

2448 / 11 cr.

THE

# ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY



19

123

## Getting over difficulties . .

You've probably heard that one about "... supplies are limited but we are distributing them as fairly as we can; meanwhile it's worth while waiting for ..." Enough to make you sick, isn't it? O.K. ... we won't crack that one then ... we'll simply say that we're doing all we know (and a lot we don't!) to get over our difficulties and help you with yours.



S. O. BOWKER LTD



19-21 WARSTONE LANE B'HAM 18

RPI141D

17 JANUARY, 1947  
- SIXPENCE -

**MAN-HOUR**

**Savers**



**METROVICK**  
Fractional  
**MOTORS**

**METROPOLITAN**  
**Vickers**

CO. LTD.  
ELECTRICAL  
TRAFFORD PARK ... MANCHESTER 17.



1/Q301

Switch to

**METROVICK**

*Capitain*

when daylight fades

# DALY

## Electrolytics for all 'Motor Start' purposes



TYPE NO.  
P.M. 41/8

Specialisation always produces the best. It is because DALY manufacture only electrolytic condensers that their world-wide reputation in the electrical field stands so high.

DALY build for all electrical requirements and welcome difficult electrolytic problems, priding themselves on the flexibility of their organisation and ability to supply special types.

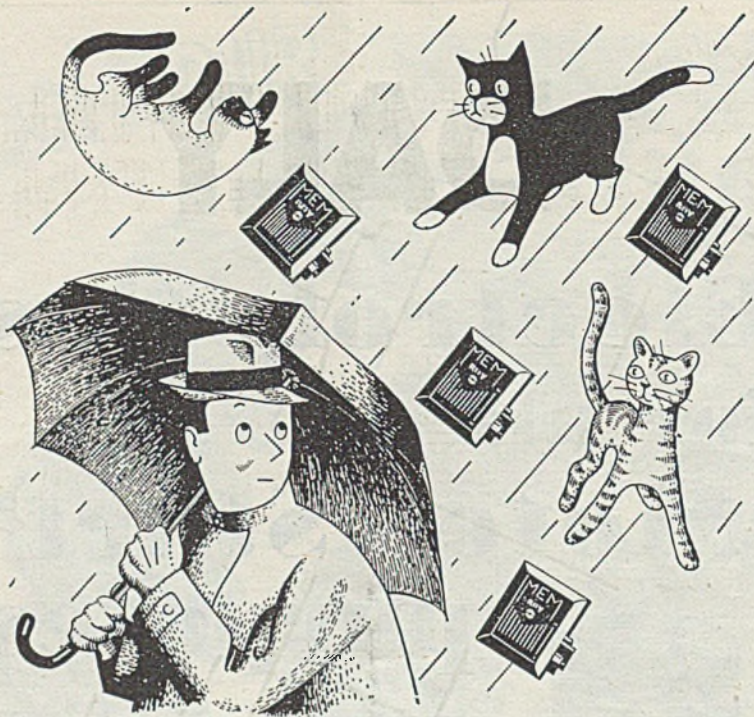
### GENERAL TYPES —

TYPE NO.	CAPACITY	VOLTS (R.M.S.)
P.M. 12/6	30 MFD	110 V.
P.M. 45/6	60 MFD	"
P.M. 49/6	100 MFD	"
P.M. 51/6	130 MFD	"
P.M. 52/6	150 MFD	"
P.M. 55/6	200 MFD	"
P.M. 45/8	60 MFD	240 V.
P.M. 12/8	30 MFD	"
P.M. 9/8	20 MFD	"
P.M. 41/8	50 MFD	"

**DALY (CONDENSERS) LTD.**

West Lodge Works, The Green, Ealing, London, W.5.

Phone: Ealing 4841.



## If it rained cats and switches

If switchgear rained from the skies, M.E.M. could forget shortages, controls and restrictions and supply the present heavy requirements without delay. Yet even in

these hard, practical times, output is being steadily increased and the goods are going out with all possible speed to the wholesalers. They in turn are doing a splendid job of work in distributing all available supplies fairly and equitably. You'll get your supplies more quickly through your wholesaler.



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

SWITCH, FUSE AND MOTOR CONTROL GEAR, ELECTRIC FIRES  
AND LOCALISED LIGHTING EQUIPMENT

London Showrooms & Stores: 21-22 Rathbone Place, W.1 : Manchester Showrooms & Stores: 48-50 Chapel St., Salford, 3

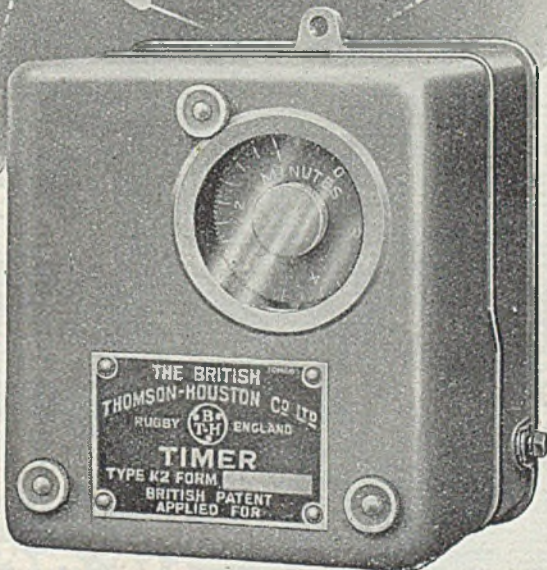


# INDUSTRIAL ELECTRIC TIMER



Designed to withstand frequent and arduous service in industry, the BTH Timer has two ranges, namely from 5 seconds to 5 minutes (in 5 sec. steps) and 20 seconds to 20 minutes (in 20 sec. steps).

It is controlled by any form of pilot switch or push button and will give lasting, trouble-free service.



Write for list No. 5642-5

## BTH

## RUGBY

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, RUGBY, ENGLAND

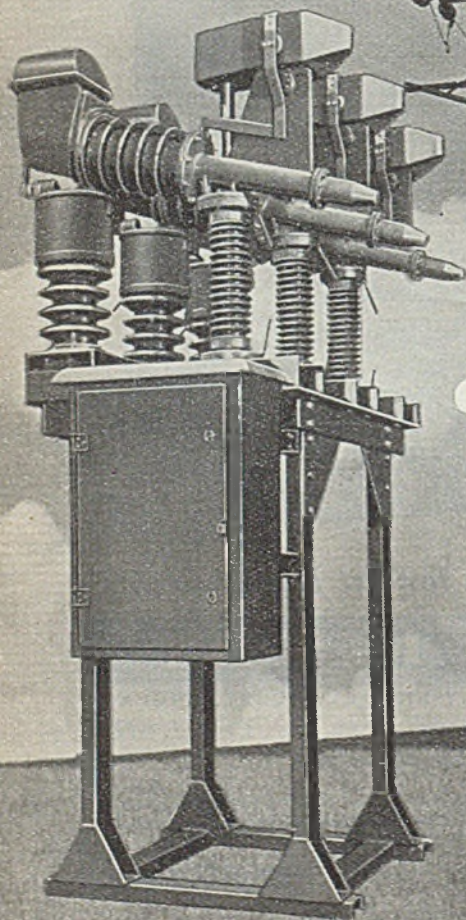
A3566



# THE COOKE & FERGUSON OUTDOOR OIL CIRCUIT BREAKER

TYPE O.E.G.

UP TO  
1500 M.V.A. 44kV  
1500 M.V.A. 33kV  
1000 M.V.A. 22kV



*Short-circuit  
tested and  
Certificated  
in accordance  
with  
BS.116'1937 pt.2*



VICTORIA ST. OPENSHAW, MANCHESTER II and KINGSWAY, LONDON

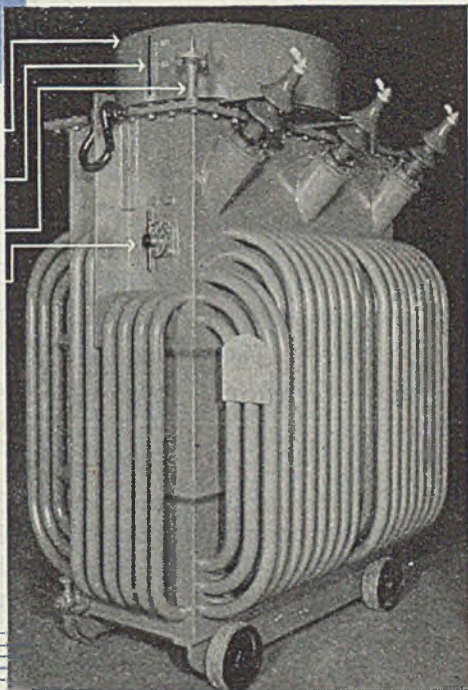
# The LINDLEY THOMPSON TRANSFORMER & SERVICE CO., LTD.

## 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**



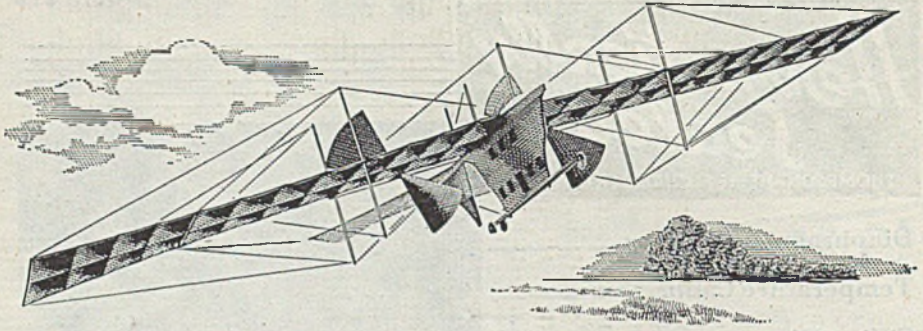
600 KVA 3 $\phi$  50 ~ 11000/400 Volts.  
PART OF A GOVERNMENT CONTRACT  
FOR INDIA

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**

## EVERYTHING HAD A BEGINNING—



*We think of the aeroplane as a modern device, but its origin goes back to Leonardo da Vinci's conception in the year 1500. Since then many attempts were made with varying degrees of success to design machines that would take to the air. Illustrated is Henson's machine of 1843 which was equipped with a 25-h.p. steam engine.*

There may be some doubt as to who made the *first* aeroplane that could rise in the air, but it is well known that we made the *first* electrical accumulators to be fitted to British aircraft, also the *first* British ground starter Batteries, and the *first* British moulded battery containers.

Our experience has been gained from the year 1882, when we made the first storage batteries. They were used to supply light in the Royal Exchange, the Royal Mint, and other important buildings.

When you hear heavy aircraft engines leap into life, or see the navigation lights of aircraft, you can be certain that the energy is provided as a direct result of those pioneer days of 1882, when P. & G. and E.P.S. produced the first commercial accumulators.

### REPLATING

Ensure long and reliable service by having your present batteries replated by us.

## PRITCHETT & GOLD and E.P.S. CO. LTD.

— formerly the Electrical Power Storage Co. Ltd. —

### MADE THE FIRST BATTERIES

50 GROSVENOR GARDENS, LONDON, S.W.1



Phone : Sloane 7164. Grams : Storage, Sowest, London

PG15/46



# ANACOS

REGD.

## RODS, STRIPS, WIRES, RECTANGLES & BARS

*in*

**COPPER, BRONZE,  
CADMIUM-COPPER**

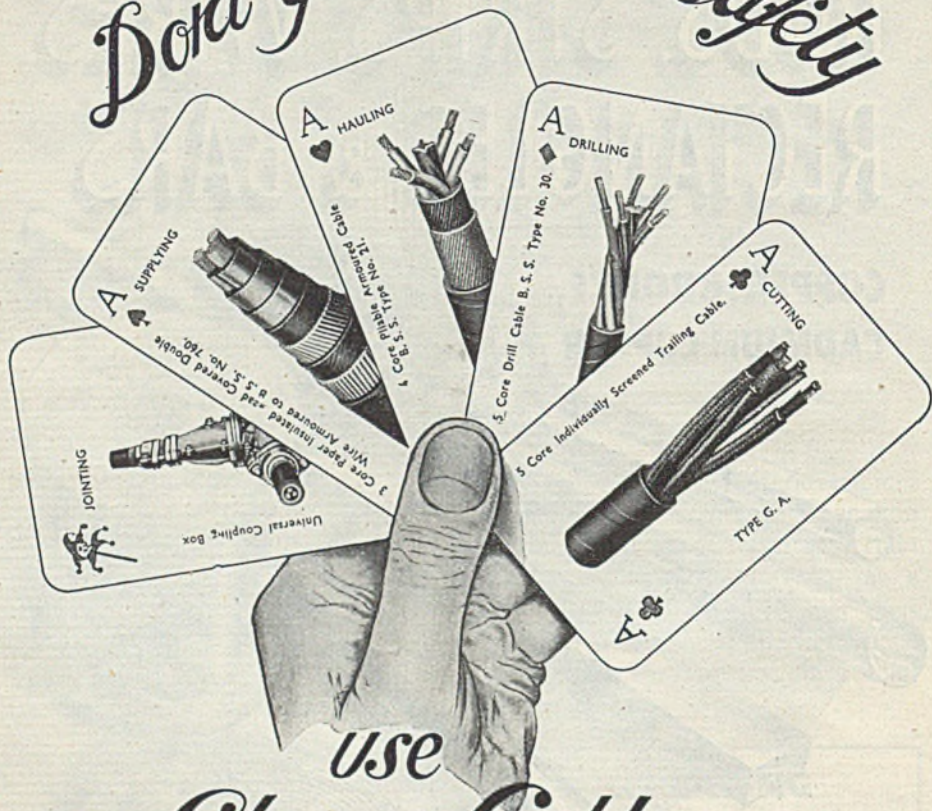


TELEPHONE  
BLACKFRIARS  
8701 (9 lines)

**FREDERICK SMITH & COMPANY**  
(INCORPORATED IN THE LONDON ELECTRIC WIRE COMPANY & SMITHS, LIMITED)  
 ANACONDA WORKS, SALFORD, 3, LANCs

TELEGRAMS  
ANACONDA  
MANCHESTER

*Don't gamble with safety*



*use  
Glovers Cable*

TRAFFORD PARK

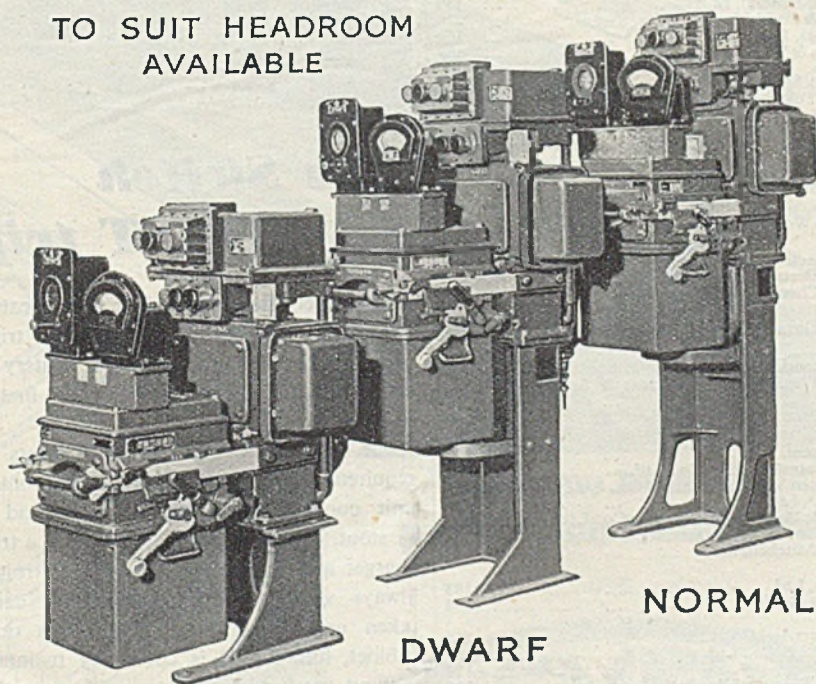


MANCHESTER, 17

# In Perspective



TO SUIT HEADROOM  
AVAILABLE



PIGMY

DWARF

NORMAL

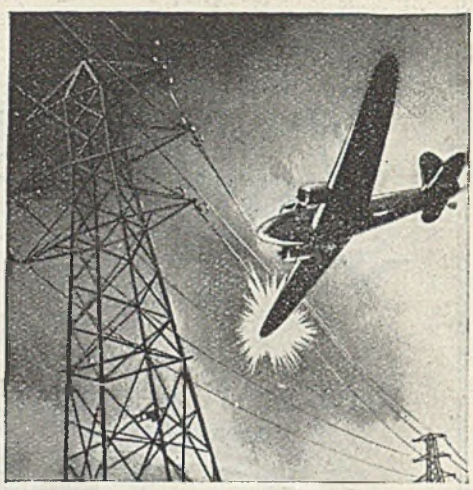
UP TO 600 AMPS  
25 MVA AT 3,300 VOLTS

## THREE PILLARS OF WISDOM

REYROLLE

HEBBURN-ON-TYNE

Aidas Electric, Ltd. ....	222
Aron Electricity Meter Co. ....	222
Arrow Electric Switches, Ltd. ....	169
Babcock & Wilcox, Ltd. ....	184
Baldwin Instrument Co., Ltd. ....	168
Bastian & Allen, Ltd. ....	174
Bowker, S. O., Ltd. ....	Cover i
British Rototherm Co., Ltd. ....	175
British Thomson-Houston Co., Ltd. (The) ....	151
Brooks & Bohm, Ltd. ....	175
Buck & Hickman, Ltd. ....	167
Burgess Products, Ltd. ....	172
Chamberlain & Hookham ....	221
Charlton Electric Appliances, Ltd. ....	174
Chloride Electrical Storage Co., Ltd. (The) ....	158
Churchill, H. & D., Ltd. ....	171
Cooke & Ferguson, Ltd. ....	152
Cornercroft (Plastics), Ltd. ....	226
Daly (Condensers), Ltd. ....	149
Dorman & Smith, Ltd. ....	226
D. S. Plugs, Ltd. ....	162
Duratube & Wire, Ltd. ....	183
Electricity Services, Ltd. ....	174
Ericsson Telephones, Ltd. ....	223
Fluorescent Spares ...	175
Fluxite, Ltd. ....	172
Glover, W. T., & Co., Ltd. ....	156
Grey & Martin, Ltd. ....	175
Hampton Works, Ltd. ....	183
Igranic Electric Co., Ltd. ....	161
Instanta Electric, Ltd. ....	175
Imperial Chemical Industries ...	228
Keith Blackman, Ltd. ....	163
Langley London, Ltd. ....	165
Lindley Thompson Transformer & Service Co., Ltd. ....	153
London Electric Wire Co., Ltd. ....	160
Measurement, Ltd. ....	Cover iv
Metallic Seamless Tube Co., Ltd. ....	170
Metropolitan Vickers Electrical Co., Ltd. ....	Cover ii
Microfuses, Ltd. ....	172
Micramatic Electrical Instrument Co., Ltd. ....	175
Midland Electric Manufacturing Co., Ltd. ....	150
Mosses & Mitchell, Ltd. ....	175
Presspahn, Ltd. ....	183
Pritchett & Gold ...	154
Record Electrical Co., Ltd. ....	224
Reyrolle, A., & Co., Ltd. ....	157
Rivlin, J. ....	174
Runbaken Electrical Products ...	182
Scott, A. C., & Co., Ltd. ....	224
Siemens Electrical Lamps & Supplies, Ltd. ....	159
Sims, F. D., Ltd. ....	225
Smith, Fredk., & Co., Ltd. ....	155
Streamline Filters, Ltd. ....	168
Symonds, R. H., Ltd. ....	162
Telco, Ltd. ....	182
Telegraph Construction & Maintenance Co., Ltd. ....	173
Terry, Herbert, & Sons, Ltd. ....	166
Tullis Russell & Co., Ltd. ....	164
Universal Tools, Ltd. ....	223
West Insulating Co., Ltd. ....	174
Westinghouse Brake & Signal Co., Ltd. ....	Cover iii
Whiteley, B. S. & W., Ltd. ....	227
Wilcox, Edward, & Co., Ltd. ....	183



17

## The Switch MUST trip!

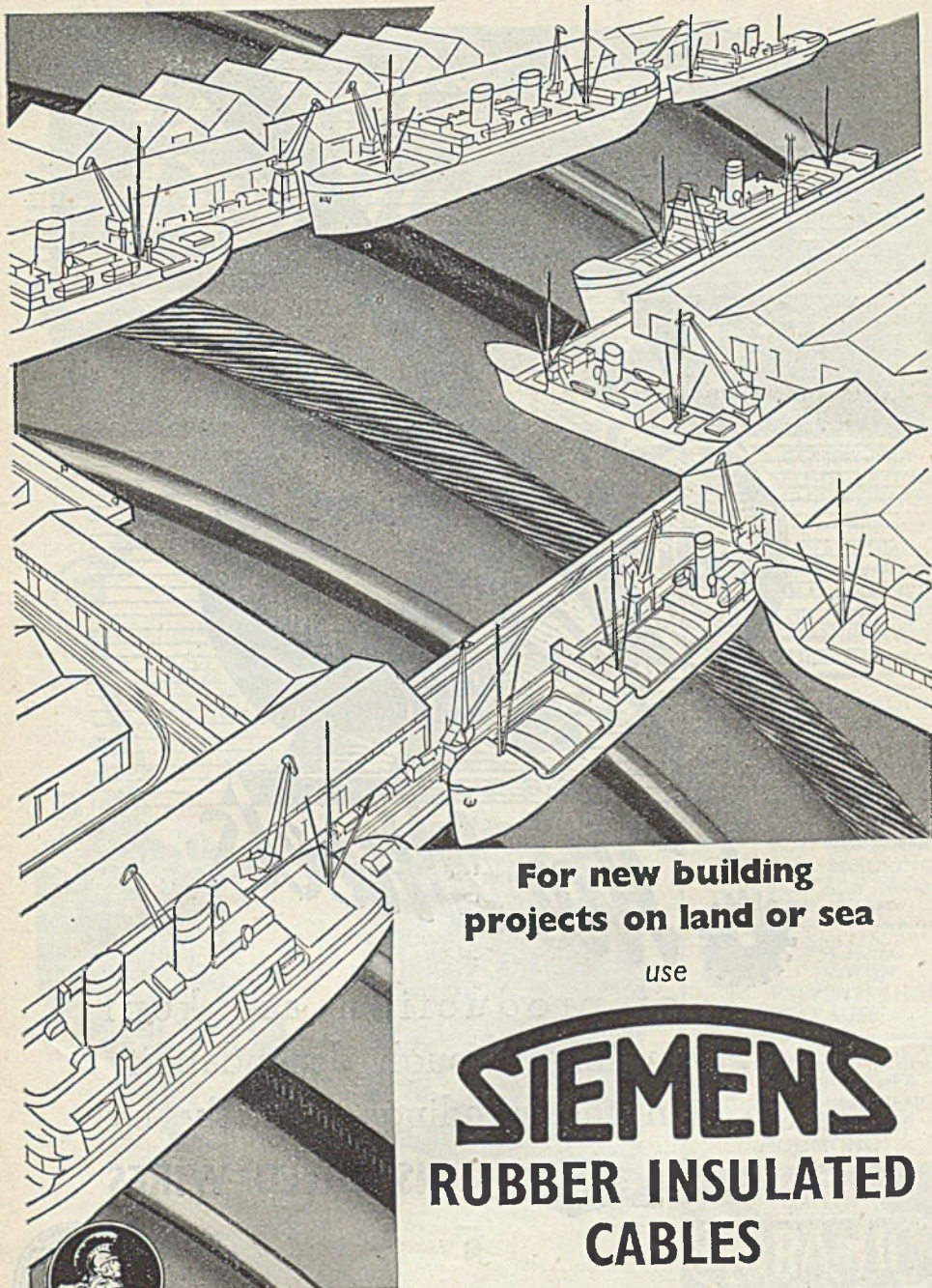
Immediately the fault-finding relay locates the trouble, power *must* be available for tripping the switch. This calls for a battery and equipment of utter reliability and first-class quality.

