.

WIGGINS, — (male), 1, Priory Street, Hastings, electrician. £10 5s. 1d. November 1.

SUPER STANDARD RADIO AND TELEVISION CO. (a firm), 20, Brighton Road, South Croydon, electricians. £11 0s. 8d. October 31.

SHORTHOUSE ELECTRICAL MAINTENANCE (a firm), Broad Lane, Tanworth-in-Arden, electrical engineers. £15 17s. 11d. October 22.

FRANCES, L. G. (male), 2, The Parade, Angmering-on-Sea, Sussex, electrical contractor. £13 19s. 4d. November 26.

F.B. ELECTRICAL APPLIANCES (a firm), 14, Snow Hill, Birmingham, electricians. £15 0s. 9d. September 17.

MARTIN, Gordon B., "Perivale," Ravenfield Common, Rotherham, Yorks, electrical contractor. £88 4s. 3d. December 11.

WORMALD, Arthur Cecil, 30, New Street, Barnsley, Yorks, radio dealer. £22 11s. 6d. November 19.

Orders for Discharge

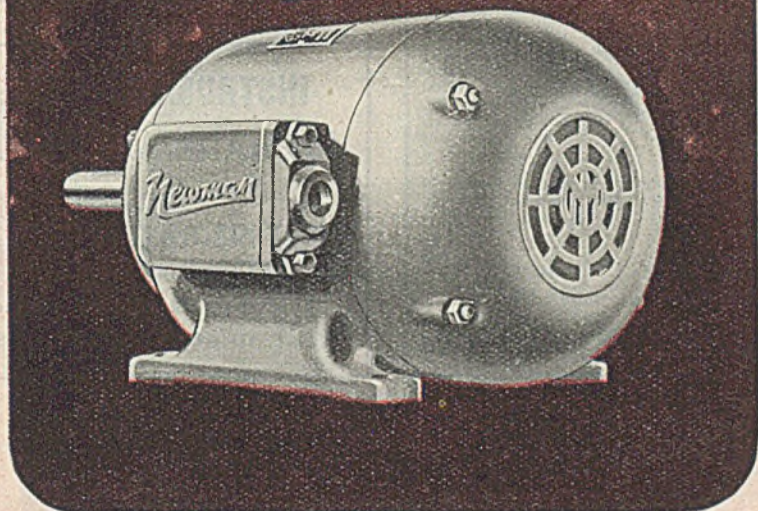
HOLLAND, Leslie Ernest, trading at 4, St. James's Churchyard, Haymarket, and formerly at 67, Ashgrove Road, Horfield, Bristol, and now residing at "Terra Cotta," West Kington, Wilts., electrician. Court, Bristol. Date of Order: September 20, 1946. Bankrupt's discharge suspended and that he be discharged as from September 20, 1947.

MERCADO, Moses, 39, Mapesbury Road, London, N.W.2, radio salesman. Court: High Court of Justice. Date of Order: December 17, 1946. Bankrupt's discharge suspended for one month, and that he be discharged as from January 17, 1947.

RITCHIE, Thomas Albert (trading as Ritchie's Radio), 114, Winson Green Road, Birmingham, and 143, Spring Hill, Birmingham, wireless and cycle retailer. Court: Birmingham. Date of Order: December 4, 1946. Bankrupt discharged subject to his consenting to Judgment for £48 10s. and £1 10s. Costs of Judgment. (Note: £50 paid in lieu of entering Judgment.)

Totally enclosed -

at no extra cost!



THE BASIC NEWMAN IDEA

By standardising on the totally enclosed motor and concentrating manufacture on the more popular sizes, Newman secure important production advantages.

The benefits of the totally enclosed motor are thus made available at prices which permit its universal application. No other motor offers such supreme value.

Newman

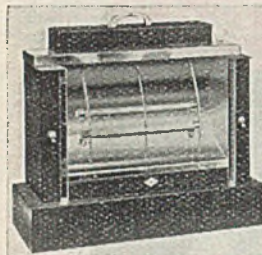
Pioneers in the universal application of Totally Enclosed Motors

NEWMAN INDUSTRIES LIMITED, YATE, BRISTOL, ENGL. London Office: 52, Victoria St., Westminster, S.W.1

Copyright

BROOKS & BOHM LTD.

"Attracta" No. 1, 2-kw. reflector fire with two strong metal switches, one for each fire bar. Reflector made from polished heavy alloy combined with strong metal frame in assorted crackled colours. Easily carried from one room to another. Strong handle fitted on top.