Exide Switch Tripping equipment meets these requirements to the full. Each self-contained unit comprises a battery of lead-acid cells in stout, non-conducting glass boxes, a trickle-charger and a load-test device. Electrolyte is always visible. Battery test-readings can be taken under load from instruments on the cabinet, full charge is constantly maintained, without gassing, electrolyte needs no renewal.



## SWITCH TRIPPING EQUIPMENT

THE CHLORIDE ELECTRICAL STORAGE CO. LTD.  
STATIONARY BATTERY DEPARTMENT  
77 King St., Manchester 2 Tel: Blackfriars 4731



**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.



Regd. Trade Mark  
(No. 412319 3072)



# The Wheels

of production are kept turning through dependability in the windings—largely by

**Lewcos** INSULATED WIRES



THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED • LEYTON • E10

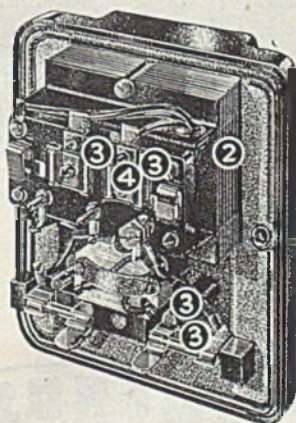
# Details that Distinguish . . .

*In the product of the Specialist there are details of design that distinguish it from its contemporaries.*

## "LŌ-VŌ-LITE"

### TRANSFORMER SWITCH-FUSE UNIT

FOR SAFE & ECONOMICAL  
LOCALISED LIGHTING



**1** COMPLETELY SELF-ISOLATING TRANSFORMER

**2** VACUUM IMPREGNATED TRANSFORMER GIVING HIGH PRIMARY TO SECONDARY INSULATION

**3** DOUBLE POLE FUSES (AND SPARES) FOR BOTH WINDINGS

**4** SECONDARY FUSE HOLDER OF LOW RESISTANCE CONTACTS ENSURING LOW VOLTAGE DROP ON SECONDARY

**5** RECESSED SWITCH PREVENTS SHOP BREAKAGES

**6** UNIVERSAL BASE FOR EITHER MACHINE, BENCH OR TRANSFORMER MOUNTING

(ASK FOR PUBLICATION 68610)

ELECTRIC  
**IGRANIC**  
CO. LTD.  
HEAD OFFICE AND WORKS BEDFORD

LONDON · BIRMINGHAM · BRISTOL · CARDIFF · GLASGOW · LEEDS · MANCHESTER · NEWCASTLE · SHEFFIELD

17 JANUARY 1947

THE ELECTRICIAN



# 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 10

### The Process of Wire Drawing (No 2)

### Electrical ANNEALING

All wires, from 44 SWG to the thickest Copper Strip manufactured, are annealed on the latest type British made Electric Furnaces with protective atmosphere, giving the highest possible quality finish obtainable anywhere in the world.

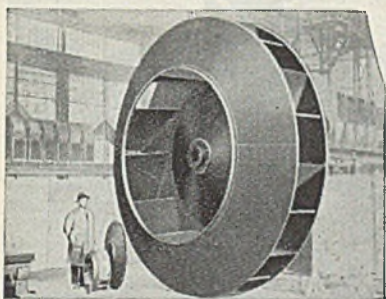
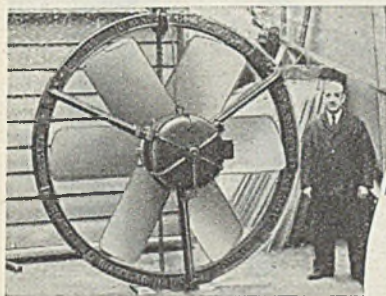
## R. H. SYMONDS Ltd.



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



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

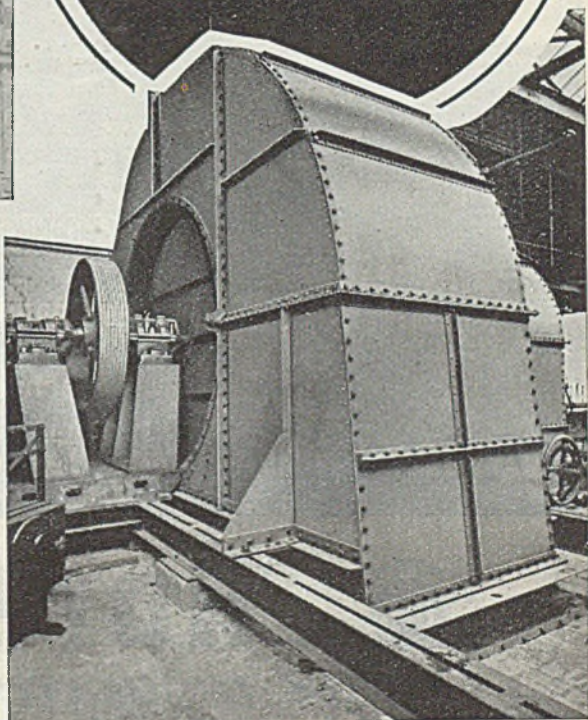


HEATING  
VENTILATION  
DUST REMOVAL  
FORGE BLOWING  
MECHANICAL DRAUGHT  
FUMES REMOVAL  
STEAM REMOVAL  
CUPOLA BLOWING  
SMOKE REMOVAL  
FURNACE BLOWING  
DRYING, COOLING  
etc.

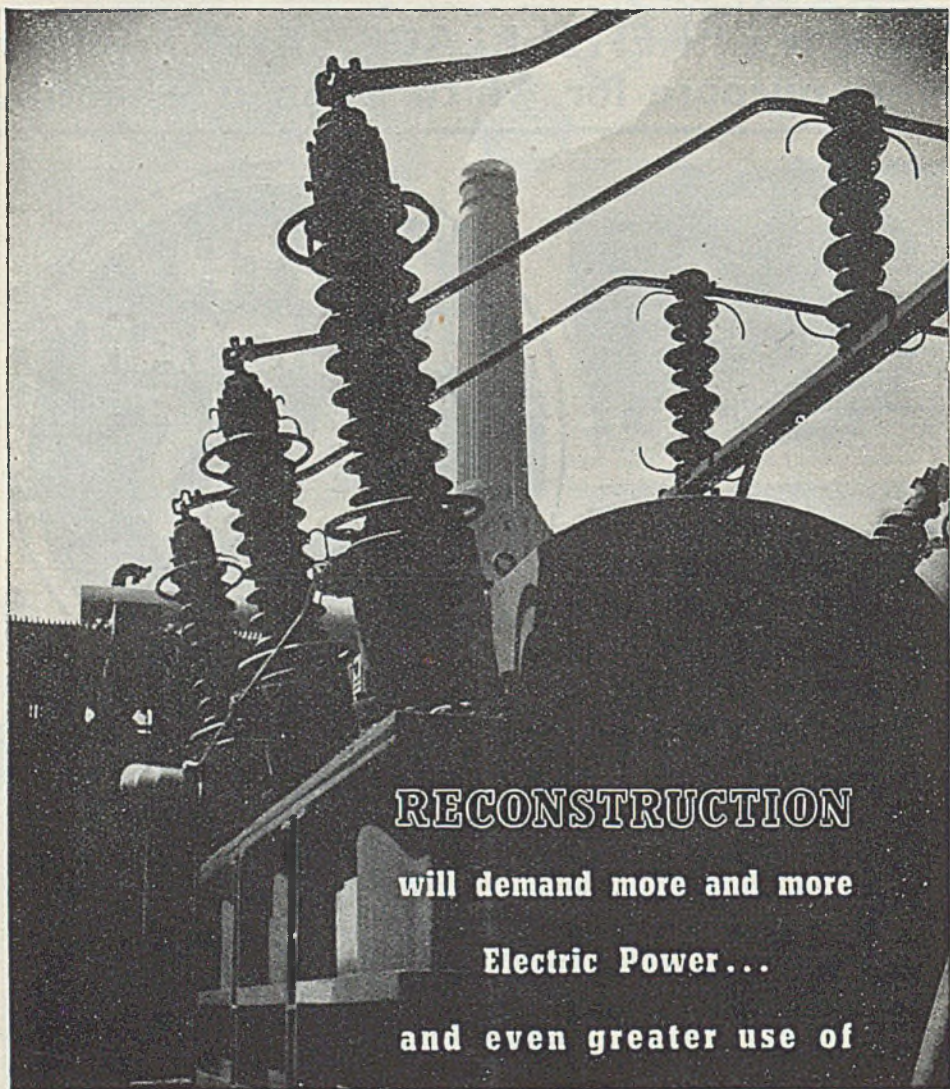


"GRAMS KEITHBLAC, PHONE, LONDON"

"KEITH-  
BLACKMAN"  
FANS



We invite your enquiries.



**RECONSTRUCTION**

will demand more and more

Electric Power...

and even greater use of



# ROTHMILL

**CABLE INSULATING PAPER**

*Tullis Russell & Co. Ltd.*

AUCHMUTY &  
ROTHES PAPER  
MILLS, MARKINCH  
SCOTLAND

LONDON  
1 Tudor Street  
E.C.4

MANCHESTER  
372 Corn Exchange  
Buildings  
Corporation Street

BIRMINGHAM  
116  
Colmore Row

# WASH BOILERS PROMPT DELIVERY

We supply very large quantities of Mica pieces for Electric Wash Boiler Elements.

Your enquiries for this work will receive our prompt attention.

Government Housing Priority numbers enable us to make ultra-rapid delivery.

**LANGLEY LONDON LIMITED**  
161, BOROUGH HIGH ST., LONDON, S.E.1

'Phone:  
HOP 2946 (P.B.E.)

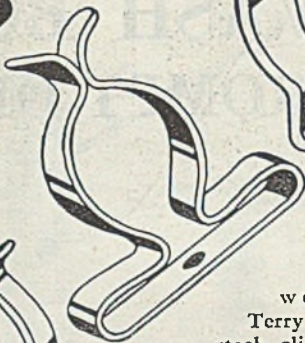
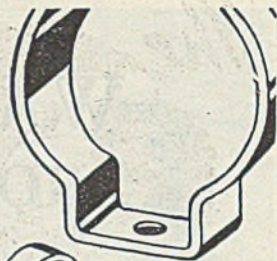
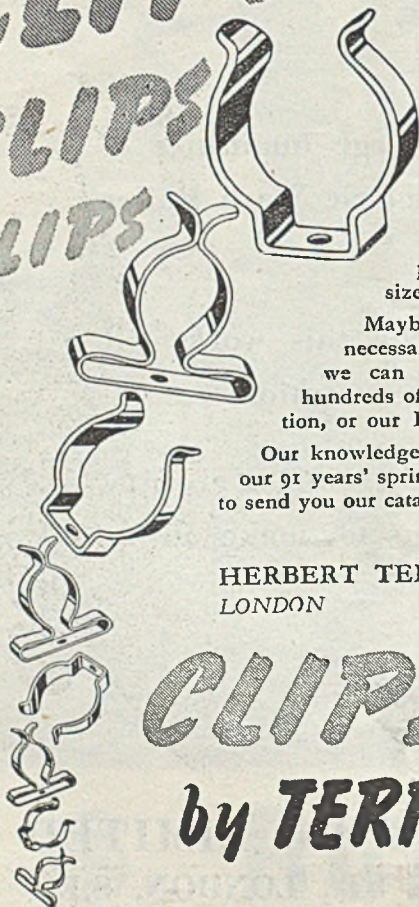
'Grams:  
LAGLYCOL Phone LONDON

# 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, and we should like to send you our catalogue.

*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

# The **F.T.** Patented MODEL 925/D **FLOOR SANDER & POLISHER**

- ★ An entirely new design of Floor Machine incorporating many patented features.
- ★ Combines Sanding and Polishing in the one Machine.
- ★ Built by Engineers for use by skilled or unskilled labour.
- ★ Will cut fast and smooth and will give long, trouble-free service.
- ★ Patented abrasive disc ensures fast cutting with the lightest pressure, freedom from clogging and consequently longer life from the abrasive disc.
- ★ Will tackle all types of wood block, parquet, strip or composition floors.



## **BUCK & HICKMAN LTD**

*Electrical Tools Division*

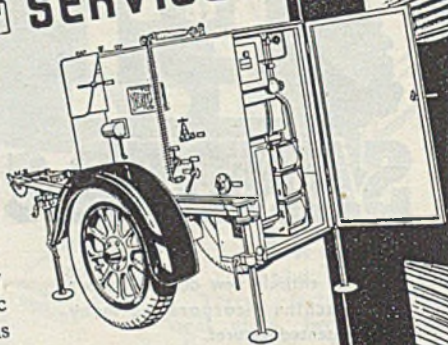
**ALBEMARLE ROAD, BECKENHAM, KENT**

HEAD OFFICE:  
WHITECHAPEL ROAD  
LONDON, E.1

BRANCHES:  
ALPERTON BIRMINGHAM  
GLASGOW MANCHESTER

## 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

# BALDWIN

INSTRUMENT COMPANY LIMITED

## 'MUFER'

### CAPACITY BRIDGE

This instrument, which had a range of  $0.00005\mu F$  to  $4.0\mu F$ , embodies advanced features of design which give quick and simplified reading.

FULLY DESCRIPTIVE LEAFLET  
SUPPLIED ON REQUEST

**BALDWIN INSTRUMENT COMPANY LTD.**

London Office: GRAND BUILDINGS, TRAFALGAR SQUARE, LONDON, W.C.2.

Telephone: Whitehall 3736



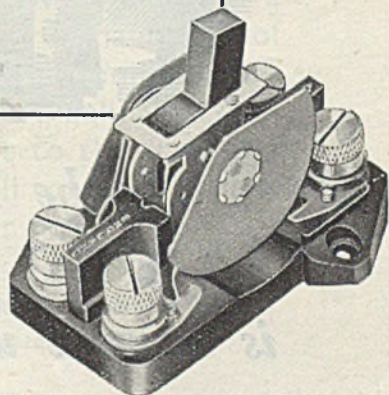
# TUMBLER SWITCHES

by

# ARROW

QUICK MAKE AND BREAK

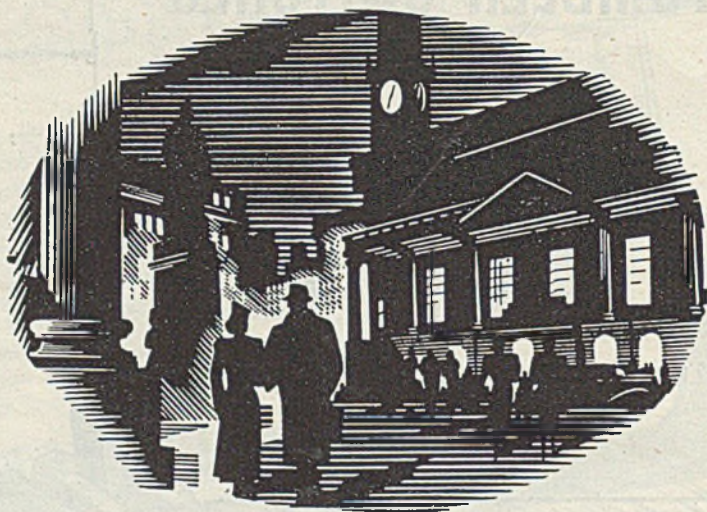
30 amp. Double Pole - 60 amp. Double Pole



Ensure the reliability of your products by the selection of a switch of PROVEN efficiency. There is built into ARROW switches something you'll not find elsewhere. . . . a more scientific design . . . a more positive action . . . greater accuracy in detail and increased durability under severe operating conditions.

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

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 Tube because of its consistent quality and high reputation for accuracy.



THE METALLIC SEAMLESS TUBE CO. LTD.

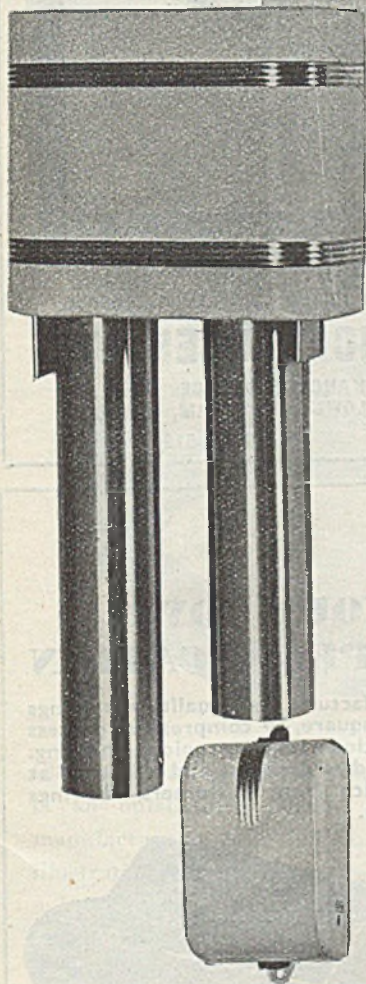
Ludgate Hill, Birmingham. Phone: CEN. 7167. Grams: "Flask", Birmingham. Sales Depots: London: 88 Goswell Rd., E.C.1.  
 Newcastle-on-Tyne: St. John Street. Leeds: 5 York Place. Swansea: 1 Grove Place. Glasgow: 137a St. Vincent Street.



# 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 "Fluxite  
Quins" at work  
"Look after our  
FLUXITE!"  
cried OO.  
"He's dropped  
it! Now what  
shall we do...?"  
Through the  
rollers it slipped  
Cried the lads,  
"Now we're  
pipped."

"When we want some, we'll scrape it off you."

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

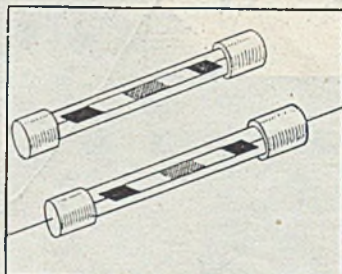
SIMPLIFIES ALL SOLDERING

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

## HIGH ACCURACY CARTRIDGE MICROFUSES

10mA.—1 Amp.

with Gold Film Fuse Link



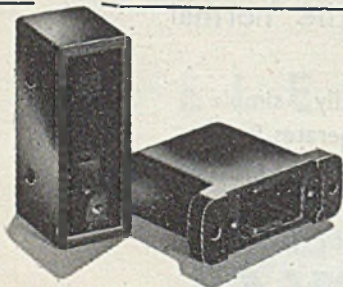
Colour indication of blown fuses or Neon Indicators if preferred.

Pamphlet C.M.18 on request.

## MICROFUSES LTD

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

TEL. SYD. 5129



Enquiries are invited by—  
BURGESS MOULDINGS LTD  
SAPCOTE · LEICESTERSHIRE

To

## YOUR OWN SPECIFICATION

We manufacture high quality mouldings up to 8" square, by compression process in conjunction with electronic pre-heating. Moulding dies designed and produced at short notice from customers drawings or samples.



# TELCON METALS



Close technical control of production is an outstanding feature in the manufacture of MUMETAL. The illustration shows factory testing of a batch of MUMETAL cores. Our technical experts will be pleased to discuss the application of MUMETAL to your particular requirements.

## MUMETAL

REGD.

*A magnetic alloy  
unsurpassed for*

INSTRUMENT TRANSFORMERS  
METERING DEVICES  
PROTECTING RELAYS  
MAGNETIC SHIELDS  
INDICATING INSTRUMENTS



Founded 1864

THE TELEGRAPH CONSTRUCTION & MAINTENANCE CO. LTD

Head Office: 22 OLD BROAD STREET, LONDON, E.C.2. Telephone: LONDON Wall 3141

Enquiries to: TELCON WORKS, GREENWICH, S.E.10. Telephone: GREENWICH 1040.

## INSTRUMENT WIRES INSULATING MATERIALS

**WEST INSULATING COMPANY**  
LTD.,

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

## SOCKETS

**3 PIN, 5 AMP, SHUTTER**  
Available in good quantities  
**COMPACT BALLAST UNITS**  
including strikers  
**TENATHERAM SOIL HEATERS**  
FULL LIST ON REQUEST

**J. RIVLIN**  
16/17, BRUNSWICK STREET, LEEDS, 2  
Telephone 21515

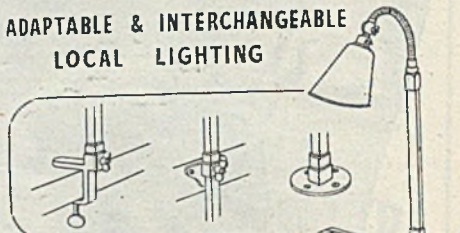
## VULCANIZED FIBRE.

**EBONITE, BAKELITE**  
Sheets, Rods, Tubes and Machined Shapes

**LEATHEROID** Sheets, Rolls, etc.  
"CLIFTEX" Insulating Tapes.  
Insulating Staples, Jointing, Presspahn.

**MOSSER & MITCHELL LTD.**  
60-68, Ironmonger Row, London, E.C.1.

ADAPTABLE & INTERCHANGEABLE  
LOCAL LIGHTING

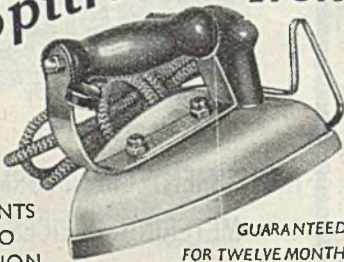


THE "TYPERLITE" CO.  
(ELECTRICITY SERVICES LTD.)  
86 CANNON STREET, LONDON, E.C.3.

The

## "Spittire" Iron

PROMPT  
DELIVERY  
HOME OR  
EXPORT



**5 POINTS  
TO  
PERFECTION**

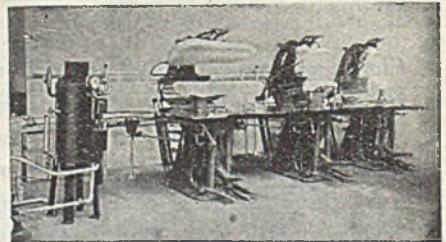
**GUARANTEED  
FOR TWELVE MONTH  
AGAINST FAULTY WORKMANSHIP**

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

*\* 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



For accurate  
Temperature,  
measurement  
and control.

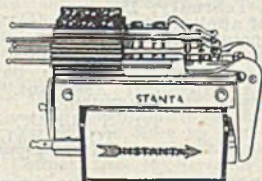
# Rototherm

DIAL THERMOMETERS

THE BRITISH ROTOTHERM CO., LTD.,  
Merton Abbey, S.W.19. Liberty 3406.

# RELAYS

ASK FOR  
LIST  
A.C.R.



N.P.L.  
REPORT  
AVAILABLE

A.C.

D.C.

INSTANTA ELECTRIC LTD

48 OLD CHURCH ST., FLA 3531  
CHELSEA, S.W.3



## 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.

MEICO WORKS: CONGLETON; CHESHIRE  
TELEPHONE: CONGLETON 607

GREY & MARTEN LTD.

for  
**GOLDER**

For all Electrical Work. To British Standard or any other specifications. With a reputation for purity of constituents and excellence of appearance. GREY & MARTEN, Ltd. Southwark Bridge, S.E.1.

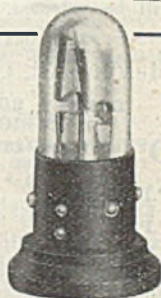
Phone: Hop 0414. Grams: Amalgam, Boroh  
BIRMINGHAM: 11, James St.

Phone: B'ham 3 Cent. 6006. Grams: Amalgam, B'ham.

BEMO

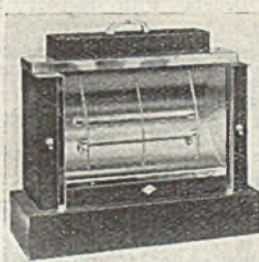
REPLACEMENT  
**FLUORESCENT  
STARTER SWITCHES**  
(THERMAL TYPE)  
For use with B.T.H., Reva and  
Metrovick Lighting Units  
Early Delivery

**FLUORESCENT  
SPARES**  
Dept. E/A, 53, GOODGE  
STREET, LONDON, W.1



## 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

## MISCELLANEOUS ADVERTISEMENTS

### TENDERS

#### CITY OF BIRMINGHAM ELECTRIC SUPPLY DEPARTMENT.

##### ELECTRIC MOTORS AND STARTERS.

THE Electric Supply Committee invites Tenders for the supply of A.C. Electric Motors and Starters to be delivered as required.

The General Conditions of Contract (which includes the Corporation's Fair Wages and Conditions of Labour Clause), Specification No. APP. 39 and Forms of Tender, may be obtained on application to the undersigned.

Sealed Tenders, enclosed in the official envelope provided and endorsed for the purpose, must be delivered to the undersigned NOT LATER THAN 10 A.M. on FRIDAY, 31st JANUARY, 1947, when they will be opened.

Tenders not complying with the foregoing will be rejected.

F. W. LAWTON,  
Chief Engineer and Manager.

14, Dale End,  
BIRMINGHAM, 4.

#### COUNTY BOROUGH OF OLDHAM. ELECTRICITY DEPARTMENT.

OFFERS are invited for the purchase and removal from stores of approximately:—  
600—1d. coin 5 amp. 230 volt, 50 cycles A.C.  
P.P. Meters.

1000—1s. coin 5 amp 230 volt, 50 cycles, A.C.  
P.P. Meters,  
mainly consisting of Ferranti, type Feb, fitted with 20 amp. switches.

Further particulars may be obtained from the Chief Engineer and Manager, Electricity Department, and the meters may be inspected on enquiry at the Greenhill Offices, between the hours of 10 a.m. to 12 noon and 2 p.m. to 4 p.m. Monday to Friday.

No offer will be accepted unless it is (a) sent in a plain sealed envelope which shall not bear any mark or name indicating the sender; (b) is endorsed "Offer for Meters"; and (c) addressed to the Chairman of the Electricity Committee, Greenhill Offices, Oldham, and delivered not later than the first post on Saturday, the 15th February, 1947.

The purchaser will be required to pay cash before each or any part of consignment is taken away from the premises.

The Contract will be subject to the Corporation's Standing Orders with respect to Contracts.

The highest or any tender will not necessarily be accepted, and the Electricity Committee reserves the right of acceptance of part or the whole of an offer.

THOMAS ALKER,  
Town Clerk.

Town Hall,  
OLDHAM.  
15th January, 1947.

### SITUATIONS VACANT

#### WOLVERHAMPTON AND STAFFORDSHIRE TECHNICAL COLLEGE.

Principal: W. E. Fisher, O.B.E., D.Sc.

APPLICATIONS invited for appointment as Senior Assistant in Electrical Engineering. Salary £600 to £750 per annum with additions for recognised training. Applicants should be graduates with appropriate teaching and industrial experience. Research experience an advantage. Further particulars obtainable on application within 10 days of this advertisement from

F. LONSDALE MILLS,  
Clerk to the Governors,  
Education Offices, North Street,  
Wolverhampton.

20th December, 1946.

### SITUATIONS VACANT

#### METROPOLITAN BOROUGH OF FULHAM.

##### ELECTRICITY DEPARTMENT.

##### Second Architectural Assistant.

APPLICATIONS are invited for the position of Second Architectural Assistant. Candidates must be not more than 35 years of age and must be either a registered Architect or preferably an Associate of the R.I.B.A. Applicants must have had training and experience in the preparation of plans and specifications, bills of quantity, etc., for all types of buildings, including electricity substations, showrooms, etc.

The salary will be in accordance with the A.P.T. Division IV of the National Joint Council for Local Authorities Administrative, Professional, Technical and Clerical Services commencing at £440 per annum and rising by annual increments of £15 to maximum of £485, including London Weighting. Salaries are at present subject to an addition of Cost of Living Bonus amounting to £59 16s. per annum.

Completed applications must be despatched to reach me not later than 12 noon on Monday, 17th February, 1947.

Forms of application and general conditions of the appointment may be obtained on sending stamped addressed envelope to me—envelope enclosing request to be endorsed "Second Architectural Assistant."

CYRIL F. THATCHER,

TOWN CLERK,  
TOWN HALL,  
FULHAM,  
S.W.6.

#### METROPOLITAN BOROUGH OF FULHAM. ELECTRICITY DEPARTMENT.

##### Publicity Assistant.

APPLICATIONS are invited for the position of Publicity Assistant, male or female, to act as assistant to the Publicity Officer from candidates not over 35 years of age who have had training and experience in commercial art, poster work, lettering, preparation of brochures and pamphlets, showroom layout and window displays, mailing campaigns and special demonstrations incorporating proprietary articles. Knowledge of Multilith and Multigraph printing machines and Adrema addressing systems desirable.

Salary and conditions in accordance with the National Joint Council for Local Authorities' Administrative, Professional, Technical and Clerical Services, General Division. Salary according to age and ability—maximum (male) £389 16s., (female) £312 2s. per annum, including appropriate London Weighting and Cost of Living Bonus.

Forms of application and general conditions of the appointment may be obtained on sending stamped addressed envelope to me—envelope enclosing request to be endorsed "Publicity Assistant."

Completed applications must be despatched to reach me not later than 12 noon on Monday, 17th February, 1947.

CYRIL F. THATCHER,

TOWN CLERK,  
TOWN HALL,  
FULHAM,  
S.W.6.

#### METROPOLITAN BOROUGH OF FULHAM. ELECTRICITY DEPARTMENT.

##### Boiler House Inspector (Mechanical).

APPLICATIONS are invited for the position of Boiler House Inspector (Mechanical), male. Applicants must be not more than 40 years of age and must have educational qualifications equal to Inter. B.Sc. They must also have served at least a three years' recognised apprenticeship and have full practical knowledge of fitting and alignment to close limits. Candidates must also have had at least five years in a position of

responsibility as a Mechanical Engineer, preferably on maintenance of heavy plant.

Salary and conditions will be in accordance with N.J.B. Class M, Grade 9A, at present £501 18s. per annum.

Forms of applications and general conditions of the appointment may be obtained on sending stamped addressed envelope to me—envelope enclosing request to be endorsed "Boiler House Inspector (Mechanical)."

Completed applications must be despatched to reach me not later than 12 noon on Monday, 17th February, 1947.

CYRIL F. THATCHER,  
TOWN CLERK,  
TOWN HALL,  
FULHAM,  
S.W.6.

**BOROUGH OF LEYTON.**  
**ELECTRICITY DEPARTMENT.**  
**Appointment of Plumber.**

APPLICATIONS are invited for the position of Plumber in the Electricity Department. Applicants must be qualified plumbers fully competent to carry out plumbing work on all types of domestic and commercial hot water systems, and should preferably have experience in the installation of electrical water heating apparatus.

The present rate of wages is 2s. 7½d. per hour.

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

Applications, stating age, qualifications and experience, accompanied by copies of not more than three recent testimonials, to be addressed to the Borough Electrical Engineer and Manager, Electricity Offices, Cathall Road, Leytonstone, E.11, and received not later than 31st January, 1947.

Canvassing in any form will be a disqualification.

D. J. OSBORNE,  
Town Clerk  
Town Hall,  
LEYTON, E.10.  
8th January, 1947.

**CORPORATION OF KIRKCALDY.**  
**APPOINTMENT OF MAINS ASSISTANT.**

APPLICATIONS are invited for the position of Mains Assistant, in the Department of the Burgh Electrical Engineer. Salary Class E, Grade 8 N.J.B. Schedule, presently £413 per annum. Applicants must be Graduates of the Institution of Electrical Engineers and have had experience with an Electricity Supply Authority in construction, commissioning, operation and maintenance of 6.6 kV and 400/230 volts distribution systems. The appointment will be subject to the provisions of the Town Council Conditions of Service and the Local Government Superannuation (Scotland) Act, 1937, and the selected candidate will require to pass a medical examination. Form of application may be had from the Burgh Electrical Engineer, Electricity Department, Victoria Road, Kirkcaldy, with whom applications, along with copies of three recent testimonials, must be lodged not later than 29th January, 1947.

JOINTERS required for work in Persia.— Suitable applicants would be placed on a year's contract with good salary and accommodation found.—Apply Box 1.D.H. "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

**SITUATIONS VACANT**

**BOROUGH OF GRAVESEND.**

**GENERATION SUPERINTENDENT.**

APPLICATIONS are invited from Corporate Members of the I.E.E. and/or Corporate Members of the I.Mech.E. for the above position. Membership of the Institute of Fuel will be a recommendation. The position is Class "F," Grade 3, carrying a salary of £640-£667 per annum, and the successful applicant will be required to contribute to the Council's Superannuation Scheme.

Applicants should preferably be under 45 years of age and have had a thorough training and a varied experience in the operation of steam raising and electrical generating plant in a Selected Power Station.

The Gravesend Selected Power Station has a capacity of 13 500 Kw's with steam at 200 lbs./sq. in., and generation at 6 600 v. A programme of modernisation is in hand and two shift running is usual.

Applications, giving details of training and past work and present position, together with copies of any testimonials, should be sent to the undersigned before Friday, 31st January, 1947.

G. V. HARRAP, A.M.I.E.E., A.I.Mech.E.,  
M.Inst.F.,  
General Manager and Engineer.

**BOROUGH OF GRAVESEND.**

**DISTRIBUTION SUPERINTENDENT.**

APPLICATIONS are invited for the above position from Corporate Members of the I.E.E. The position is Class F, Grade 3, with a salary of £640-£667 per annum, and the successful applicant will be required to undergo a medical examination and participate in the Corporation's Superannuation Scheme.

Applicants should preferably be under 45 years of age, and must have had experience on E.H.V. and L.V. A.C. and D.C. mains, on rotary and rectifier plant, and on the construction and operation of Sub-stations, overhead lines and underground networks.

The Gravesend system handles about 50 million units per annum, and has 44 Sub-stations with another 12 Sub-stations under construction. The present maximum demand is approximately 14 000 Kw's and industrial loads comprise about half the consumption of electricity to the 16 000 consumers.

Applications giving details of training and past work and present position, together with copies of any testimonials, should be sent to the undersigned before Friday, 31st January, 1947.

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

**ELECTRICAL POWER ENGINEERS' ASSOCIATION.**

APPOINTMENT OF ASSISTANT SECRETARY. THE National Executive Council of the Electrical Power Engineers' Association invites applications for the appointment of Assistant Secretary.

It would be an advantage for applicants to have had experience in the Electricity Supply Industry, preferably on the technical side.

The successful applicant will be required to operate in the Association's Southern Area and to reside at Bristol.

The commencing salary will be £424 basic, rising to £556 basic; subject to adjustments for variations in the cost of living. The present commencing salary is £485.

Applications should be made on a form obtainable from the undersigned, which form should be returned duly completed not later than 14th February, 1946.

J. F. WALLACE,  
General Secretary.  
102, St. George's Square, LONDON, S.W.1.

## SITUATIONS VACANT

## HIS MAJESTY'S COLONIAL SERVICE.

## THE COLONIAL POSTAL SERVICE.

**A**SSISTANT Controllers of Telecommunications (Engineering) are required in the Telecommunications Department of the Malayan Union. Selected officers will normally be required to take executive control of a District within a Telecommunications Region, and will be responsible to the Controller of Telecommunications of that Region for all technical traffic and staff matters within the District. Alternatively they may be required to perform specialist engineering duties in any part of the Malayan Union at the discretion of the Director of Telecommunications.

Qualifications normally entitling candidates to consideration are Associate Membership of the Institution of Electrical Engineers, or degrees or diplomas giving exemption from the qualifying examinations of that Institution. In addition candidates should have had not less than two years' practical experience with the British Post Office or with a manufacturer of Telephone and Telegraph apparatus. Under present conditions, however, consideration will be given to applications from candidates with longer experience who lack the full examination qualifications but expect to be able to secure these during the first three years of their service in Malaya. Candidates must be between 25 and 35 years of age. Salary scale from £560 by annual increments of £35 to £1120 per annum, starting salary depending on age, qualifications and experience. Appointments are on probation for permanent, pensionable employment. Free quarters are not provided, but Government quarters, partly furnished, are usually available at low rates. Free passages for the officer and, if married, for his wife on first appointment and on leave. Home leave on full pay is normally granted after three years of resident service at the rate of four days for each month of resident service. Allowances for children under 18 are payable at the rate of £98 per annum for the first child and £70 per annum for the second child. Outfit allowance on first appointment.

Applications should be addressed to the Director of Recruitment, Colonial Office, 15, Victoria Street, London, S.W.1, stating age, qualifications and experience. Employees of the British Post Office should apply through their Establishment Officer.

## HIS MAJESTY'S COLONIAL SERVICE.

## THE COLONIAL POSTAL SERVICE.

**A**SSISTANT Controllers of Telecommunications (Wireless) are required in the Telecommunications Department of the Malayan Union. Officers selected will normally be required to take executive control of a group of wireless stations, and will be responsible to the Controller of Telecommunications of the region in which the stations are situated for all technical traffic and staff matters connected with these stations. Alternatively, they may be required to perform specialist wireless duties in any part of the Malayan Union at the discretion of the Director of Telecommunications.

Qualifications normally entitling candidates to consideration are Associate Membership of the Institution of Electrical Engineers, or degrees or diplomas giving exemption from the qualifying examinations of that Institution. They should have had at least two years' practical experience in a responsible technical position in a radio operating or manufacturing undertaking. Under present conditions, however, consideration will be given to applications from candidates with longer experience who lack the full examination qualifications but expect to be able to secure these during the first three years of

their service in Malaya. Candidates must be between 25 and 35 years of age.

Salary scale from £560 by annual increments of £35 to £1120 per annum, starting salary depending on age, qualifications and experience. Appointments are on probation for permanent pensionable employment. Free quarters are not provided, but Government quarters, partially furnished, are usually available at low rates. Free passages for the officer and if married for his wife on first appointment and on leave. Home leave on full pay is normally granted after three years of resident service at the rate of four days for each month of resident service. Allowances in respect of children under 18 are payable at the rate of £98 for the first child and £70 for the second child. Outfit allowance on first appointment.

Applications, stating age, experience and qualifications should be addressed to the Director of Recruitment, Colonial Office, 15, Victoria Street, London, S.W.1. Employees of the British Post Office or the British Broadcasting Corporation should apply through their Establishment Officer.

## DENBIGHSHIRE EDUCATION COMMITTEE.

## DENBIGHSHIRE TECHNICAL COLLEGE, WREXHAM.

**A**PPPLICATIONS are invited for the post of Lecturer in Engineering Subjects at the above College. Minimum qualifications—Higher National Certificate in Electrical Engineering and five years industrial experience. Successful applicants must be able to teach Electronics to Higher National Certificate, Electrical Technology and Mathematics to Ordinary National Standard. Ability to assist with Engineering Drawing an advantage.

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

Applications (no form), stating age, education, qualifications and experience, with dates, accompanied by copies of two testimonials and the names of two referees, should reach the undersigned on or before Saturday, the 15th February, 1947.

EDWARD REES,

Director of Education.

Education Offices,

RUTHIN.

9th January, 1947.

## CITY OF PLYMOUTH EDUCATION COMMITTEE.

## PLYMOUTH AND DEVONPORT TECHNICAL COLLEGE.

Principal: A. R. Boeree, M.A., B.Sc. (Oxon), F.I.C.

**A**PPPLICATIONS are invited for (a) the post of lecturer in Chemistry; (b) the post of lecturer to teach Electrical and/or Civil and Mechanical Engineering. A good honours degree of a British University and teaching and industrial experience are desirable. Salary will be paid according to the Burnham Technical Report. Further particulars and application form (which should be returned within two weeks of the appearance of this advertisement) may be had from

ANDREW SCOTLAND,

Director of Education,  
Cobourg Street, Plymouth.

**A**SSISTANT Engineer, 25 to 35, required for overhead transmission line work in Consultants' Office in Newcastle. Must be thoroughly conversant with design and checking of steel towers; electrical experience desirable but not essential. Applications stating age, qualifications, experience and salary required to Merz and McLellan, Carlisle House, Newcastle-upon-Tyne, 1.

**A**RMATURE 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.



## SITUATIONS VACANT

## FOLKESTONE ELECTRICITY SUPPLY COMPANY LIMITED.

## DRAUGHTSMAN.

APPLICATIONS are invited for the above appointment for Draughtsman with experience in a distribution drawing office, who is conversant with mains records and the design and layout of distribution networks.

Salary and conditions of employment will be in accordance with N.J.B. Schedule, Class "E," Grade 9, viz., £335-£351 per annum.

Applications should be addressed to the Regional Manager, Folkestone Electricity Supply Co., Ltd., York House, Cheriton Gardens, Folkestone, giving full details of experience, age, training and qualifications, and accompanied by copies of two testimonials.