Suitable length of 3-core flex supplied. Tubular element made from white clay which is easily replaced. Approx. size: Height 15", width 19", depth 7". Immediate delivery 230/250 volts and other voltages supplied by special arrangement. Retail price 73s. 4d. each. Generous trade discounts.

This is only one of a multitude of other household electrical appliances available; radiators, heaters, toasters, etc.

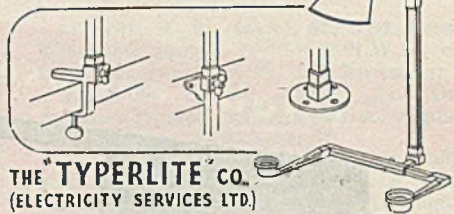
90, Victoria St., London, S.W.1

Telephone: VIC 9550/1441

Belfast Office:

Ulster Bank Chambers, 4/6, Ann Street, Belfast

ADAPTABLE & INTERCHANGEABLE
LOCAL LIGHTING



"TYPERLITE" CO.
(ELECTRICITY SERVICES LTD.)
86 CANNON STREET. LONDON. E. C. 3.

INSTRUMENT WIRES INSULATING MATERIALS

WEST INSULATING COMPANY

LTD.,

2, Abbey Orchard Street,
Westminster, London, S.W.1

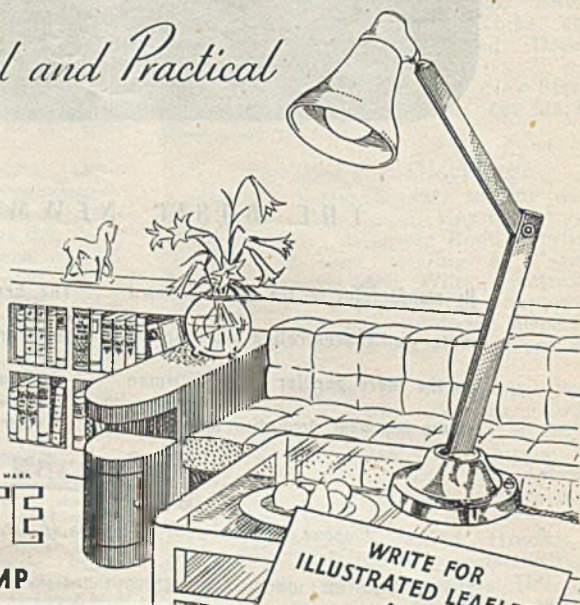
Modern, Beautiful and Practical

At a touch the "Wandalite" Adjustable Table Lamp takes up any position you require, yet because of the unique balanced mechanism it always "stays put"—light exactly where you require it.

WANDALITE
REGISTERED MARK
ADJUSTABLE TABLE LAMP

CORNERCROFT (PLASTICS) LTD.

subsidiary of Cornercroft Ltd. ACE WORKS, COVENTRY



® WL 12

The New KANGO S-TYPE HAMMER



The new "S" Type Kango Hammer has been introduced to fill an essential need for a light, handy, yet powerful hammer designed to stand up to hard and continuous work within its very useful capacity.

A most important feature of this new "S" type hammer is that owing to its light weight it can be used for all ceiling work where the much heavier hammers are outside the physical capabilities of the workman to operate, furthermore its use will, in the majority of cases, dispense with the elaborate staging that the work usually entails.

SPECIFICATION

Length	-	-	19 inches
Weight	-	-	12 lbs.
Number of blows	-	-	1,550 per min.

Drilling in Concrete, Depth 2'

No. 6	-	12 Secs.	No. 12	-	23 Secs
No. 8	-	18 "	No. 14	-	26 "
No. 10	-	21 "	No. 16	-	30 "
			No. 18	-	32 Secs.

The current consumption of the "S" type is less than 360 watts.

For heavier work, either the Kango C or D type Hammers, of which we have good stocks, are recommended.

BUCK & HICKMAN LTD

Electric Tools Division
ALBEMARLE ROAD, BECKENHAM, KENT

Head Office:- WHITECHAPEL RD.
LONDON, E.1.

Branches:- ALPERTON-BIRMINGHAM
GLASGOW-MANCHESTER

SYNCHROMATIC

PUBLIC CLOCKS

FOR A.C. OR D.C. SUPPLY



MAXIMUM PUBLICITY

AT

MINIMUM COST

SYNCHROMATIC

TIME RECORDING CO. LTD.

LIVERPOOL, 6

Grams: SYNTIME.

Tel: ANFIELD 1834

TIME INSTRUMENTS · ELECTRIC CLOCKS

Progressive wholesale Electrical House in West Riding of Yorkshire seeks first class products in Electrical goods. Sole distribution of guaranteed sales undertaken. Box J.R., "The Electrician," 154, Fleet Street, London, E.C.4.