## CITY OF BRADFORD.

## FOREMAN (ELECTRICAL CONTRACTING).

APPLICATIONS are invited for the position of Foreman (Electrical Contracting) in the Consumers Engineer's Section of the Electricity Department, from persons who have had a sound training and considerable practical experience in the Electrical Contracting Industry.

The person appointed will be directly responsible to the Consumers' Engineer for the preparation of estimates and specifications for all classes of electrical installation work undertaken by the Department, the supervision of the carrying out of such work, and the control of the staff engaged thereon.

The normal working hours will be 47 per week, and the wage paid will be the rate applicable to an electrician in the contracting section, which is at present 2s. 6d. per hour, plus £1 10s. per week, i.e., a total amount of £7 7s. 6d. per week. This wage will be subject to review when a Scheme of Grading of Foremen, etc., now under consideration by the Corporation, is put into operation.

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

Applications, stating age, qualifications, experience and appointment at present held, accompanied by copies of recent testimonials, and endorsed "Foreman (Electrical Contracting)" should be sent to the Electrical Engineer and Manager, 45-53, Sunbridge Road, Bradford, so as to reach him not later than 4th February, 1947.

W. H. LEATHEM.

Town Hall, Bradford. Town Clerk.  
BRADFORD.  
January, 1947.

**D**OWER Plant Engineer required by oil company Persian Gulf holding degree in electrical or mechanical engineering with experience in large power plant station. Age 30-35. Salary from £720 per annum, depending on qualifications. In addition meals and furnished accommodation provided free of charge. No income tax. Married applicants must be prepared separation from families for two years.—Write full details to Box 1501, c/o. Charles Barker and Sons Ltd., 31, Budge Row, London, E.C.4.

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

**E**XPERIENCED DRAUGHTSMEN required for electric cookers and water heating appliances. Applications to—South Wales Switchgear, Ltd., Blackwood, Mon.

**F**ULLY qualified ELECTRICIANS required at N.F.E.A. rate of 2s. 6d. an hour—Apply to the East Anglian Electric Supply Co. Ltd. (L.R.S.), Fimborough Hall, Stowmarket, Suffolk.

## SITUATIONS VACANT

**W**ANTED, Foreman Armature Winder; must be accustomed to A.C. and D.C. repairs, testing and running machines; capable of taking full charge of workshop. Apply in writing, stating full experience, age, married or single, and wages expected, to Potter's Electrical Repair Works, Bath Lane, Swansea.

**F**H.P. MOTOR Repairs. Good REPAIR MAN required, used to all types, including car dynamos and starters. Able to wind, fit and turn; small friendly shop, 5-day week, 44 hours. Write only: Express Elect., 185, Isledon Road, Finsbury Park, N.7.

**E**LECTRICAL DRAUGHTSMEN required for modern precision engineering works in the North West. Experience in light current control apparatus for industrial and aircraft application. A man with workshop experience preferred. Remuneration will be commensurate with qualifications and past experience. Reply stating age, present salary, and giving full details of past experience, to Box 10DJ, "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

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

## SITUATION FILLED

**M**ESSRS. Richard Haworth and Co. Ltd. wish to thank all applicants for the position of Chief Engineer, and to inform them that the position has now been filled.

## NOTICES

G.  R.

By Order of the Minister of Supply.

WITHOUT RESERVE,  
ASHCHURCH, GLOS.

(Within 2 miles of Tewkesbury and 7 of Cheltenham.)

Sale by Auction of about

26 000 TYRES and wheel assemblies.

4 500 INNER TUBES.

2 000 GENERATING UNITS, Petrol and Diesel driven, from 110 to 125 volts, and from 5 to 30 kilowatts.

A LARGE QUANTITY OF MEDICAL, Bedside and other Tables, Enamel Instrument Tables, Stands, Chairs, etc. Miscellaneous RUBBER AND CANVAS HOSE and FITTINGS.

A very large, and varied, assortment of CARPENTER'S, BLACKSMITH'S, ENGINEER'S, and ELECTRICIAN'S TOOLS, stores, etc.

Auctioneers:

BRUTON, KNOWLES AND CO.,

in conjunction with GEORGE HONE.

SALE DAYS: TUESDAY, WEDNESDAY,

THURSDAY and FRIDAY of each week.

JANUARY 28th, 29th, 30th, 31st.

FEBRUARY 4th, 5th, 6th, 7th.

FEBRUARY 11th, 12th, 13th, 14th, 1947,

at 11 o'clock punctually each day.

VIEW DAYS: THURSDAY, FRIDAY AND

SATURDAY, January 23rd, 24th, 25th,

and MONDAYS, JANUARY 27th, and

FEBRUARY 3rd and 10th, 1947.

From 9 a.m. to 3 p.m., and on Sale Days

from 9 a.m. to 10.30 a.m.

CATALOGUES, price 6d. each, may be had of the Auctioneers: Bruton, Knowles and Co., Albion Chambers, Gloucester (telephone Gloucester 2257), or George Hone, Tewkesbury (telephone Tewkesbury 10).

Admission will be by catalogue only.

## FOR SALE

1-H.P. Motors, 230-250 volts, 50 cycles, split-4 phase, starting torque 225 per cent., sleeve bearings, automatic thermal protection. These motors are brand new and manufactured by English Electric. A few are available for immediate delivery at £7 10s. each net. Carriage paid for lots of 12 or more.—Waltman Electrical Co., The Mall, Chiswick, W.4 (Chiswick 4542).

D.C. Higgs Motors, one 15 h.p., with starter, £22 10s.; one 10 h.p., ditto, £15.—Ryland, 150, Moseley Road, Birmingham, 12.

D.C. Exhaust Fans: Keith Blackman, type S, 8 in. outlet, 15 h.p., 220 v.; Sturtevant No. 6, 10 in. outlet, 12 h.p., 220 v.; Sturtevant No. 6, 10 in. outlet, 10 h.p., 220 v.; Sturtevant No. 3, 7 in. outlet, 4 h.p., 220 v.; Keith Blackman, type S, 8 in. outlet, 6 h.p., 440 v.—S. C. Bilsby, Crosswells Road, Langley Green, near Birmingham.

5000 GOOD strong Crates, inside measurements 29 in. by 9½ in. by 9½ in., ¾ in. thick, battened all round, at 1s. 9d. each, ex works.—L. Goldser and Sons, 14a, Rectory Square, London, E.1 (Tel.: Steyne-Regen 2550).

600-W. and 750-w. Spiral Elements, large quantities ex stock, competitive prices, 5d. and 6d. each respectively.—Middlesex Electron Co., Ltd. (Molesley 3541).

SECTIONAL timber buildings.—Completely reconditioned and equal to new. Sizes: 6 ft. by 6 ft., 16 ft. by 8 ft., 20 ft. by 12 ft., 36 ft. by 17 ft., 52 ft. by 20 ft., 60 ft. by 16 ft., 6 in. Nissen types: 90 ft. by 30 ft., 95 ft. by 35 ft., and others. Suitable for offices, canteens, workshops, classrooms, hostels, and bungalows. No purchase licence required. Offered subject to being unsold.—D. McMaster and Co., Mount Bures Works, 21c, Bures, near Colchester, Essex. Tel.: Bures 351/2.

FIRE Elements.—Good quality, pencil type. Wound nichrome wire. 9½ in., 1 kW, 48s. dozen; 500 lots, 3s. 7d. each; 1000 lots, 3s. 6d. each; 5000 lots, 3s. 3d. each; 8 in., 750 w., 42s. dozen; 500 lots, 3s. 1d. each; 1000 lots, 3s.; 5000 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.

WE have for immediate disposal the following materials surplus to our requirements.—Black Oiled Silk, 12 in. sq. 394. Yellow Varnished Silk, 5 in. by .006 in. Black Varnished Silk, 1.13/16 in. by .006 in. Yellow Varnished Silk, 1.13/16 in. by .006 in. Varnished Silk Sq. 394, 1.15/16 in. by .006 in. Varnished Silk, 10 m/m by .0025 sq. 394. All the above are brand new and are offered at considerably less than market prices to clear.—Leightons (Contractors), Ltd., 10, Chandos Street, London, W.1. Tel.: Langham 3704.

"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.

SWITCH BLOCKS.—Round I.W. and W.E. Well finished in best quality hardwood. 2½ in. by ½ in., 48s. gross; 3 in. by ½ in., 45s. gross. 2½ per cent. discount. Carriage paid.—Elf Mfg. Co., Sansome Place, Worcester.

BUS-BARS. 1350. 12 ft. sections, 5-phase neutral Bus-Bar Chambers, complete with connectors. MERCURY VAPOUR LAMPS.—50 complete, as new, with chokes and condensers, 400-watt bulbs. DUAL FITTINGS WITH SHADES.—100 as new, complete, less chokes and condensers. FLUORESCENT LIGHTING.—100 Twin 5 ft. Tube Fittings, complete with chokes and condensers, and tested, less tubes.—Apply: C. J. Rice, 137, Mayplace Road West, Bexleyheath, Kent. Phone: Bex. Heath 3262.

QUANTITY of Flexible Drive MACHINES, ¼ h.p. for disposal.—Carbot, Ltd., 201, Long Lane, London, S.E.1.

## FOR SALE

QUANTITY of Portable Electric BLOWERS, complete with heating elements, for disposal.—Carbot, Ltd., 201, Long Lane, London, S.E.1.

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

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

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

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

FOR SALE.—Nisson Huts 36 ft. by 16 ft., also 12 Wooden Sectional Buildings, all sizes.—Sykes, Tenterfields, Ovenden, Halifax. Tele. Halifax 5802.

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

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

ALL Types of ELECTRICAL and CON-TRACTORS PLANT, Pumps, Boilers, Engines, etc., in stock.—G. E. WHITAKER, Wellington Mill, Bolton Road, Blackburn. Tel. 7232.

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

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.

FOR SALE.—New Threaded Steel Rods, 2 ft. 3 in. long overall, threaded for 2 ft. B.S.F. diameters ½ in. and ¾ in. Also Rods 2 ft. 3 in. long, ¾ 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.

LARGE quantity of Tufnol Carp Brand Strip, 4 ft. by 3 in. by .020 in. thick; also Tufnol Tube, 4 ft. long by 3 in. internal dia. by 3 in. outside dia. Write or phone.—Stanley and Sanders, 34, West Common Road, Hayes, Bromley, Kent (Phone: Hurstway 1393).

## DYNAMO &amp; MOTOR REPAIRS LTD.

Wembley Park, Middlesex.  
Telephone: Wembley 3121 (4 lines).  
Also at Phoenix Works, Belgrave Terrace,  
Soho Road, Handsworth, Birmingham.  
Telephone: Northern 0698.

## 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 1000 RATINGS ACTUALLY IN STOCK  
HEREF.

## FOR SALE

WE can supply all types of Presspahn Insulating pieces to specification, and would appreciate enquiries.—Tradex Manufacturing Co., Tradex Works, Swindon.

WE have for immediate disposal a large quantity of New Insulating Sleeving (mainly Vidaflex) in various sizes. Discounts up to 40 per cent. allowable off current prices for bulk purchases.—Thornley and Co., 82, Hoyalake Crescent, Ickenham, Middlesex.

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

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

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

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

SACKS and Bags in excellent condition for all commodities, as low as 4d. each. Write: John Braydon, Ltd., 230, Tottenham Court Road, W.1.

HEAVY-DUTY ARC-WELDING PLANTS.—200 amps. Price £36 10s. complete. Also Spot Welders. £48 10s.—John E. Steel, Clyde Mills, Bingley. Phone 1066.

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.: W0RDsworth 4928.

VACUUM Cleaner Spares and Accessories. Bags, bearings, belts, brushes, fans, switches, etc. Repairs, rewinding, rebristling. Sent for price list.—Reliance Vacuum Cleaner Service, 152-154, Broadway, Bexleyheath, Kent. A TLAS lamps from stock, delivery in London, Surrey, Sussex and Kent; other lines include clocks, toasters, fires, irons, kettles, fans, fittings, chargers, speakers, etc.—Drubel Radio Distributors, Ltd., 39a, Stafford Road, Croydon. Croydon 1107.

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. Tel.: Vic. 9550/1441.

SINGLE Phase Slip Ring Induction Motors. 1-30 H.P., 1000 r.p.m., 200/400 volts, by Brook; 1-15 H.P., 1500 r.p.m., 200 volts, by Brook; 1-15 H.P., 1450 r.p.m., 200 volts, by A.S.E.A.; 1-15 H.P., 950 r.p.m., 200 volts, by Fuller; 1-3 H.P., 1450 r.p.m., 460 volts, by Hopkinson, Squirrel Cage. All the above motors fitted with ball and roller bearings.—Oldfield Engineering Company, Ltd., 96, East Ordsall Lane, Salford, 5.

## FOR SALE

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.

ELECTRIC Convector Heaters.—Home and Export market supplied. Prompt deliveries from Weatherhead and Company (Glasgow) Ltd., Electro-Engineering Manufacturers and Distributors, 153, Oxford Street, Glasgow, C.5.

FOR Disposal.—Five 10 h.p., 400 V, 50 c, 1470 r.p.m. Single phase, squirrel cage, capacitor MOTORS. Met-Vick, protected type (one unused). One 10 h.p. 400 V, 50c, 1425 r.p.m. single phase Century Motor. All complete, five groove pulleys. Vee Belts, switches and automatic starters.—Universal Postal Frankers, Ltd., 1-7, Canonbury Street, London, N.1. Clissold 3613.

## WANTED

WANTED, two 80-yard lengths or one 160-yard length P.L. served .75 sq. inch CABLE, 660 volts.—C. Davidson and Sons, Ltd., Mungie Moss, Bucksburn, Aberdeenshire.

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.

WANTED.—Complete industrial diesel generating plant, 400 v., 3-phase. A.C. up to 25 K.W.—Box No. LDI, "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

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

WANTED urgently, 1 and 3 phase MOTORS, V S/C or totally enclosed, ½ h.p. to 1 h.p., 1425 or 2800 revs.—F. W. Kubach, 12, Sylvan Road, London, S.E.19. Phone: Livingstone 3111/2.

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.

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

FLUORESCENT Lamps (tubes) 5 ft. 12 urgently required. Good prices paid.—Box No. 17G, "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

## EDUCATIONAL

UNIVERSITY OF LONDON.—A course of five lectures on "Atomic Energy in Relation to Electrical Engineering" will be given by Dr. T. E. Allibone at 5.30 p.m. on Mondays, 20th January, 3rd, 17th February, 3rd and 17th March at the University of London, Senate House, W.C.1 (entrance from Russell Square or Malet Street). The Chair at the first lecture will be taken by Professor W. J. John. ADMISSION FREE, WITHOUT TICKET.

JAMES HENDERSON,

Academic Registrar.

## REPAIRS

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

## 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.

## WORK WANTED

**J**IG and Tool, Light Mechanical and  
Structural Design, Tracing and Detailing.  
—Fraser-Hayes and Son, 7, Kenilworth Road,  
Cheddle Heath, Stockport.

**C**APSTAN capacity immediately available,  
6 BA to 1½ in. Brass or Steel. Large stocks  
of raw material in hand. — Chiswick  
Engineering, Ltd., 7, High Road, Chiswick,  
London, W.4, Chiswick 3595.

**"CLEPA"** 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.

**C**APACITY available for coil winding, im-  
pregnating, engraving and light machine  
work.—Castlenau Instruments Ltd., 50,  
Glentham Road, S.W.13.

**V**ACUUM 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.

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

**V**ACUUM CLEANER REWINDING SERVICE,  
commutators and Bearings. Prompt  
delivery and full guarantee.—Thomas Ander-  
son, 117, Bowes Street, Blyth, Northumber-  
land. Phone: Blyth 405.

**BRISCOE PLATING CO. LTD.,** now have

available capacity for silver and nickle  
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

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

## BUSINESS FOR SALE

**R**ADIO, television, electrical sales and  
service, est. 23 years, important Midland  
town; one D.F. shop, leased, and D.F. shop  
with detached house, freehold; net profit  
£2,000 p.a., accountants' figures; price £7,000,  
including freehold, s.a.v.—Russell Gunton, 2,  
Market Street, Kettering.

## AGENCIES

**L**. GOODMAN (RADIO), LTD., 9, Percy  
Street, W.1, are sole London agents for  
the "Mico" Elongated FLUORESCENT  
CHOKE and Fluorescent Starter SWITCHES  
Museum 0216.

THE ELECTRICIAN

## PATENT AGENTS

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

**A. E. HILL**

Chartered Patent Agent,  
27, Chancery Lane, London, W.C.2.  
Chancery 8444

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

**ECHO ARMATURE TESTER**

Instantly detects faults in A.C.  
Armatures & Coil Windings D.C.

Send for Leaflet R11

**RUNBAKEN-MANCHESTER**



# STUDDING?

## TELCO

TELCO LIMITED

3 NEWMAN ST.

LONDON, W.1

MUSEUM 5701/4



93.43

17 JANUARY 1947

# Fusing Facilities

## No. 4



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

*Durable by Design...*

Sole Manufacturers:  
**DURATUBE & WIRE LTD**  
 FELTHAM • MIDDSX

# Tags



**IN GREAT VARIETY**

*The* **HAMPTON WORKS**  
 (STAMPINGS) LIMITED  
 PRESSWORK EXPERTS

TWYNINGS ROAD, STIRCHLEY, BIRMINGHAM  
 Tel.: KINGs Norton 2901 (3 lines). \*Grams: Radiagills, B'ham.

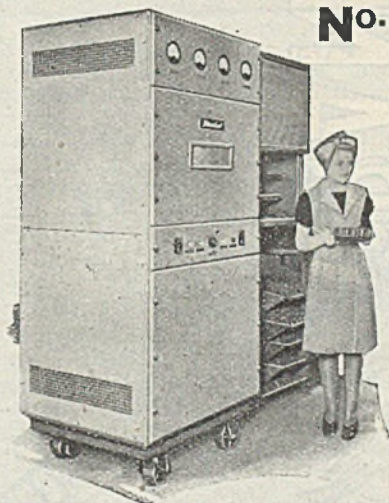
# PRESSPAHN, LTD.

Electrical Insulative Material Manufacturers

REGISTERED EST. 1900  
 Telephone: BRADFORD 5050  
 Telegrams & Cables: "PRESSPAHN" BRADFORD



REGISTERED OFFICES:  
 38 WELL ST., BRADFORD, England



## 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

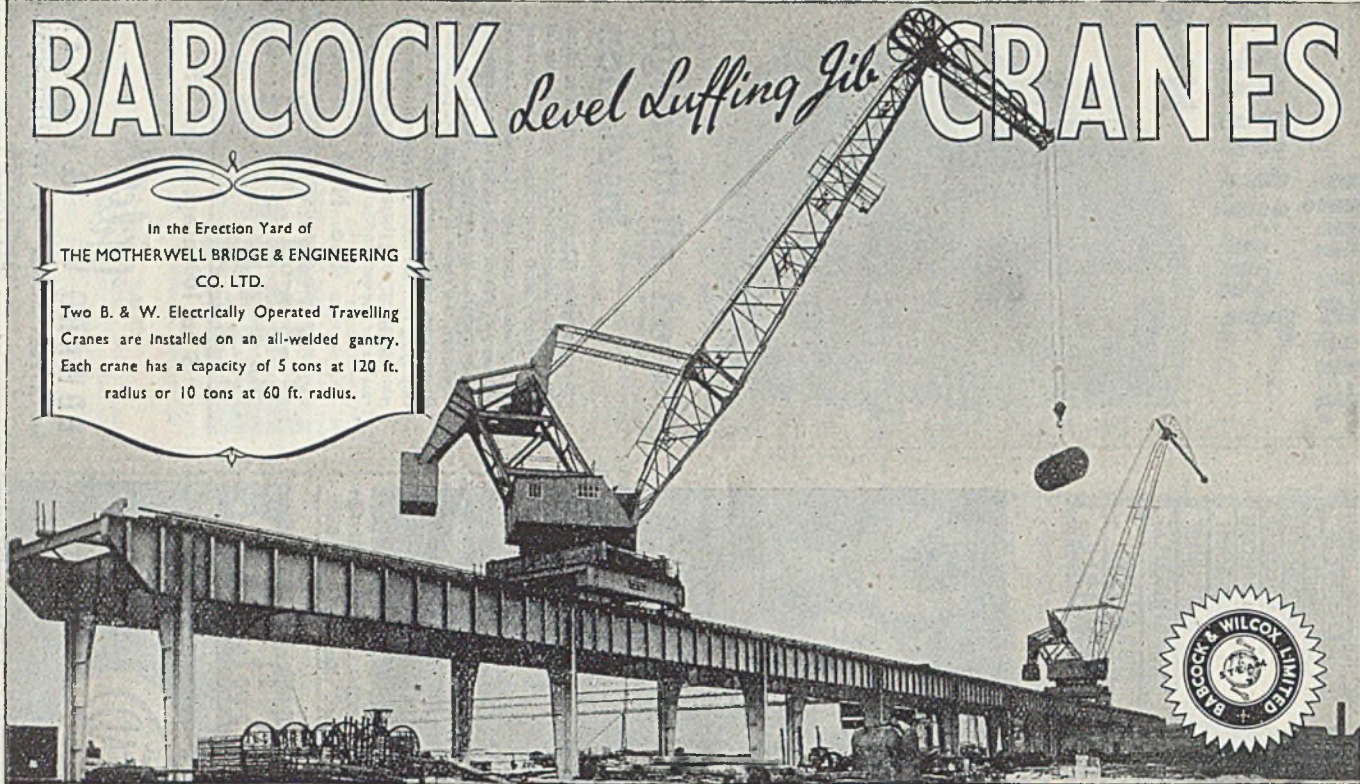
*Wilcox*  
**EDWARD & CO. LTD.**  
 SHARSTON ROAD • WYTHENSHAW  
 MANCHESTER

dm EW9

# BABCOCK *Level Luffing Jib* CRANES

In the Erection Yard of  
THE MOTHERWELL BRIDGE & ENGINEERING  
CO. LTD.