RADIANT ELECTRIC BED WARMERS

SUPPLIES NOW AVAILABLE

Apply to your local Wholesaler

Wholesalers' enquiries should be made to :-
SOUND, 483-489, BARLOW MOOR RD., MANCHESTER, 2

£1.9.6

plus P.T.

CORK

BRITISH CORK MILLS LTD.

167, Victoria Street,
London, S.W.1.

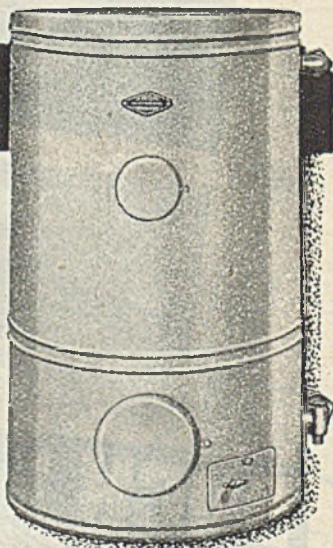
Phone: VICtoria 1414-5-6
" 7713

HOT WATER BY ELECTRICITY

-the modern way

The Sadia TYPE U.D.B. electric water heater provides a completely automatic hot water system for the small house or flat. Like most good things, the Sadia is simple; it needs the absolute minimum of work to install and occupies the least possible space. It requires no flues or ventilation, it does away with complicated piping problems. Many thousands of

Sadias are in use today and we are building more and more each week. Although the number of orders prevent delivery from stock, the Sadia U.D.B. is well worth waiting for. Write for further details now. Delivery of orders supported by W.B.A. Priority can usually be arranged to fit in with the building programme.



AIDAS ELECTRIC LIMITED, SADIA WORKS, ROWDELL ROAD,
NORTHOLT, MIDDLESEX

'Phone: WAXlow 1607 'Grams: AIDASELECT GREENFORD

Scottish Agents: W. Brown & Co. (Engineers) Ltd.,
39, Douglas Street, Glasgow, C.2.

SADIA
TYPE U.D.B. ELECTRIC
WATER HEATER

The Melo-chyme

DOOR CALL

-BRINGS HARMONY
TO THE *Home*

At each pressure on the door push the Melo-chyme emits a deep resonant note of two harmonious tones and is a delightful contrast to the irritating shrill of the normal door bell.

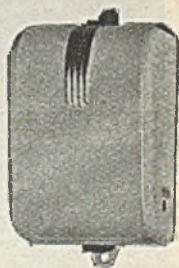
Exceptionally simple fitting. Operates from battery or mains.

PRICE

47/6

Transformers for use
with the Melo-chyme
door Call - - - -

15/6

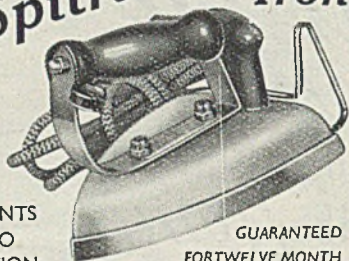


Also at
BIRMINGHAM
MANCHESTER
GLASGOW
NEWCASTLE

For full particulars apply to
H. & D. CHURCHILL LTD.
(Wholesale and Export)
WALNUT TREE WALK, KENNINGTON, LONDON, S.E.11

The "Spittire" Iron

PROMPT
DELIVERY
HOME OR
EXPORT



5 POINTS
TO
PERFECTION

GUARANTEED
FORTWELVE MONTH
AGAINST FAULTY WORKMANSHIP

1. HEAVILY NICKEL PLATED SOLE PLATE
DROP FORGED STEEL
2. UNBREAKABLE IF DROPPED
3. FASTER AND LASTING HEAT
4. ALL IRONS TESTED
5. BRITISH MADE THROUGHOUT

CHARLTON ELECTRICAL APPLIANCES LTD.
"SPITFIRE" WORKS, CLARENDON PARK, LEICESTER,

BIRMINGHAM PRODUCTS Ltd.,
176-178, NEWHALL ST., BIRMINGHAM 3.

CAPSTAN AND REPETITION WORK IN
ALL METALS FOR THE ELECTRICAL
TRADE.

ROLLED THREAD SCREWS, WOOD SCREWS,
BOLTS AND NUTS, RIVETS, WASHERS, ETC.

LARGE STOCKS CARRIED.

'Grams :
ROLTHRED, B'HAM.

'Phone :
CENTRAL 2661-2-3-4.

VULCANIZED FIBRE.

EBONITE, BAKELITE

Sheets, Rods, Tubes and Machined Shapes

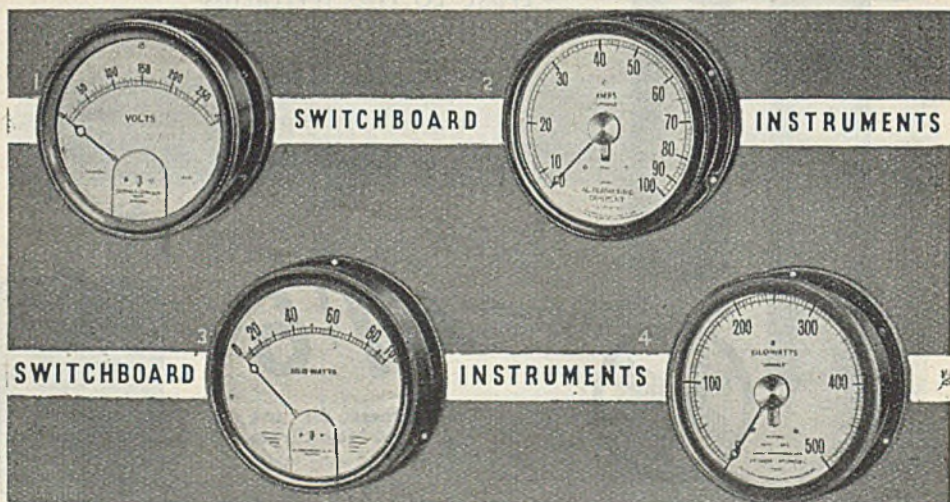
LEATHEROID Sheets, Rolls, etc.

"CLIFTEX" Insulating Tapes.

Insulating Staples, Jointing, Presspahn.

MOSSSES & MITCHELL LTD.

60-68, Ironmonger Row, London, E.C.1.



THE RECORD ELECTRICAL CO LTD
BROADHEATH ALTRINCHAM CHESHIRE

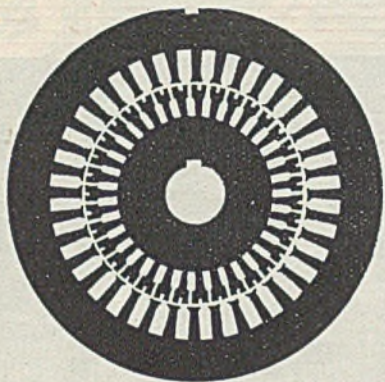
1. Standard Scale Ammeter and Voltmeter—Moving Iron and Moving Coil
2. Cirscale Ammeter and Voltmeter—Moving Iron and Moving Coil.
3. Dynamometer Wattmeter
4. Induction Wattmeter

Also Frequency Meters, Power Factor Meters,
Synchrosopes, Tachometers etc.

The Record Electrical Co. Ltd.
Broadheath, Altrincham, Cheshire
Telephone : Altrincham 3221/2
Grams : "Infusion" Altrincham
London Office,
28, Victoria Street, S.W.1.

RECORD

SHEETS AND STAMPINGS



for
**THE
 ELECTRICAL
 TRADE**

**JOSEPH SANKEY
 & SONS, LTD.**

BILSTON · STAFFS
 London Office :
 168, REGENT STREET, W.1

ELECTRIC MOTOR & ARMATURE REWINDS

AUTOMOBILE GENERATOR

AND

STARTER ARMATURE REWINDS

OUR SPECIALITY

**48 HOUR
 SERVICE**

**HUDSON
 PRESSINGS
 LTD.**

**RHO'S MILL,
 HIGGINSHAW,
 OLDHAM,
 LANCs.**

Phone
**MAIN
 3109**

**PROMPT
 ATTENTION
 GIVEN TO ALL
 ENQUIRIES**

RELIABLE SERVICE IN ELECTRIC MOTOR RE-WINDS.

The LINDLEY THOMPSON TRANSFORMER & SERVICE CO., LTD.

Hermetically Sealed

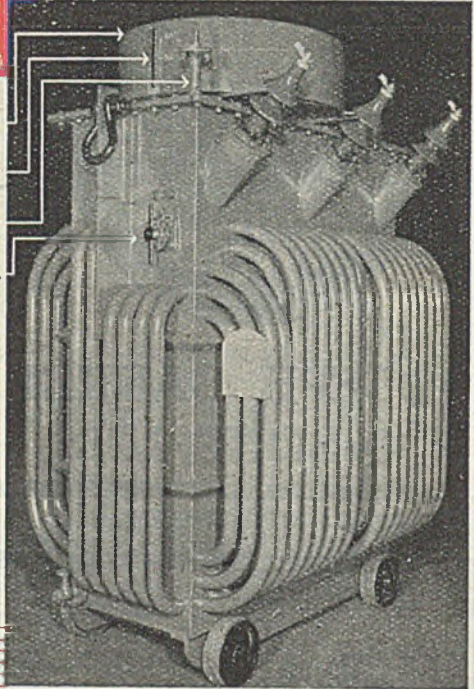
THOMPSON RELIEF CHAMBER (PATENTED)