Two B. & W. Electrically Operated Travelling  
Cranes are Installed on an all-welded gantry.  
Each crane has a capacity of 5 tons at 120 ft.  
radius or 10 tons at 60 ft. radius.



**BABCOCK & WILCOX LTD., 34-35 FARRINGTON ST., LONDON, E.C.4**



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 3581

17 JANUARY 1947

Vol CXXXVIII No 3

## CONTENTS

<i>Views on Current Affairs</i> .....	185
<i>The Electricity Bill</i> .....	188
<i>The Area Boards</i> .....	191
<i>Electricity "Take-Over" Prices</i> .....	192
<i>Bankside Power Station</i> .....	195
<i>Protection of Installations</i> .....	197
<i>Electrical Personalities</i> .....	199
<i>Protecting Power Cables</i> .....	201
<i>Answers to Technical Questions</i> .....	204
<i>What Manufacturers Are Doing—IV</i> ...	205
<i>Equipment and Appliances</i> .....	207
<i>More Coal for Electricity</i> .....	209
<i>Industrial Information</i> .....	210
<i>Electrical Inventions</i> .....	214
<i>Electricity Supply</i> .....	215
<i>Coming Events</i> .....	216
<i>Electrical Industry in Italy</i> .....	217
<i>Contracts Open</i> .....	218
<i>Company News</i> .....	219
<i>Commercial Information</i> .....	220

## The Bill

THERE is in the Electricity Bill evidence that it has been drawn up, not with proper regard to the future of electricity supply but on the dangerous assumption that State monopoly is the final word in economic wisdom.

It ignores the reconstruction schemes submitted by the industry to the Minister of Fuel when the Coalition Government was in office, and by its similarity in certain details to the Bills relative to coal and transport, shows that the Government looks upon the nationalisation process as something which can be standardised, irrespective of whether the industry to become State-owned is efficient or otherwise.

The record of electricity supply is one of outstanding achievement despite overwhelming handicaps put up by outdated legislation, while the main adjustments in organisation outlined in the Bill were recommended by the industry three years ago. The industry has shown by its flexibility that by adaptation and reform of its existing constitution, the aims of the present Bill could be achieved without the upheaval which threatens it and without introducing further embarrassment at a time when the exacting tasks of pre-war reconstruction are the main concern.

The declared objectives of the Bill include cheaper and more uniform tariffs; co-ordinated supply and distribution; development of rural electrification; investigation into the possibilities of district heating; standardisation of voltage and of frequency—every one of which is

### MIDLANDS OFFICE:

Daimler House, Paradise Street, Birmingham  
Telephone: Midlands 0784-5

### GLASGOW OFFICE:

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

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

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

at present already being pursued, including rural electrification up to 95 per cent. of the country within the next five years, and a number of district heating schemes already drawn up by independent consulting engineers and published. The Bill is open to objections stronger in their expression than those levelled against coal and transport, in that the efficiency of electricity supply is not in doubt nor has it ever been challenged by the Government. Electricity is a rapidly expanding industry with prospects of which the Bill gives its present administrators none of the benefits; it is an organisation, the uninterrupted advancement of which is indispensable to all other forms of industry; and it is impossible to see in the Bill anything more than another case of nationalisation, not because the conditions demand it, but because those politically in power at the moment want it.

### **Power to Manufacture**

THAT part of the Bill which gives powers to the Authority to manufacture has about it an atmosphere of intimidation which the industry is fully justified in resenting, for the proclaimed intention to use the powers only if prices are forced up and intervention is warranted suggests that the Authority might at some future date use its powers as a threat to private enterprise. The power to sell, hire or otherwise supply electrical fittings is provided in the Bill for both the Central and Area bodies, and the position of the electrical contractor in the circumstances is a matter for speculation. While it is the declared intention that the powers vested in the Authority and the Boards should be used only as a corrective price safeguard, the fact that the Government has already commenced the manufacture of electric cookers and ceramics in Royal ordnance factories in connection with the housing programmes, gives rise to serious misgiving as to what the ultimate result may be.

### **Compensation for Companies**

WITH respect to compensating the industry so far as the companies are concerned the proposals are generally regarded as inadequate since they make no allowance for the goodwill

established, the risks taken, and the fact that the industry has an assured future bound up with steady expansion. Compensation in the case of the supply companies and the C.E.B. stockholders is estimated roughly at £370 million and is to be based on Stock Exchange prices and not on the net maintainable revenue of the industry. This basis has been denounced as unfair and unjust in City financial circles and the investors feel that they are getting a raw deal.

### **Local Authority Transfer**

SO far as local authorities are concerned, they are to receive by way of compensation for the transfer of their undertakings, payments from the Central Authority to cover the interest and sinking fund charges on the debt of such undertakings, the total liability being estimated at about £200 millions. In other words, they will be relieved of their liabilities and will receive no compensation for the loss of valuable assets, the Government view being that in the transfer from one public authority to another of an undertaking built up out of capital charges derived from loans and extended out of revenue, no question of compensation can arise, and as the transfer involves no liability on the local authority there is no element of unfairness. That this view will be refuted by local authorities cannot be in doubt.

### **Future Development**

ARGUMENTS in opposition to the Bill include, too, the retarding effect the proposals may have on existing plans for electrical development at a time when the industry of the country is calling out for more power; and the fact that the interests of industrial and domestic consumers are inadequately safeguarded. There is the danger, too, that the proposed Consultative Councils may usurp to some extent the functions now carried out by the British Electrical Development Association, and the possible effect of the nationalisation of the supply industry on the future of that useful body may require those concerned with its activities to widen its scope. The Central Authority may, on the other hand, recognise the value of the E.D.A. as a propaganda medium and utilise its services to the full, in which case the conclusion may be reached that the



association would become part of the main framework and thereby lose much of its present independence.

### **A Sacrifice to Politics**

THE Bill discloses no plan for the improvement of the industry nor for the provision of a more abundant or cheaper supply of electricity such as the companies have put forward in their five-year programmes; nor does it promise any extension of the ready service which the municipalities have offered in the urban areas during the last twenty years and before. It is, on the other hand prejudicial to electricity supply and confers no benefits upon the consumer or the nation which would not have come about with the industry as at present constituted. It discloses the fact that it has been drawn up without that full measure of co-operation with the industry which it is reasonable to expect would have resulted in a more constructive proposal. It is a Bill deserving of the severest opposition and criticism in that its proposals, designed to give expression to political ambitions, all but ignore the welfare of the industry in the years to come and reduces the industry's competitive value with respect to gas.

### **Fuel Minister's Power**

A WRITER in "The Economist," of last week, discussing the effects of existing and forthcoming nationalisation measures, makes the significant point that the results of State-ownership may well mean that less, not more, is known about any nationalised industry than before. Under private enterprise, it is pointed out, the affairs of an industry are periodically ventilated before the public during disputes between labour and management, or management and the Government, and this is held to be desirable, in that the public always has two versions of the story. Similar disputes in a nationalised industry, however, are likely to be conducted behind a curtain of inter-departmental memoranda and may concern matters of considerable public interest which may not, however, ever become public knowledge. The opinions quoted above were forced before the Electricity Bill became public, and they become of special importance in view of Clause 8 of the Bill, which

permits the Minister, in the national interest, to forbid any reference, in the Central Authority's annual report, to certain Ministerial directions. There will be general agreement that, in times of national emergency, such powers are essential. The phrase "national interest," however, is a flexible one, and the Clause, as it stands, provides a too convenient blanket for Ministerial deficiencies.

### **P.M.H. and the Future**

SOME weeks ago, we had occasion to call attention, in these pages, to an excellent British documentary film called "Can We Be Rich?" Its text was the correlation between standard of living and output per man-hour, and it made clear the inescapable economic fact that a rising standard of living, together with increased social amenities and shorter working hours, can only be attained, or justified, on a basis of greatly increased productivity. Now, this message is reinforced in a carefully compiled pamphlet, "Men, Management and Machines," issued by Political and Economic Planning. Not only, the writers state, is greater output essential to maintain our living standard, when the loans run out, but to prevent a major breakdown.

### **Electricity the Exception**

IN a comparison between the productivity rates now and before the war, the disconcerting fact is brought out in the pamphlet that, far from a higher P.M.H. being within sight, output in many branches of industry has fallen severely. A rare exception is the electricity supply industry which, it is shown, up to 1944 had increased output per worker more than 16 per cent. on 1939 levels, albeit at a cost to plant for which we are now paying. Some of the causes of low output are a function of reconversion and may be relied upon to disappear. Others, such as maldistribution of the available labour force and the effects of P.A.Y.E., need early solution, and the ultimate results of a full employment policy have still to be ascertained. What is quite certain is that electricity, from improved factory lighting to more widespread use of electric drive, will, given the opportunity, play a very large part in the P.M.H. improvements which must be brought about.

# The Electricity Bill

*Published on January 10, as foreshadowed in THE ELECTRICIAN last week, The Electricity Bill provides in brief for (1) the establishment of a British Electricity Authority, 14 Area Boards, a North of Scotland Board and 15 Consultative Councils; (2) the nationalisation of 570 electricity undertakings, 370 of them municipally-owned, and holding companies with a majority interest in supply; (3) compensation to the companies in Treasury-guaranteed stock, on a basis of share values at certain dates, the total sum involved being estimated at £350 000 000; (4) payments to municipalities on a basis of net outstanding debt, to cover interest and sinking fund charges; (5) issue of further stock, limited to £800 000 000, to cover extensions, etc; (6) compensation to employees in respect of financial loss due to vesting; (7) the manufacture and sale of electrical equipment.*

**T**HE main purpose of The Electricity Bill, details of which were made public on January 10, is "To provide for the co-ordination under public-ownership of the electricity supply industry in Great Britain." Under its provisions 570 authorised undertakings will be nationalised, the C.E.B., and possibly the Electricity Commissioners, dissolved, and stockholders compensated on the basis of the Stock Exchange value of their holdings, a figure estimated at £370 000 000.

There are to be set up three types of organisation; a British Electricity Authority, a North of Scotland Board, 14 Area Boards and a Consultative Council to each Board.

**The Central Authority is empowered, from the vesting date, to generate or acquire supplies, co-ordinate distribution by the Area Boards and exercise a general control over their policy, and also supply direct to large consumers, such as railways. It may also manufacture, sell, hire, instal, repair and maintain plant and fittings.**

The Authority will consist of a chairman and not more than six members appointed by the Minister on account of their technical or other qualifications. There will be, in addition, not more than four members drawn from chairmen of the Area Boards, and also the chairman of the North of Scotland Board.

The policy of the Area Boards is to be directed to securing the use of economical methods of generation, transmission and distribution, cheapening, when practicable, of supplies, simplification of tariffs and standardisation of supply systems and types of fitting.

**Boards may sell, hire, etc., but not manufacture, plant and fittings.**

Each Area Board is to consist of a chairman and not more than seven members selected by the Minister on account of their qualifications (which may include knowledge of local government matters) and in addition, the chairman of the Consultative Council in that Area.

It will be a duty of the Authority, and in some circumstances the Boards, to conduct and assist research, and to make provision for the training of employees and the improvement of equipment and methods of working.

Any Area Board may, with the approval of the Central Authority, give or acquire supplies from another Area Board and may also acquire supplies from a producer other than a Board. By agreement with another Board, it may supply consumers beyond its boundaries.

The North of Scotland Board will be in a special position, and will discharge in its district, which is to be enlarged by the inclusion of Dundee and other urban and rural areas, those functions undertaken elsewhere by the Central Authority, and the Area Boards. It will not be subject to the control of the Central Authority, but will be responsible to the Secretary of State for Scotland in the same way as the Central Authority will be responsible to the Minister of Fuel and Power.

Provision will be made for enlarging the membership of the Scottish Board, in view of its additional functions, by permitting an increase in membership up to a maximum of nine. These members will be appointed by the Secretary of State and the Minister, acting jointly. The chairman will be ex officio a member of the Central Authority.

In each Area Board district, and in the North of Scotland District, will be established a Consultative Council. These will consist of 20-30 members appointed by the Minister, half from local authorities and the remainder representing consumers and other interested persons. The Councils will be concerned with matters affecting distribution, including charges, tariffs and the provision of new or improved services and facilities.

They will also consider the general plans and arrangements of the Area Board concerned, Boards being under a statutory obligation to keep Councils informed on

such matters. In the event of a Consultative Council being dissatisfied with any decision of its Area Board, it may make representations to the Central Authority, which in turn is given the power to issue directions for the rectification of any defect.

The Minister will issue general directions to the Central Authority on matters affecting the nation's interest and lay down general lines on which programmes of reorganisation and development are to be drawn. He may also demand information regarding the exercise by the Authority of its functions. In Scotland, the Secretary of State has similar powers in relation to the North of Scotland Board.

The powers of the Central Authority with respect to the Area Boards will cover the issue of directions on matters of distribution and financial policy.

Various annual reports will be called for. The Central Authority must report to the Minister at the end of each financial year on its functions, policy and programmes. These reports are to set out any Ministerial directions made to the Authority during the year. If, however, the Minister considers that the disclosure of such directions would be against the national interest, he may order their omission. Area Boards, in their turn, will report similarly to the Central Authority. These reports will be laid before Parliament by the Minister.

Authorisation may be given by the Minister to Boards to purchase compulsorily any land required for the discharge of their functions.

Central Authorities and any Area Board may, with the consent of the Minister, promote or oppose Bills in Parliament. The Boards are not exempted from any taxes, rates or other general or local charges.

From the vesting date, the following bodies will be taken over:

All authorised undertakers, including the Central Electricity Board, but excluding the North of Scotland Board.

Power station companies who are not authorised undertakers, but whose business consists wholly or mainly in constructing, owning or operating generating stations.

Holding companies who are not authorised undertakers, but three-

quarters of whose assets at the date of the last audited balance sheet of the company before January 1, 1946, comprised interests in authorised undertakers or power station companies.

The assets and liabilities of the C.E.B., together with all generating stations and main transmission lines and all investments and cash of any authorised undertakers (other than such as vest in the North of Scotland Board) will be vested in the Central Authority.

The remaining assets and liabilities of authorised undertakers will vest in the Area Boards. The North of Scotland Board will take over assets or liabilities in its district, as described above. Where authorised undertakings are a local authority, only the electricity undertaking will vest. Provision is made for subsequent adjustments as between the Central Authority and the various Boards.

**Holders of securities in electricity companies (but not in a local authority) whose assets and liabilities are transferred by the Bill will be compensated by the issue, by the Central Authority, of negotiable British Electricity Stock to an amount considered, in the opinion of the Treasury, to be at the date of issue of a value equal to the value of the securities.**

The value of the securities for which stock will be issued is to be deemed to be the average market value of the securities on either of two groups of dates, whichever is the more favourable to the holder. Special provision is made for valuation in cases where there has been a fresh issue

of securities after November 1, 1946, and in cases where securities are unquoted. "Stockholders' representatives" are to be appointed by the Minister to represent their interests in connection with the payment of compensation.

Interest and dividends on securities of transferred bodies are to be limited to permitted

maxima after January 10, 1947. Transactions resulting in the dissipation of assets after this date may be re-opened.

**Compensation to local authorities will be made by the Central Authority, on a basis of net outstanding debt.**

Where a municipality has established a loan redemption fund, capital payments will be made to provide for the repayment of the loan within the redemption period.

---

*The Bill gives the Minister power to:*  
*Appoint all but one of the members of the Central Authority.*

*Appoint all members of Area Boards and Consultative Councils.*

*Give general directions on matters appearing to affect the national interest.*

*Lay down general lines for organisation and development programmes.*

*Require information of the Authority, and*

*Prohibit the disclosure of Ministerial directions.*

---

So long as the fund is insufficient to redeem the loan, annual payments will be made equal to the interest due on the loan.

Where provision has been made by the authority for the redemption of a loan by instalments, the Central Authority, subject to certain regulations, will pay to the authority capital payments equal to the amount of the instalments and also make annual payments equal to the interest due on the loan. Where the instalments represent payments of interest and principal, combined, capital repayments and amounts to cover interest will be made concurrently.

In certain circumstances, further payments may be made to local authorities in respect of capital expenditure incurred by them after November 19, 1945.

It is not stated what the total amount of compensation will be. An estimate puts the compensation payable to companies alone (including the C.E.B.) at £370 000 000.

The Central Authority is also empowered to

create and issue British Electricity Stock for the purpose of borrowing money for capital purposes. Both the Authority and the Area Boards may raise temporary loans, but the total sum outstanding at any time in respect of stock issued, which may be required for the building of power stations and the financing of distribution, etc., is not to exceed £700 000 000, in the case of the Central Authority and the Area Boards, and £100 000 000 in the case of the North of Scotland Board.

**It will be a duty of the Central Authority to secure that the combined revenues of the Authority and the Boards are not less than sufficient to meet their combined outgoings.**

The Central Authority will have general powers of control over the Area Boards in matters of financial policy, including the approval of expenditure, and may require the Boards to contribute towards obligations arising out of the payment of compensation or the borrowing of money.

Present tariffs in an area of supply are to remain in force, until varied or replaced

by tariffs fixed by Area Boards. Separate tariff agreements may be made between Area Boards and any consumer, provided that no special preference is shown to any person. Such agreements must, however, comply with general or specific directions given by the Central Authority.

The Central Authority will establish a central reserve fund, to be used only for the purposes of the Authority and the Area Boards, and to which the Authority and Boards are to contribute. Area Boards may, according to the Bill, themselves establish reserve funds, out of their surplus revenues.

Such funds may be used to prevent frequent fluctuations in charges.

All accounts must be laid before Parliament annually and audited by auditors appointed by the Minister of Fuel.

The duty of supplying electricity to railway companies will rest only with the Central Authority. The railway companies themselves may use supplies for any other purposes apart from traction, subject to the provision that no interference is caused

with telegraph lines. Although originating in one area, traction supplies may, with permission, be run into the areas of other Boards.

Investigation of methods of using surplus heat for heating buildings, or for other useful purposes, will be a responsibility of the Central Authority, and they may conduct research into such methods. Area Boards themselves may sell surplus heat.

After approval by the Minister, Boards may proceed with schemes for the breaking up of streets, railways or tramways for the purpose of electricity supply. Any order made in this respect, however, will be subject to special Parliamentary procedure.

The period of ten years specified in the Electricity Supply (Meters) Act, 1936, is to be extended by a further period of five years.

**The Bill makes provision for the compensation of personnel.**

Electricity Boards are to seek methods of settling terms and conditions of employment of their staffs, either separately or in conjunction with other Boards; and it will also be a duty to consult with the appro-

---

*The North of Scotland Board will be subject to the control of the Secretary of State for Scotland, not that of the Central Authority.*

*In addition to the exclusive rights to hydro-electric resources within its area, already conferred by the 1943 Act, the new Board will acquire thermal stations in its enlarged district, including the undertakings at present administered by the Grampian Electricity Supply Co., and the Dundee and Aberdeen Corporations.*

*Among additions to the present area will be Dundee and the counties of Kinross and those parts of Angus and Perth at present outside it. The district will have an area of 21 600 square miles—73 per cent. of the total area of Scotland—and will serve a population of 1 165 000.*

*Present arrangements under which surplus hydro-electric output may be sold at a guaranteed price to the C.E.B. will be continued, the Central Authority taking the place of the Board.*

---

private organisations on matters affecting the safety, health, and welfare of persons employed.

The Minister and the Secretary of State for Scotland may make joint regulations providing for pensions in respect of personnel who have not been taken into the employment of an Electricity Board, and for making any necessary amendments to existing pension schemes. Where such amendments occur, persons having pension rights will not be placed in any worse financial position. If, however, the regulations do not secure this result, the Minister and Secretary of State must, as soon as possible, make the necessary amending regulations. The Minister may order the dissolution of the Electricity Commissioners and the transfer of their property, rights and obligations, but powers will exist for the compensation of officers of any body who suffer financial loss by reason of vesting. Compensation will be paid to members of the C.E.B. and—if dissolved—the Electricity Commissioners.

Regulations for the purpose of ensuring that consumers' supplies shall be reasonably safe and efficient, and that the public is, as far as practicable, protected from danger, will be made, as the Minister thinks fit. Penalties are to be provided, in the event of any person making a false statement in connection with the provisions of the Act.

A White Paper (Cmd. 7 007, Stationery Office, 2d.) issued in conjunction with the Bill, gives details of the methods used to fix boundaries to the 14 Area Boards. These have been drawn, it is explained, in accordance with geographical, administrative and technical considerations.

Greater London was considered too large for a single area, and the boundaries of the London district have accordingly been kept to the smallest limits consistent with administrative and technical requirements. Adjacent areas take part of the London suburban load.

North Wales and Merseyside have been formed into one supply Area because they are thought to have many electrical interests in common; similarly, the East-to-



Map showing boundaries of Area Electricity Boards. Key to the figures is given in the table below

West division across Wales follows the route of existing main transmission lines.

Boundaries have been drawn as far as possible through lightly populated districts. Attention has been paid to load diversity by striking a balance of rural and urban population in each Area, and so far as possible, the existing distribution networks have not been cut.