Diaphragm and Cover _____

Temperature Calibration _____

Filling Pipe _____

Off Load Tapping Switch _____



NO MOISTURE
NO SLUDGING
OF OIL
NO SERVICE
COSTS

600 KVA 3ϕ 50 ~ 11000/400 Volts.
PART OF A GOVERNMENT CONTRACT
FOR INDIA

Designed to give
TRouble-FREE SERVICE under
DAMP and HUMID CONDITIONS.

This type of unit is operating perfectly in
INDIA, EAST & WEST AFRICA,
MALAYA, EAST INDIA, ETC.

APPLY FOR BROCHURE TO:-
ST. MARY'S ROAD, MIDDLE GREEN, SLOUGH, BUCKS.
Telephone. LANGLEY (BUCKS) 200/201



HOW LONG DOES IT LIVE ?



The Badger

How long does a badger live? Few indeed have ever seen this grey nocturnal animal and probably not many more would be able to do more than hazard a guess at the answer. He can in fact attain an age of 20 years, but the average life is about 8/9 years.

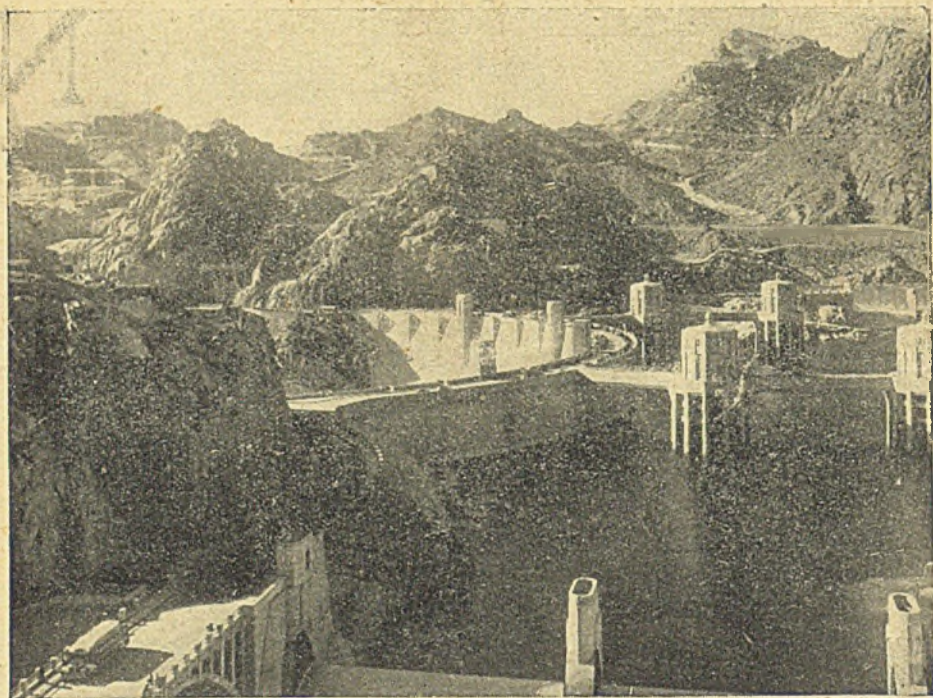
What is the life of a Westinghouse Metal Rectifier? Many of the original copper-oxide units are still giving excellent service after 20 years continuous use and the new "Westalite" rectifiers appear to have an even greater potential life. In any case, it can be stated with certainty that there are no more reliable rectifiers than



METAL RECTIFIERS

WESTINGHOUSE BRAKE & SIGNAL CO. LTD.

82, YORK WAY, KING'S CROSS, LONDON, N.1



FAMOUS HYDRO-ELECTRIC STATIONS :

Boulder Dam, Nevada, U.S.A. This photograph shows part of the reservoir, with a capacity of 30,500,000 acre feet. Another view of this Dam has already appeared in this series. It is the largest artificial reservoir in the world, with an electrical power initial capacity of 1,835,000 H.P.



MEASUREMENT LIMITED

Electricity and Water Meters of Quality

TERMINAL HOUSE, GROSVENOR GARDENS, LONDON, S.W.1

CM 95

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, February 14, 1947