This has not been entirely avoided where other considerations seemed more important, particularly along the Welsh border, but the Bill makes provision for Area Boards to give supplies beyond their own boundaries, where distribution systems would, as far as can be anticipated, otherwise be uneconomically interrupted.

#### AREA BOARDS AND POPULATIONS.

Area Electricity Board	Area (sq. m.)			Population (1 000's)		
	Urban	Rural	Total	Urban	Rural	Total
1.—London ...	297	—	297	6 273	—	6 273
2.—South Eastern ...	684	2 517	3 201	2 380	591	2 971
3.—Southern ...	597	5 880	6 477	2 080	923	3 003
4.—South Western ...	490	5 067	5 557	1 366	569	1 935
5.—East Anglian ...	1 049	6 637	7 686	2 923	1 005	3 928
6.—East Midlands ...	679	5 081	5 760	2 199	948	3 147
7.—Midlands ...	630	4 256	4 886	3 040	658	3 698
8.—South Wales ...	617	4 078	4 695	1 485	444	1 929
9.—Merseyside and North Wales ...	594	4 081	4 675	2 153	517	2 670
10.—Yorkshire ...	952	3 492	4 444	3 584	595	4 179
11.—North Eastern ...	616	5 048	5 664	2 336	538	2 874
12.—North Western ...	1 003	3 998	5 001	4 097	408	4 505
13.—South East Scot- land ...	126	3 048	3 174	923	357	1 280
14.—South West Scot- land ...	156	4 843	4 999	1 913	633	2 546

Figures are approximate only.

# Electricity "Take-Over" Prices

## Approximate Compensation Figures Under Nationalisation

THE following table, which is reproduced by arrangement with the "Financial Times," shows the approxi-

mate compensation prices to be paid in British Electricity stock for the securities (Continued on p. 194)

*Amount quoted	Company—	Average of 1945 dates specified	Average of 1946 dates specified	Compensation basis	Market price Friday, 10th Jan., 1947	Change on day
<b>BOARD AND AUTHORITY STOCKS</b>						
1,736,000	Electricity (Civil Defence) 3 p.c. Red. 1955-60 (isa. by Central Elec. Board)	100	104	104	103-105	+1
997,548	Lon. & Home Count. Joint Elec. Authy. 3½ p.c. 1955-75	101	105	105	104-107	—
1,000,000	4½ p.c. 1955-75	111	115	115	112-115	—
1,500,000	5 p.c. 1955-75	115 2-3	118½	118½	117-120	—
886,000	N.W. Midlands Joint Elec. Authy. 5 p.c. 1950-70	107½	109½	109½	106-109	—
2,000,000	W. Midlands Joint Elec. Authy 5 p.c. 1948-68	106½	104	106½	102½-104½	—
	Stamp Duty on transfers of above stocks is borne by Local Authorities.					
<b>CENTRAL ELECTRICITY BOARD</b>						
9,250,333	Central Elec. 3¼ pc 1974-94 ...	101 1-3	111 2-3	111 2-3	102-112	-2
7,769,071	3½ pc 1963-93	104 11	113	113	104-114	+1
2,912,649	4 pc 1959-89	109	113½	113½	105-115	-1½
5,978,844	4½ pc 1951-73	106½	108½	108½	100-110	-1
9,758,556	4½ pc 1957-82	112½	116¾	116¾	108-118	—
9,934,209	5 pc 1950-70	108½	108	108½	100-110	+1
6,659,683	5 pc 1955-75	115	117 1-6	117 1-6	110-120	—
<b>COMPANY STOCKS</b>						
745,769	Bournemouth & Poole Elec. Supply Ord.	63/11	66/8	66/8	62/9-64/9	-1/9
75,000	4½ p.c. Cum. Pref.	23/8	26/	26/	23/6-25/	-1/9
190,250	6 p.c. Cum. Pref.	31/7	36/9	36/9	33/35/	-5/
400,000	3½ p.c. deb	102 1-3	101 2-3	102 1-3	99-101	-1½
2,030,000	British Pwr. & Lt. Ord.	33/	37/10	37/10	35/37/	+1/
1,000,000	6 p.c. Cum. Pref.	29/10	28/11	29/10	26/28/	+1/
600,000	4½ p.c. Cum. Pref.	23/10	24/	24/	22/24/	+6
1,237,487	Cent. London Elec. 3¼ p.c. deb.	100	101½	101½	100-103	—
1,600,000	City of Lond. Elec. Ord.	31/	34/4	34/4	32/6-33/6	-2/3
400,000	6 p.c. Cum. 1st Pref.	31/1	31/5	31/5	29/31/	-1/
300,000	8 p.c. Cum. 2nd Pref.	33/2	33/	33/2	30/32/	-2/
540,383	5 p.c. Cons. deb	119½	120½	120½	116-119	-3½
3,150,000	Clyde Valley Elec. Ord.	42/3	46/5	46/5	43/6-45/6	—
300,000	6 p.c. Cum. 1st Pref.	31/10	30/	31/10	27/6-29/6	-1/6
500,000	8 p.c. Cum. 2nd Pref.	41/	35/	41/	31/33/	-3/
7,232,109	County of London Ord.	44/1	49/5	49/5	47/48/	-1/3
3,381,925	6 pc Cum. Pref.	31/10	36/4	36/4	33/35/	—
3,000,000	4 pc Cum. Pref.	22/2	23/9	23/9	21/6-23/	+9
5,500,000	5 pc Deb. 1965-72	119 5-6	118	119 5-6	116-119	-½
3,000,000	3¼ pc Deb	101 5-6	102½	102½	99-101	-1½
6,750,000	Edmundsons Ord	31/6	30/6	31/6	28/9-30/9	-1/6
400,000	7 pc Cum. Pref.	36/1	35/9	36/1	32/6-34/6	-2/6
1,513,685	6 pc Cum. Pref.	31/	28/9¾	31/	29/31/	+2/6
2,201,152	4 pc Deb.	103 5-6	103½	103 5-6	100-103	-1
1,735,159	3¼ pc Deb.	100 1-3	101½	101½	98-100	-2½
150,000	Egham and Staines 7½ pc Pref.	31/6	33/9	33/9	33/6-36/	—
431,262	Elec. Supply Ord.	50/8	48/5½	50/8	47/6-49/6	-1/6
250,000	6 pc Cum. Pref.	30/4	28/	30/4	28/30/	+1/6
1,519,240	Elec. Dist. of Yorks. Ord.	46/3	51/	51/	47/9-49/9	-3
1,283,333	6 pc Cum. Pref.	31/7	29/9	31/7	29/31/	+2/6
500,000	3¼ pc Deb	99½	101½	101½	98-100	-2½
375,000	Elec. Finance Ord.	63/10	67/	67/	63/6-66/6	-2/6
150,000	7 pc Cum. Pref.	32/3	29/5	32/3	29/31/	+6
279,247	4 pc Deb.	101½	101½	101½	98-100	-2½
50,000	Folkestone Elec 5 pc Cum. Pref.	23/2	22/6	23/2	21/23/	-1/6
3,335,389	Galloway Water Power 5 pc Deb. 1947-91	103 1-6	101½	103 1-6	99-102	—
1,323,624	4 pc Deb. 1957-94	102 5-6	101½	102 5-6	98-101	-2
150,000	Isle of Thanet Elec. Ord.	20/4	22/4	22/4	20/22/	-1/6
282,000	6 pc Cum. Ptg. Pref.	23/11½	25/	25/	21/6-23/6	—
50,000	Isle of Wight 5 pc Pref.	95/	95/	95/	90/100/	—
75,000	Kent Elec. Pwr. 4½ p.c. Irr. Db.	105½	103½	105½	102-105	—
2,000,000	3½ p.c. deb	102 1-6	103½	103½	102-105	—
2,900,000	Lancs. Elec. Lt. & Pwr. Ord.	37/7	37/	37/7	35/37/	—
571,415	6 p.c. tax free to 6/ Cm. 1st Pf.	38/4	35/	38/4	32/6-34/6	-2/6
1,000,000	7 p.c. Ptg. Cum. Pref.	38/3	33/10	38/3	34/6-36/6	+4/
1,000,000	3¾ p.c. Cum. Pref.	—	23/2	23/2	21/23/	+1/
1,248,527	5 p.c. deb.	110 1-3	110½	110½	106-109	-3

250,000	Lincoln & Cent. Elec. 4½ p.c. Pt.	22/	22/8	22/8†	22/24/	—
371,853	4 p.c. debts	101	102	102†	100-104	—
660,000	Llanelli & Dist. Ord.	29/1	27/8	29/1	27/29/	+16
660,000	6 p.c. Prof.	28/2	27/9	28/2	27/29/	—
4,663,443	London Assoc. Underlaks. Ord.	26/9½	29/6	29/6	27/29/	-13
1,405,000	4½ p.c. Cum. Prof.	22/10	25/11	25/11	23/6-25/6	+2†
202,909	6 p.c. Cum. Prof.	29/5	28/7-	28/7	26/28/	-1/
874,125	London Elec. Supply Ord.	31/4	28/	33/4	28/6-30/6	+2/6
140,000	6 p.c. Prof. (Non-Cum.)	6½	6½	6½	6-6½	—
8,897,117	London Power 5 p.c. deb.	104 5-12	104	104 5-12	100-103	-2
2,000,000	4 p.c. deb. 1952-72	103 2-3	103½	103 2-3	99-102	-3
2,000,000	3¼ p.c. deb. 1952-72	100 1-6	103	103	99-102	—
2,500,000	3½ p.c. Red. deb. 1952-72	102½	103	103	99-102	-2
550,000	Mersey Power 6 p.c. Cum. Prof.	30/4	28/4	30/4	27/29/	—
3,000,000	Met. Elec. Supply Ord.	43/9	48/	48/	45/3-47/3	-2/3
500,000	4½ p.c. Cum. Prof.	24/	24/7	24/7	22/24/	—
1,940,000	3 p.c. deb.	96 1-3	100	100	96-99	-2½
524,231	Mid-Cheshire Elec. Ord.	41/3	42/11	42/11	40/42/	-1/6
299,640	4 p.c. Cum. Prof.	21/10	22/4	22/4	20/6-22/6	-2†
60,525	7 p.c. Cum. Prof.	32/6	30/11	32/6	29/31/	-1/3
3,000,000	Mid. Counties Elec. Ord.	42/9	51/5	51/5	48/50/	-2†
2,000,000	6 p.c. Cum. Prof.	31/6	29/8	31/6	29/31/	+2†
1,000,000	4¼ p.c. Cum. Prof.	22/6	23/9	23/9	22/24/	—
1,750,000	3½ p.c. Deb. 1952-62	102 2-3	102½	102 2-3	98-101	-2
933,333	Mid. Elec. for Power Distn. Ord.	44/11	47/	47/	44/6-46/6	-1/
200,000	7 p.c. Cum. Prof.	34/6	31/6	34/6	31/6-33/6	-2†
600,000	3¼ p.c. 1st Deb.	100	103	103	99-102	-1½
600,000	Newcastle & Dist. Elec. Ord.	32/1	32/7	32/7	29/6-31/6	-3/6
4,759,919	North Eastern Elec. Ord.	35/8	36/6	36/6	33/9-35/9	-1/9
1,609,640	5 p.c. Prof. (Non-Cum. & Ptg.)	25/11	26/7	26/7	24/26/	-1/6
1,500,000	7 p.c. Cum. Prof.	36/4	34/1	36/4	33/6-35/6	+4/6
1,825,363	3½ p.c. Cons. deb.	102½	102½	102½	98-101	-1
1,252,113	3¼ p.c. Cons. deb.	100	101½	101½	98-101	-2
2,089,100	3¼ p.c. Cons. deb.	102 5-6	102½	102 5-6	97-100	-5
514,300	N. Met. Pwr. Stn. 5 p.c. Gtd. deb.	111 2-3	112	112	108-111	—
83,740	3½ p.c. 2nd Mt. deb. 1963	100½	102½	102½	98-101	-3
2,305,127	3½ p.c. 2nd Mt. deb. 'B' 1965	101 1-6	101½	101½	97-100	-3
1,450,192	3¼ p.c. 2nd Mt. deb. 1970	100	100	101	98-101	-1½
500,000	N. Somerset Elec. Ord.	32/2	36/	36/	33/33½	-1/
200,000	5½ p.c. Cum. Prof.	27/5	26/1	27/5	22/25/	-2/
762,400	N. Wales Pwr. 3 p.c. Gtd. deb. 1946-53	99 1-6	100	100	99-102	-9
870,000	Northampton Elec. Ord.	50/11	50/10	50 11	47/50/	+2/6
600,000	3½ p.c. deb.	101½	102½	102½	99-102	—
3,192,693	Northmet Pwr Ord.	40/10	48/2	48/2	45/47/	+9
1,535,765	6 p.c. Cum. Prof.	31/7	29/8	31/7	29/31/	+1/2
1,000,000	4 p.c. Cum. Prof.	22/	22/5	22/5	22/6-24/6	+2†
189,200	5 p.c. Mortgages (Reg.)	107 1-6	104½	107 1-6	103-106	-1
1,067,810	4 p.c. deb.	102½	102½	102½	99-102	-1
541,034	3¼ p.c. deb.	100	100½	100½	97-100	-1
310,000	Richmond Elec. Ord.	26/7	26/8	26/8	26/28/	—
3,800,000	Scottish Power Ord.	40/8	46/1	46/1	43/45/	-1/6
2,200,000	6 p.c. Cum. Prof.	31/4	30/	31/4	29/31/	+1/6
1,500,000	4 p.c. Cum. Prof.	22/4	22/4	22/4	20/6-22/6	—
2,250,000	Shrops. Wores. and Staffs. 6 p.c. Cum. Prof.	32/	30/1	32/	29/6-31/6	+2/6
3,119,000	5 p.c. Deb. 1952-82	109½	108	109½	105-108	-1
533,520	London Elec. Ord.	30/5	33/	33/	30/32/	-2/
300,000	4½ p.c. Deb.	108	108	108	105-106	-2½
150,000	S. Met. Elec. Lt. and Pwr. 7 p.c. Cum. 1st Prof.	33/	33/9	33/9	30/6-32/6	-3/
100,000	6 p.c. Cum. 2nd Prof.	29/10	27/10	29/10	27/6-29/6	+1/6
500,000	4 p.c. Cum. 3rd Prof.	21/10	22/4	22/4	20/6-22/6	—
500,000	4½ p.c. Deb.	109½	106½	108½	106-108	+1½
500,000	3¼ p.c. Deb.	100	100	100	96-99	-2½
500,000	3½ p.c. Deb.	101 11-12	102½	102½	98-101	-2
793,125	S. Wales Elec. Power 3½ p.c. Deb.	102½	103½	102½	98-102	-1½
1,750,000	S. Wales Power Stn. 3½ p.c. 1st Deb. (1958/68)	100½	99½	100½	98-101	—
783,484	Stn. Areas Elec. Ord.	23/8	24/6	24/6	22/24/	—
30,000	St. Austell 7 p.c. Prof.	27/6	24/	27/6†	23/25/	—
1,500,000	Wessex Elec. 3¼ p.c. Deb.	104 1-6	103½	104 1-6	101-104	-2
350,000	West Devon Elec. Ord.	25/	28/	28/	25/27/	-1/6
100,000	6 p.c. Cum. Prof.	27/	25/8	27/	23/25/	-1/6
303,500	W. Gloucs. Power Ord.	26/9	32/8	32/8	29 6-32/6	-3/6
519,500	6½ p.c. Ptg. Prof.	31/7	31/8	31/8	29/31/	+2†
509,844	4 p.c. 1st Mrt. Skg. Fnd. Deb.	102½	103	103	100 3	-2½
500,000	W. Kent Elec. 4½ p.c. Cum. Pf.	22/6	23 5	23 5	22/24/	—
441,478	W. England Eic. Inv. 3½ p.c. Dh.	101½	103	103	99-102	—
2,000,000	West Midland J.E.A. 5 p.c. Deb.	106½	104	106½	102½-105	—
209,612	Woking El. 4½ p.c. Deb.	105½	105½	105½†	102-105	—
3,324,600	Yorks. Elec. Power Ord.	45/3	50/10	50/10	47/6-9/6	+2/3
1,623,000	6 p.c. Cum. Prof.	31/10	30/11	31/10	29/31/	+1/6
1,923,800	3¼ p.c. Deb. 1955-65	100½	102½	102½	99-102	-1
550,000	3½ p.c. Deb.	102½	103½	103½	100-3	-2

\* In stock or £1 shares.

† Supplementary List.

of electricity supply Boards and undertakings. It includes prices in respect of Central Electricity Board stocks, as well as those of Joint Electricity Authorities. Prices are shown both on the basis of quotations of February 15, March 15, April 16, May 15, June 15 and July 16, 1945, and of quotations of 1st, 4th, 5th, 6th, 7th and 8th November, 1946. The quotations, which will prevail as "take-over" prices, are shown under the heading "Compensation Basis." Closing quotations on January 10, and the day's changes, are given in the final columns.

To the tables should be added the following stocks and compensation prices, which have been taken from a list prepared over the week-end by a leading firm of jobbers and published in the "Financial Times" on Monday:—

Altrincham ordinary, 33s. 2d.; Rushden and District ordinary, 42s. 6d.; St. Austell and District ordinary, 34s. 6d.; South Wales 5 per cent. debentures, 123 1-6th; Woking Electric ordinary, 53s. 5d.

The same firm gives the following, extracted from the monthly list, as a guide to compensation prices:—

Altrincham 6 per cent. preference, 26s.; Altrincham 7 per cent. preference, 28s.; Altrincham Electric deferred, 14s. 10d.; Bridgewater and District 7 per cent. preference, 25s.; Cornwall Power 7 per cent. preference, 25s. 5d.; Mersey Power 3½ per cent. debentures, 100; Newcastle and District 5 per cent. preference, 104.

Northampton 5 per cent. preference, 24s. 3d.; North Wales Power ordinary, 14s.; Notting Hill 6 per cent. preference, 11½; Notting Hill 5 per cent. debenture, 102½; St. Austell 4½ per cent. preference, 21s.; Shrops., Wores. and Staffs. "A" ordinary, 31s.; Shrops., Wores. and Staffs. "B" ordinary, 22s. 6d.; South London 6 per cent. preference, 28s. 5d.

Urban Electric ordinary 6s.; Urban Electric 6 per cent. preference, 28s. 9d.; Woking 6 per cent. preference, 28s.; Woking 7 per cent. preference, 33s.; Woking 10 per cent. preference, 38s. 5d.

Quotations have been taken from the Stock Exchange Official List, except where indicated as having been taken from the Supplementary List.

#### MUNICIPAL COMPENSATION

The unfairness of the method of compensation to municipalities for acquisition by the State of their electricity undertakings, amounting in many cases to subsidisation of the State by local ratepayers, is emphasised by the representative table in col. 2. It shows capital expenditure of some of the larger local authorities, together with unextinguished debt, which is all the Minister will pay for the trans-

fer of the undertaking. In some cases the amount of outstanding loan debt is very much less than total capital expenditure, although allowance must be made for obsolescence in the latter figure.

Inefficient local authorities whose undertakings show a deficit will be relieved of all liabilities under the Bill. On the other hand the measure will penalise councils who have been "guilty" of good management—and ratepayers who have benefited from the profits will suffer.

Corporation	Capital expend. £	Total borrowing £	Debt out- standing £
Aberdeen ...	2 766 687	2 647 475	898 371
Aldershot ...	202 831	195 940	43 311
Birkenhead ...	1 600 058	1 322 830	615 722
Birmingham	23 622 766	24 238 298	13 578 614
Bradford ...	6 350 559	7 076 598	2 365 755
Cardiff ...	4 276 042	4 103 468	1 973 825
Croydon ...	3 708 158	3 412 280	1 468 661
Edinburgh ...	6 231 537	5 794 686	1 018 348
Glasgow ...	12 355 501	11 699 677	2 787 385
Leeds ...	10 218 954	10 003 706	4 237 078
Manchester ...	16 388 882	16 868 730	6 230 300
Portsmouth...	4 101 225	3 817 543	1 942 598
Swansea ...	5 727 818	5 388 663	3 472 399

The Government's "bargain" is made even more favourable by the fact that in many cases capital expenditure has to some extent been financed out of revenue account. Of Birkenhead's capital expenditure, £299 901, was provided from revenue. In 1945-46 £7 560, was taken into revenue from the municipal electricity undertaking, equal to more than a 2d. rate.

Cardiff's contribution from revenue up to March, 1945, was £653 289, and in 1945-46 £32 000 was contributed by the undertaking towards revenue, or more than a 4d. rate. In the case of Leeds the revenue contribution to capital outlay was £1 373 706. Portsmouth's revenue contribution was £451 920.

The York undertaking's contribution to relief of local rates amounted in 1945-46 to £22 000, equal to an 8d. rate. Stockport and Warrington undertakings each contributed £10 000 in that year, equal to a 3d. and a 6d. rate respectively.

A meeting of the Parliamentary Committee of the Incorporated Municipal Electrical Association was held in London yesterday, Thursday, when the committee, of which Mr. J. S. Pickles, electrical engineer of the Dumfries County Council, is chairman by virtue of his office as president of the I.M.E.A., considered the Bill clause by clause. The committee will draw up a report for presentation to a full meeting of the I.M.E.A. council today, Friday, at which it is expected decisions will be taken on the future course of action to be recommended to local authorities concerning their electricity undertakings.



# Bankside Power Station

## Opposition to Proposed Reconstruction Plan

A JOINT local inquiry by the Electricity Commissioners and Mr. K. S. Dodd, on behalf of the Minister of Town and Country Planning, into the application of the City of London Electric Lighting Co., Ltd., for consents under Section 11 of the Electricity (Supply) Act, 1919, and under the Town and Country Planning Act, to the reconstruction and extension of the company's Bankside generating station at Southwark opened at Southwark Town Hall on Tuesday morning. The proposed extension involves the installation of two turbo-alternator sets, each having a maximum continuous rating of 53 000 kW, complete with necessary ancillary plant; four boiler units, each having a maximum continuous evaporative capacity of 320 000 lbs. of steam per hr., complete with the necessary ancillary plant; and the necessary buildings and civil engineering works.

Sir Cyril Hurcomb, chairman of the Electricity Commission, presided at the inquiry, and sitting with him were Sir John Kennedy, deputy chairman of the Commission, and Mr. H. Nimmo, a commissioner, as well as Mr. Dodd.

The application is opposed by the L.C.C., the London City Corporation and the Southwark Borough Council.

### A SELECTED STATION

Sir David Maxwell Fyfe, counsel for the company, stated that the present Bankside generating station was erected under the Act of 1892 and the company had acquired land adjoining the station with a view to its extension. Despite alterations and additions, much of the original station was still in use and the last substantial modernisation of the plant took place 20 years ago. It was inevitable that the station in its present form should on occasions cause offence in Southwark by the emission of smoke and grit. As to the functional history of the station, it had continuously generated electricity and supplied the areas of the City of London and of the old St. Saviours' and Christ Church Board of Works. Since 1928 it had been a selected station under the Electricity Supply Act and was connected to the grid system, and the proposed reconstruction of the station was required for the continuance of the same purpose. The company had expected to undertake and complete its reconstruction several years ago. The Central Board requested them to do it in 1939 and it was intended that the new plant should be ready by

1945. It was worth noting that when making their plans in 1939 the company consulted the Southwark Borough Council so that they could, as far as possible, conform to the riverside improvement and road widening schemes of that body and at that time there was no objection.

After stressing the urgent necessity for increasing the generating plant to supply the pressing needs of the country at the present time, Sir David Maxwell Fyfe, said that the Central Electricity Board regarded the reconstruction of the Bankside station as of great importance because of its riverside location and central position, and as an important part of London's generating resources and as an essential step towards the restoration of the generation of adequate supplies. The aim of the company was to have a combination of a distinguished building taking a worthy place among the architectural features of London and one that gave Londoners an efficient supply of electricity; and for that purpose the design of the civil, electrical and mechanical engineering had been placed in the hands of Sir Leonard Pearce, who designed that of the Battersea and other stations, and the architectural design in the hands of Sir Giles Gilbert Scott. It was the intention of the company that the new station should from every point of view form part of the riverside improvement scheme between the Blackfriars and Southwark bridges, and they suggested that the scheme would be suitable to an area which had been industrial for a great many years and which would have to remain industrial in part, at any rate, if the trade, commerce and industry of London was to be maintained.

### C.E.B. PROPOSALS

Counsel mentioned that in July, 1944, the C.E.B. renewed their request to the company to reconstruct the Bankside station, contemplating the installation of two 50 000 kW sets for the winter of 1948, which might be followed by two further sets of similar capacity by the winter of 1949, and an ultimate capacity of 300 000 kW. In February, 1945, the company applied to the L.C.C. for permission under the Town Planning Acts to proceed with the development of Bankside and there were further letters and discussions, but no progress was made towards obtaining the permission of the L.C.C. On August 8, 1946, the C.E.B., having obtained the approval of the Electricity Commissioners, issued a direction

to the company to extend the Bankside station, and notification was sent to the L.C.C. and to the Minister of Town and Country Planning. By a letter dated October 26, the Council informed the Minister of Town and Country Planning that the erection of a new generating station at Bankside would not conform with the tentative zoning proposal for the site in question and the County Council was in favour of removing the station to a site at Rotherhithe, or some other suitable site approved in order to effect the planning improvement of the south bank of the river immediately opposite St. Paul's Cathedral. Later formal objection to the proposal was lodged.

#### BOROUGH COUNCIL'S OBJECTIONS

The Southwark Borough Council informed the company that they desired the removal of the existing generation station from Bankside to take place at as early a date as practicable. Over a period of years the Council had received from time to time a number of complaints concerning the quantity of coal and other dust, smoke and grit emanating from the station. The redevelopment of that area should be aesthetical and attractive; to permit any extension of the existing station would be to lose for ever the opportunities now offered by the admitted obsolescence of the existing generating station and the area cleared by bomb damage; a large generating station was incompatible with the redevelopment of that area as indicated in the County of London Plan or with the desires of the Borough Council. The Council made the further point that, apart from the question of the architecture of the station itself, the erection of a coal-handling landing stage on the riverside was objected to as conflicting with the proposed south bank development. In the Council's view no industrial development should be included in the south bank redevelopment scheme. The extension of the generating station would result in protection of the existing user of the area which would effectively prevent a desirable redevelopment scheme.

A point raised by the City Corporation was the huge building bulk of the proposed station in relation to and in, so to speak, competition with St. Paul's Cathedral. There was no great danger of competition with, or taking away from the glory of St. Paul's by the proposed building, but it was a point which would be considered. Another objection raised by the Corporation was to the smoke or other emission from the chimneys.

Summarised, the objections were: (1) that any power station erected above London Bridge would be against the

County of London Plan, and in particular the erection of a large power station in Southwark would specially interfere with that plan; (2) that the bulk of St. Paul's would be balanced by the bulk of a large power station on the Bankside site on the south side of the river; and (3) the emission of smoke and fumes made it undesirable to have a power station in a built-up area. His submission was that the development of electricity supply at the present moment was a great fundamental issue. Their opponents were really saying that the proposal to extend the station was an unwarrantable intrusion and infringement of the plan of the local authorities for the improvement and beautification of the built-up areas of London. The company said that extension was vital to the development of electricity supply. It was not only vital to the industrial reconstruction and development of the country, but also to the cleanliness and improvement of the built-up areas in general and of London in particular, and if they interfered for the sake of one aspect of improvement, with the development of electricity supply, they were killing an essential prerequisite to the progress of the work of the improvement of the built-up areas.

#### BUILDING IN TWO STAGES

Dealing with the company's proposals, counsel said, what was intended was a modern station with a capacity of 210 000 kW to be built in two stages. The first part would be to the west of the existing station, and the second half on the site of the existing station. The company was fully conscious of the importance of the site and its special relation to the proposed plan for the redevelopment of the City and County of London. The new station had been sited so as to permit the proposed uninterrupted riverside road—it would be at a distance of 200 ft.—and in addition, the straightening of the river front.

To prevent atmospheric pollution the boiler gases would undergo very careful treatment for the removal of grits and would also be carefully washed to eliminate sulphurous fumes. The coal would be transported from the river to the store at the back of the station through an underground tunnel passing under the embankment, and the station coal handling plant and chute would be enclosed. The ash would be similarly handled in the reverse direction.

There had been a reduction in the height of the proposed switchhouse by 10 ft. to 85ft. and the boilerhouse had been reduced in height to 123 ft. from 153 ft. It was intended to have one chimney on

*(Continued on page 198)*

# PROTECTION OF INSTALLATIONS

*In the last two issues was published criticism of the views expressed by "Supervisor" in the issue dated September 6, 1946, and in the article below reply is made in support of the opinions advanced. In writing his notes each month "Supervisor" is intentionally provocative in order to promote discussion and where occasion permits, correspondence. The observations made by "Supervisor" are his own and are not necessarily endorsed by the Editor; they are, however, made from a purely constructive point of view. In the communication below he invites further opinions on the subject of the protection of consumers' installations, in the hope that as many views as possible may be ventilated.*

THE article on the subject of M.E.N. protection of September 6, 1946, has evoked criticism both here and in Australia, and correspondents have described some of the statements made as misleading. Lest they may also think that they are irresponsible, it is felt that the matter should be further pursued, whereby it may be established that although practical experience of the M.E.N. system in this country amounts to very little, considerable thought and study have been devoted to the subject of installation protection in general, and to M.E.N. in particular.

Mr. Thorn's reference in last week's issue to misleading statements should be directed towards the technical journals of his own country, as it will be remembered that the quotations describing the M.E.N. system as unsatisfactory were derived exclusively from one such journal, and the date of issue was given. It is inconceivable that such statements should be published, as far as is known without challenge, unless the opinions stated were held by at least some electrical engineers in Australia. It is noted that both Mr. Thorn and Mr. Connolly, a letter from whom was published in THE ELECTRICIAN of January 3, are associated with the State Electricity Commission of Victoria, but the writer has before him a booklet written by Mr. D. Dunham, also of the State Electricity Commission of Victoria, which is entitled "Earth Leakage Protection," and in which the merits of the M.E.N. system are much more cautiously expressed than in the communications of the two gentlemen mentioned.

If experiences in America and Canada are often omitted in any discussion of M.E.N. it is because domestic voltages in those countries are generally lower than in this country, 110 V as compared with

230 V, and the risk of high neutral potentials is thereby reduced. The retort might be made that the advocates of M.E.N. omit references to Eire, and this is the case with Mr. Thorn's communication, for it is known that M.E.N. is often supplemented by E.L.C.B.'s in that country. Mr. Thorn's statement that the R.W.E. in Germany admitted that Nullung was perfectly satisfactory is difficult to accept, as the Appendix to Mr. T. C. Gilbert's paper on "Voltage Operated Earth Leakage Protection," read before the Institution of Electrical Engineers, contained letters from a director of this concern expressing the exact opposite, and the original letters have been seen by the present writer.

The standard book on leakage protection as practised in Germany is Dr.-Ing. Oskar Lobl's "Erdung, Nullung & Schutzschaltung," a complete treatise on the subject, and readers of this book will obtain a clear idea of the conditions that led to the introduction of the E.L.C.B. in that country. Mr. Thorn also states that the problem of selectivity was not solved in Germany in 1938, but this was in connection with the installation of the E.L.C.B. as a type of main switch, cutting off the whole installation on occurrence of a fault on one appliance, and which practice appears to be standard in Australia also. Mr. Thorn should know that selectivity on farm equipment, etc., was achieved with the use of the protective switch-socket, the logical point at which to apply leakage protection. The present writer has one of these switch-sockets in his possession, but apparently it has not yet been described in Australia.

## MISUSE OF E.L.C.B.

The problems of selectivity mentioned by Mr. Thorn can only arise by reason of the application of the E.L.C.B. at the main intake point of an installation, whereas it should be installed as the control switch to vulnerable equipment in comparable dangerous situations. Attempts to apply selective operation to sections of a steel conduit installation, for instance, are foredoomed to failure, as should be obvious to all electrical engineers. If Australia is judging the E.L.C.B. on this basis, it can hardly be a matter of wonder

that M.E.N. is being retained, in spite of the fact that—to again quote an Australian technical paper—“M.E.N. has been found wanting.” Selectivity can be secured with the use of insulated wiring systems, with the sub-circuit use of E.L.C.B.’s, vide “Anleitung für die Anwendung der Schutzschaltung,” by A. Kolb, Kraftwerk Thüringen A.-G., and this was often applied in the R.W.E. areas also.

#### LINKING TWO SYSTEMS

Mr. Connolly states that E.L.C.B.’s linked with an M.E.N. system have not been used in Victoria, nor, as far as he is aware, in Australia. There is before the present writer a description of the “Taylor Safety Neutral Wiring System,” and a diagram shows the service earth retained on the incoming neutral, with an E.L.C.B. connected between the neutral and an auxiliary earth electrode, described as the “house earth.” There are clearly two earth connections on the premises, one on the neutral and one for the E.L.C.B., which amounts to the linking of the two systems. Unfortunately, the covering letter accompanying this leaflet has been lost, but to the best of the writer’s recollection it came from New South Wales, some time in 1938. Mr. Connolly may be able to say if the Taylor system has been used to any extent in any of the Australian States, but it provides a *prima facie* case for the statement that the two systems have been linked in the past, whatever the present position may be.

There is considerable reference to the linking of M.E.N. with E.L.C.B.’s in the publication “Schutz gegen zu Hohe Berührungsspannung,” sponsored by the R.W.E., and dated 1929, so it would not be unlikely that Australian engineers might have experimented with the method in the early days of E.L.C.B.’s; in all cases described in the publication, however, the neutral line is interrupted by the switch as well as the active line, but in the Taylor system only the active line is broken by the E.L.C.B. The implications of this will be obvious, and will probably have led to the forcible suppression of this system long before now.

Mr. Connolly’s explanation of the “curious” regulation is welcome, but one wonders how isolation of a fault on the incoming service is secured with fuse protection, with the conduit connected to earth and the earthed neutral; does the section fuse have to blow, or does the sub-station overload protective system have to operate? This is a small point, but it would appear that if the E.L.C.B. must be used as a main control, its location at the point of intake would take care of the main cable conduit, at least

inside the building. It will be remembered that this was standard German practice.

Messrs. Thorn and Connolly have provided very useful information for those of us who study the question in this country, and it is a matter for regret that better contact between the engineers of both countries is not made, as it would result in benefit to all. The present writer adheres to the point made in the original article, however, which was “Once M.E.N. always M.E.N.,” and it is this which leads us to proceed very cautiously in this country. The R.W.E. engineers used to state it more crudely—“Those who have advocated and used M.E.N. must continue to say that it is the right protective system, or they may become liable for regrettable happenings with the system,” but as experience with the system grows, some of us may modify our views somewhat. This will not happen until all possibilities of the E.L.C.B. have been tried out, with all outworn applications to the main switch position abandoned, and the present writer is of the opinion that this has not yet been done—either in this country or Australia.

#### BANKSIDE INQUIRY, (Cont. from page 196).

the west out of the ground level and the height remained to be settled. The present suggestion was not more than 200 ft. The circulating water system would require 11 million gallons an hour and his evidence would be that the take and return would have no adverse effect either on navigation or on the channel of the river. The boiler plant method of firing would be by pulverised coal and the method of grit extraction from the flue gases would be by electrostatic precipitation. Then the gases would be washed, first by water and secondly by an alkaline solution. It was suggested that the very small amount of residual grit would be effectively removed.

With regard to the problem of St. Paul’s, so far as measurements were concerned the cathedral was higher off the ground by 40 ft. and the dome was higher by 110 ft. The chimneys of the station would not compete with the admirable mass of the dome. Another point was that the distance was half a mile apart and, therefore, it was not a question of one big building detracting from another. On the other side of the river they would have a building which was different and smaller. As to the distant view of St. Paul’s from the ground, the river, the bridges or Embankment, the power station was well out of the line and could make no obstruction.

[The inquiry was still in progress when we went to Press]

# Electrical Personalities

MR. DAVID EVAN WEBB has been appointed a director of the Madras Electric Supply Corporation, Ltd.

MR. ARTHUR MARKS, director of A. B. Metal Products, Ltd., has left on the S.S. "America," for the U.S.A., to study production methods. He will stay four or five weeks.

MR. E. A. THOMAS, of Walsall, has been appointed by the Chesterfield Electricity Committee, as consumers' engineer and meter superintendent.

MR. GORDON MCKAY CAMPBELL has retired from the board of directors of the B.T.H. Co., Ltd. Of Scottish ancestry and a Canadian by birth, he went to the company from the General Electric Co., U.S.A., in 1920. He directed the manufacturing operations of all B.T.H. factories, introducing many beneficial changes in operational control.

MR. H. T. EGAN has been appointed chief assistant engineer of the Southampton electricity undertaking. Mr. Egan received his early training at the London Passenger Transport Board's electricity generating station at Greenwich, and attended during the same period Goldsmiths' College, London, later joining the Rees Roturbo Manufacturing Co., Ltd., Wolverhampton. He has been on the staff of the Southampton undertaking since



MR. H. T. EGAN

his appointment in 1920, and during the period of its greatest expansion, and has held the successive positions of chief draughtsman, constructional engineer and engineering assistant to the Borough Electrical Engineer.

SIR ROBERT WATSON-WATT, who has been Vice-Controller of Communications Equipment Ministry of Aircraft Production, since 1942, has retired from his full-time Government appointments and is forming a private company to be known as Sir Robert Watson-Watt and Partners, Ltd. It will give technical advice to A. C. Cossor, Ltd., and the Sylvania Electric Products, Inc., in the United States (with whom they are associated), the J. Arthur Rank organisation, and Ferranti,

Ltd. Sir Robert, who sailed in the "Queen Elizabeth" on Saturday for New York, will continue to devote part of his time to consultant work for the Government, and will act as scientific adviser on telecommunications to the Ministries of Supply, Air, Civil Aviation and Transport.

MR. E. M. BENJAMIN, a director of the Philco Radio and Television Cor-

poration of Great Britain, Ltd., was among the passengers who sailed for America on the "Queen Elizabeth" on January 11.

MR. A. H. BARKER announces that on January 1, Mr. H. E. Baker entered into partnership with him, and that their joint practice as consulting mechanical and electrical engineers will be carried on at 100, Victoria Street, London, S.W.1, under the style of A. H. Barker and Partners.

MR. W. G. HENDREY, director and manager (overseas), and Mr. W. H. McFadzean, director and manager (finance), of British Insulated Callender's Cables, Ltd., have gone to India in connection with the affairs of the company and to study trade conditions there.

MR. GEOFFREY PEARCE, acting on medical advice, has resigned from Watson and Sons (Electro-Medical), Ltd., as from December 31.

Mr. Pearce entered the firm of W. Watson and Sons, Ltd., in 1900, and became managing director of Watson and Sons (Electro-Medical), Ltd., when the separate company was formed in 1915. His successor is Mr. A. J. Minns, formerly deputy managing director and chief engineer, who has been with the company 21 years.

MR. W. S. STEEL has been appointed manager, home sales, for the British Thomson-Houston Co., Ltd., and Mr. R. G. A. Dimmick has been appointed manager of the marine department in succession to Mr. Steel. Mr. Steel, who took over the management of the marine department in 1944 from Mr. W. J. Belsey, was born and educated in South Africa, graduated at the



MR. W. G. HENDREY

Witwatersrand University in mechanical and electrical engineering and received the special award of the Vice-Chancellor's gold medal at the conclusion of his studies. He joined the B.T.H. Co. as a student apprentice at Rugby and on completion of his course became an assistant in the a.c. engineering department, and was the company's guarantee engineer on the turbo-electrically propelled vessels "Platano" and "Strathnaver." This was followed by key appointments in the supply department which became the industrial sales department. Mr. Steel then went out to Wilson and Herd, Johannesburg—the B.T.H. agents in South Africa—as engineering representative of the company, returning to this country in June, 1940. For the next two years he held technical appointments in the Ministry of Labour and National Service and afterwards became Regional Controller, Ministry of Supply, in Wales. He returned to the company in September, 1943, to take over Admiralty work in the marine department. Mr. Steel is an associate member of the I.E.E. and of the Institute of Marine Engineers. Mr. R. G. A. Dimmick was educated at Reading School and graduated from Leeds University where he obtained an honours degree in engineering. In 1932 he went to the B.T.H. Company as a student apprentice, and three years later obtained a position in the industrial sales department. During the war he was transferred to the research laboratory, where he took charge of the model rooms and the film laboratory, both of which were closely associated with radar equipments for the Admiralty and the War Office. In June, 1945, he joined the marine department,

being engaged on Diesel-electric propulsion schemes, and work on electric torpedo production for the Admiralty. In 1938 he was elected an associate member of the I.E.E. for which he has done considerable work in the establishment of a sub-centre in Rugby. He is also an associate member of the I.Mech.E. and a member of the North-East Coast Institution of Engineers and Shipbuilders. For nine years he has been a part-time lecturer in engineering at the Rugby Technical College.

DR. C. C. GARRARD has been appointed resident director of the General Electric Co., Ltd., at Witton, Birmingham, and has relinquished his position as joint general manager of the engineering group of works there. Mr. J. J. Gracie, has been appointed general manager of the engineering group of works at Witton, and Mr. C. J. O.



DR. C. C. GARRARD

Garrard has been appointed manager of the switchgear department. The engineering group of works at Witton includes all works on the Witton Estate other than the moulded insulation works and the carbon and battery works.

#### Obituary

MR. S. H. RICHARDS, chief meter examiner for the Electricity Commissioners, suddenly, on January 9. He was a member of the I.E.E. and a past-chairman of the Measurements Section.



Group taken at the staff dinner of Frank Westerman (Wholesale), Ltd. From left to right (standing) are MR. R. S. WHALEY (Speedy and Eynon, Ltd.), MR. P. McFALL (W. Sanders and Co. (Wednesbury), Ltd.), MR. G. H. LEVINGER (G. E. C.), MR. F. WESTERMAN, MR. B. I. POWELL (Simplex Electric Co., Ltd.), MRS. F. WESTERMAN, MR. A. S. CHEETHAM (Precision Electric, Ltd.), MR. P. TATE (Frank Wheeler, Ltd.) and MR. W. PARKER, (Monmore Conduits)

# PROTECTING POWER CABLES

by C. C. BARNES, A.M.I.E.E.\*

**P**APER insulated lead covered power cables are normally protected against mechanical damage by steel armouring in the form of a double layer of steel tape, or a layer of wire armouring, and normal protection against chemical and/or electrolytic action is obtained by the use of well compounded textile servings.

During the war years, however, the abnormal demands for steel necessitated relaxations of pre-war regulations and lead alloy sheathed power cables with, or without a textile serving have been laid direct in the ground protected only by cover boards or tiles.

The views of many cable users regarding the need for armouring power cables have, therefore, been modified, so a brief resumé of the various types of protection recommended for specific installations should be of interest.

Table 1 gives a summary of standard textile servings and the metallic armouring applied over the lead cased cable, together with the method of installation associated with each type of finish.

**Lead and Lead Alloys for Cable Sheathing.**—Apart from the desirability of using an alloy sheath when it is necessary to bury unarmoured cables direct in the ground, it is essential also to use an alloy sheathing where there is a risk of the cable being subjected to vibration (i.e., when cables are installed on bridges, roof girders, laid under roads carrying heavy traffic or near travelling cranes, etc.), since lead alloys have a much greater resistance to vibration than pure lead.

Details of lead alloys recommended for sheathing cables are given in B.S. 801—1938 and summarised in Table 2.

## Servings for Protecting the Lead Sheath.

—The textile serving over the lead sheath of unarmoured cables usually consists of a layer of jute roves, a jute braiding, or two layers of hessian tape, all heavily compounded with layers of asphaltic bituminous compound.

B.S. 480—1942 (Paper insulated cables for Electricity Supply) unlike earlier British standards for power cables, specifies a double layer of compounded paper tape directly over the lead sheath of served and/or armoured cables—the purpose of which protection is to maintain a heavy layer of bituminous compound over the lead sheath and thereby separate it from the textile wrappings.

Such a protection is suitable for normal soil conditions but where there is a risk of severe chemical and/or electrolytic action

which sometimes occurs adjacent to power stations, chemical works, etc., a finish often used consists of five layers of heavily compounded paper tapes followed by a compounded textile serving.

An alternative, but more expensive finish which has been found particularly effective for situations where very serious corrosive or electrolytic effects are known to exist, consists of:—

One rubber tape with about 30 per cent. overlap.

One cotton tape with about 20 per cent. overlap.

One rubber tape with about 30 per cent. overlap.

One cotton tape with about 20 per cent. overlap.

One well compounded hessian tape overall.

This "rubber sandwich" protection is based on the idea of interposing a non-fibrous water-impermeable membrane between the outside of the coating in contact with the soil and the inside of the coating in contact with the metallic sheath, furthermore the special rubber tape used has bitumen incorporated in it so that it harmonises (i.e., is compatible), with the bitumen layers in which it is embedded.

Above protection is also designed with respect to elastic properties so that ground movements and differential movements of the cable with respect to the ground will not crack or damage the corrosion resisting protection.

It might be asked why the old-fashioned method of laying cables in troughs filled with bituminous compound is not used for such conditions, but with that method of installation there is always a risk of the compound developing cracks at low temperatures.

Furthermore "laying solid" is expensive and results in approximately 10 per cent. reduction in the permissible current rating of the cable.

**Indoor Cable Installations—Fire v. Corrosion Protection.**—When power cables are installed in places such as works the problem often occurs "which is the most important requirement, protection against fire or corrosion"?

This particular problem arises because unfortunately the fire resisting finishes at present available are not waterproof, and therefore offer no real protection against corrosion; conversely the normal waterproof finishes tend to be inflammable.

If, however, special installations such as chemical works which require individual consideration are excluded, resistance to

\* Standard Telephones and Cables Ltd.

TABLE 1.—STANDARD METHODS OF PROTECTING POWER CABLES

Protection over lead sheath	Method of installation	Comments
1. Lead, or lead alloy sheath (without external wrappings).	On cleats or cable racks in buildings, power stations, underground electric railways and other positions which are normally inaccessible.	A lead alloy sheath is recommended for positions where vibration may occur, e.g. on bridges, roof girders, under roads carrying heavy traffic, &c.
2. Lead sheath, 2 compounded paper tapes, textile serving (jute roves or hessian tapes).	Laid direct in the ground.	Must be protected by cover boards or tiles and laid only in soil known to be free from chemicals. The bottom of the cable trench must be free from stones and covered with a layer of riddled earth to provide a soft bedding for the cable.
3. Lead sheath, closely compounded braid of cotton, jute or asbestos.	In free air.	Mainly for ship installations or inside buildings. The asbestos braided finish provides an excellent fire resisting covering.
4. As (2) followed by double layer of compounded steel tape cpd. textile serving overall.	Low and medium voltage cable circuits laid direct in the ground.	Must not be used where the armouring is subject to tensile stresses.
5. As (2) followed by single layer of steel wires left bright.	(1) Cables in free air. (2) Pulled into duct(s).	When installed in or around buildings it is important to specify whether for inside or outside use so that the most suitable type of armouring compound may be used.
6. As (5) followed by compounded textile serving over the wire armouring.	Alternative to (4) but chiefly used for higher voltage cables laid direct in the ground.	More expensive than S.T.A. but offers a superior protection.
7. As (2) followed by first layer of steel wires compounded textile separator second layer of steel wires compounded textile serving.	Mine shafts, submarine cables or special conditions (i.e. large copper sections where the weight of the cable has to be taken by the wire armouring).	In many cases D.W.A. is preferable to S.W.A. because smaller diameter wires can be used, and greater flexibility is obtained, also D.W.A. must be used where the required tensile strength cannot be obtained with S.W.A. Often essential for mining work where the requirement is specified that the metallic covering shall have at least 50% of the conductivity of the largest conductor (particularly for non-lead sheathed types, i.e. vulcanised bitumen cables).

fire is usually the essential requirement.

Lead covered cables can be painted in situ with fire resisting paint, and when a served cable (having a cotton, jute or hessian wrapping overall) is used, the textile material should be impregnated and compounded with lead base compound.

A high degree of resistance to fire is obtained also, by a Genappe (smooth worsted yarn) braid and fireproof paint coating. Asbestos yarn (mineral origin) in the form of tapes, or braiding coated with a fire resisting paint (or compound) provides the maximum resistance against fire.

TABLE 2.—LEAD AND LEAD ALLOYS FOR SHEATHING CABLES

Lead or lead alloy	Composition (percentage by weight)						Lead, including impurities	Character	*Endurance limit ton/sq.in. (lb. sq.in.)	Remarks
	Tin		Anti-mony		Cadmium					
	min.	max.	min.	max.	min.	max.				
Pure lead	—	—	—	—	—	—	—	Very pliable	0.18 (±403.2)	For particular application where a very pliable sheath is required and poor fatigue resistance may be tolerated.
A	1.8	2.2	—	—	—	—	97.8 to 98.2%	Hard	+0.40 (±896.0)	For house and ship wiring. It is resistant to abrasion and does not age harden. Has been largely superceded by alloy E.
B	—	—	0.8	0.9	—	—	99.1 to 99.2%	Hard	+0.6 (±1344.0)	This is an economical alloy very much used for cable sheaths—it is fairly soft after extrusion but develops considerable hardness on ageing. Is used for power and aerial cables and positions where vibration is serious.
C	0.35	0.45	—	—	0.12	0.18	99.37 to 99.53%	Soft	+0.35 (±784.0)	This alloy was preferred by the Admiralty for ship wiring and is easier to instal than B. It has a high fatigue resistance and remains permanently soft.
D	—	—	0.45	0.55	0.2	0.3	99.15 to 99.35%	Very hard	+0.74 (±1657.6)	For use where vibration is severe and persistent. It has a high fatigue resistance and age hardens. Its stiffness precludes its use where ductility is important.
E	0.35	0.45	0.15	0.25	—	—	99.30 to 99.50%	Soft	+0.41 (±918.4)	A wartime substitute for alloys A and C which is now tending to be used as a permanent alternative to these two alloys.

\* Taken as the range of stress which will cause failure after 10 million reversals.



When a mechanical protection of the cable after installation is desired, a double layer of steel tape armour with an overall layer of jute roves, or hessian tapes, provides the cheapest and most commonly used finish, particularly for l.t. cables.

The short lay used, however, for applying these steel tapes round the cable means that steel tape armoured cables must not be used where they will be subject to longitudinal stresses. For such conditions, i.e., marshy ground or colliery districts where soil subsidence may occur, river crossings, vertical cable runs, installations on cleats along railway lines or pulled into ducts, etc.—single wire armouring with, or without, an overall serving is recommended, depending on the conditions.

Cables in mines have to comply with the Coal Mines Act, which contains the following requirement:—

“ . . . all parts of an earthing system, including the armouring of a cable where this is connected to the earth system, are required to have a conductivity at all joints at least equal to 50 per cent. of that of the largest conductor used solely to support the apparatus.”

Single wire armoured, or in some cases, double wire armoured cables (which have a greater armouring conductivity) will meet this requirement, but double steel tape armoured cables are not intended to be used underground in mines where the Coal Mines Act is enforced.

**Non-Magnetic Armouring for Single Core Cables.**—Magnetic steel armour may, in general, only be employed when it encloses all the conductors carrying alternating currents whose vector sum is zero (e.g., twin “go and return” conductors, or the three conductors of a three-phase circuit). In such cases there is practically no magnetic field round the assembled conductors, but this condition evidently does not hold with single core cables, which if armoured with ordinary magnetic steel tape (or wire) will result in very serious heating losses arising from the alternating flux in the armour.

For cases where the metallic protection of single core cables is considered essential, non-magnetic armouring may be employed, but the use of such protection is restricted by the mechanical properties of the armouring material itself and by its resistivity.

In general, where non-magnetic wire armoured single core cables are installed not more than 6 in. apart, the lowest loss is obtained with a relatively high resistance material, i.e., copper-silicon-manganese alloy.

Conversely, when the cable spacing is

greater than 6 in., a low resistance material is generally more suitable, and for such a case a h.d. aluminium alloy would be suitable.

An armouring is sometimes employed in which a percentage of non-magnetic wires is distributed among the steel wires, in order to increase the magnetic reluctance and keep the losses to a minimum. Again, bronze wires, particularly of the higher-resistance varieties, could be arranged to give small losses, and low losses can also be obtained by the use of non-magnetic steel.

It is important, however, to note that non-magnetic armourings make the cable very expensive, and it is therefore desirable to obtain the co-operation of the cable-maker by providing full details of the proposed method of installation in order to ensure that the most economic type of wire armouring is used.<sup>1</sup>

#### Termites and Teredos v. Cables<sup>2</sup>.—

Termites in general, many species of beetles and some wood wasps and moth caterpillars have been known to attack the lead sheathing of power (and telephone) cables. In this country, damage to cables from insects is not frequent, the greatest danger occurring in tropical and sub-tropical countries.

One method of protecting cables against this danger is to apply a layer of brass or copper tape (4 mil thick with a good overlap) between the compounded paper tapes and jute roves which form the bedding of the lead covered cable—this type of protection is particularly effective against the Teredo worm, normally found around the coast of New Zealand, since it appears to be the only type of protection the Teredo worm cannot bore through.

Another method of protection against termites is to thoroughly impregnate the textile servings of the cable with green oil or similar coal tar products, or to mix a small percentage of arsenious oxide in the bituminous compounds which are applied over each layer of textile serving. D.D.T.<sup>3</sup> may ultimately prove successful as a protection against termites.

When protection is required against termites or teredos it is particularly important that the cable user supplies the manufacturer with full particulars relating to his problem, so that the cablemaker is fully aware of the specific conditions for which protection of the cable is required.

1. Ordering Power Cables. C. C. Barnes. “Electrical Review” Vol. CXXXIX, No. 3583, July, 1946.

2. Termites and Termite Control. C. A. Kolford. University of California Press.

3. The Chemistry of D.D.T. A review. Cristal & Haller “Chemical and Engineering News,” November 25, 1945.

# 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 is meant by the terms back-fire, forward-fire, misfire and shoot-through in connection with mercury-arc converters

A back-fire, or arc-back, may occur during rectifier operation when an anode-cathode path becomes conducting during

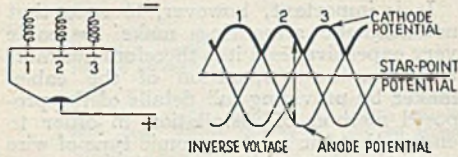


Fig. 1.—Rectifier operation

the negative half cycle, i.e., when it fails to withstand the full inverse voltage. The conditions are shown in Fig. 1. Such an occurrence constitutes a short-circuit on both a.c. and d.c. sides and must be

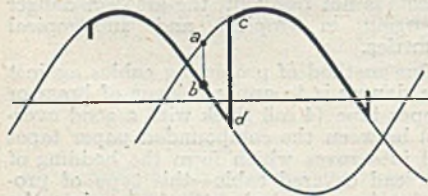


Fig. 2.—Grid control and forward-fire

cleared by the operation of appropriate circuit breakers.

A forward-fire may occur with a rectifier in which the normal commutating instant is delayed by grid control—forward-fire is said to occur if the arc strikes too soon, i.e., at a b instead of c d in Fig. 2. No

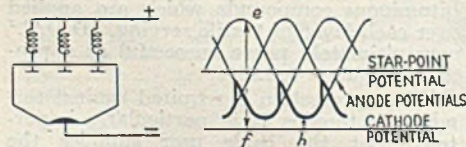


Fig. 3.—Inverter operation

damage is done as a result although if the condition occurs in every cycle the direct voltage will be too high.

A misfire means that one of the anodes does not start conducting at all in a particular cycle—again no damage will result although a succession of misfires will reduce the direct voltage.

A shoot-through or arc-through may occur with inverter operation if conduction starts during what should be a non-conducting period, e.g., at e f instead of at g h in Fig. 3. Inverted operation ceases under such conditions and the fault must be cleared by circuit breakers. E. O. T.

## Radio Transmitting Valves

A COMPREHENSIVE paper on "Radio Transmitting Valves," was presented by Mr. A. Mason, graduate, to a keenly interested audience of members and friends at the meeting of the London Students' section of the I.E.E. on January 8.

All the early transmitting valves, he said, depended upon radiation for cooling and had power outputs of from 50 to 200 W. The invention of the glass-to-metal seal by Housekeeper made possible the manufacture of high-power valves with an air or water-cooled copper anode forming part of the external envelope, thus enabling the dissipation of several kilowatts per valve.

Thermionic emission did not become appreciable until temperatures of the order of 1 000° to 2 500° K were reached and that limited the number of suitable materials which could be used for valve filaments. Tungsten, thoriated tungsten and alkaline-earth oxide-coated emitters were the only materials in common use, but the oxide emitter was used wherever possible on account of its long life and high thermionic efficiency. The dissipation of heat was a determining factor in the design and construction of valves.

Operation below normal rating prolonged filament life, but it was never desirable to operate the filament at more than 1 per cent. or 2 per cent. above its rated voltage. For example, an increase in filament voltage of 3 per cent. reduced the life of the valve by 30 per cent. and thus provision must be made for accurate adjustment and maintenance of filament voltage.

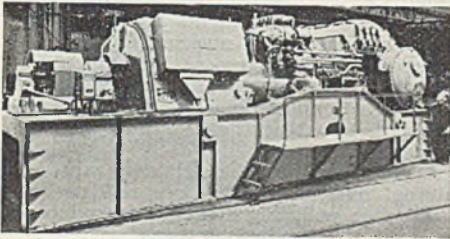
The trend of future development, said the author, was limited, although clearly defined, and was dependent upon adequate co-operation between the manufacturer and the user.

# What Manufacturers are Doing—IV

## Many Orders for Large Generating Sets

THE British Thomson-Houston Co., Ltd., celebrated its jubilee in 1946 and during the year the company was, it is reported, busier than ever with orders from home and overseas for items ranging from large power station and industrial plant to Mazda lamps of all types, and the various domestic appliances required for the housing programme. Many large lighting installations have been completed, and street lighting with "warm-white" fluorescent lamps with an outstanding development.

Orders for large turbo-alternators required for power stations scheduled in the



2500kW transportable turbo-alternator set for M.o.S. "relief" programme

Central Electricity Board's programme of extensions included three 1500 r.p.m., 75 000 kW, three-cylinder units for the Barking "C" station of the County of London Electricity Supply Co., Ltd., to operate at 900 lb./sq. in. gauge steam and 925°F. temperature. Two 3 000 r.p.m. two-cylinder 60 000 kW units to operate with steam at 900 lb./sq. in. and 900°F. have been ordered by Balfour, Beatty and Co., Ltd. Among machines now in course of erection are two 30 000 kW units for Nottingham and one of the same size for Leeds. A 20 000 kW unit was put into commission at the Bonnybridge power station of the Scottish Central Electric Power Co.

Demands for turbine-driven plant for export have been mainly for the industrial type. For the Ministry of Supply's "relief" programme ten 2 500 kW and fifteen 550 kW transportable turbo-alternator sets for the U.S.S.R., Czechoslovakia, Burma, Malaya and China were completed.

There has been a steady flow of orders for mechanical rectifiers and control for precipitation plant for boiler houses. Some of the equipments incorporate complete remote control. Another development is unified control for stokers and fans. The latest type of

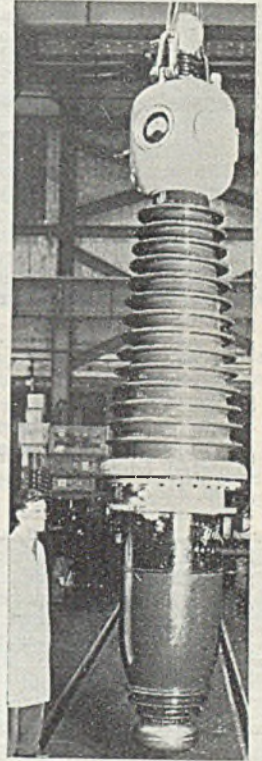
sootblower equipment includes a remote operated transfer switch to enable one equipment to be used with two boilers.

Schemes for a variety of applications for gas turbines are under consideration and there is growing interest in this new development.

Orders for large transformers included a 45 MVA, 132/33 kV unit, two of 15 MVA, 132/6.6 kV, and one of 15 MVA, 132/11 kV, all with on-load tap changing equipment, for the C.E.B.: one of them is to be installed in a new sub-station to supply the Atomic Research Establishment at Harwell; two 30 MVA, 66/11.5 kV units for North Tees power station, and two 37 500 kVA, 11/33 kV step-up units for Wigan Corporation.

Among numerous export orders were five 8 000 kVA units for the Bombay E.S. Co.; two 40 MVA, 10.5/88 kV banks, with station and auxiliary transformers of 4 000 and 750 kVA for the Orlando (Johannesburg) power station; three 37.5 MVA, 11/66 kV units for Newport power station, Australia, and units of various sizes for Travancore, Madras, Iraq and China. The first of three interesting testing transformers, designed to give a maximum test voltage of 362 kV and rated at 1 650 kVA, for the B.T.H. works at Rugby was completed, and the second is in hand.

There has been steady progress in the development of air-blast, air-284kV testing transformer break, and oil-break switchgear, many of the experimental designs of the preceding twelve months having now reached the production stage. Six indoor type 132 kV "Aero-jet" circuit-breakers incorporating re-



284kV testing transformer bushing

sistance switching, were installed at the C.E.B. sub-station at Andover. An outdoor version of the "Aerojet" breaker has been successfully subjected to low temperature tests. A new design of all-porcelain blast head with a simplified contact arrangement has been fitted to a 110 kV, 1 000 MVA "Aerojet" breaker developed for the Madras Government. Resistance switching has been incorporated in a new design of high speed, oil circuit-breaker, for 2 500 MVA at 110 and 132 kV, capable of operation in 3 cycles; the design permits the addition of auto-reclosing features. A very compact 33 kV, 500 MVA ring main equipment for sub-stations has been developed, and a number supplied to the Edinburgh Corporation.

Condenser type roof bushings have been supplied for the "Aerojet" installation at Andover, and transformer bushings for a working voltage of 264 kV between phases (153 kV to earth) have been manufactured. Four testing transformer bushings 21 ft. long overall, with a flashover voltage of 900 kV, designed for normal operation at 284 kV to earth, have been made for the testing transformers to be installed at the company's Rugby works.

#### MARINE GAS TURBINES

The marine department has supplied equipment for electrically propelled vessels, both turbo-electric and Diesel-electric. A combustion turbine is being built at the Rugby works to replace one of the four Diesel alternator sets in a Diesel-electric tanker. This is the first application of the gas turbine in a British mercantile marine ship yet to be announced.

Recent orders for trolley 'bus equipments included 52 for Wolverhampton, 15 for Derby and 12 for Mexborough. A flood-proof motor is being supplied. Tests are proceeding with a new form of relay-operated control which will enable maximum acceleration of a trolley 'bus to be automatically attained.

The battery vehicle control developed in 1945 is in full production. Orders are in hand for 500 equipments, including motors. A new battery motor is being used on 15 cwt. 1 ton, and 30 cwt. vehicles.

Export mining business included two winder equipments of more than 2 500 h.p. and three equipments of at least 3 000 h.p. At home two modern methods of handling heavy loads at low speeds, which in the majority of cases met with in Great Britain result in the greatest efficiency in winding, are being adopted. A number of schemes for the replacement of subsidiary rope haulages by conveyor installations have been prepared. A typical equipment comprises a 140 h.p. 3 300 V flameproof squirrel cage motor which drives through hydraulic coupling. Orders received dur-

ing the year for conveyor drives, include flameproof motors and control gear from 20 to 150 h.p.

A large synchronous motor driven geared compressor, capable of dealing with 17 658 cu. ft. of free air per minute at a pressure of 114 lb./sq. in. gauge was completed for the U.S.S.R.

Work on the new gear hobbing factory at Rugby is progressing.

New drives for a wide variety of rolling mills placed in commission include a 4 850 h.p. drive for a 32 in. reversing structural mill; this has amplidyne control.

A section of a B.T.H. factory at Newcastle-under-Lyme has been devoted to the manufacture of fractional horsepower motors to supplement the other works engaged in producing these machines. The varied requirements of main users have been met by the production of one basic design.

A special development has been on work associated with nuclear physics.

Experimental fluorescent lighting installations have been completed in the Binley and Birch Coppice Collieries. Further experiments to extend the field of application are under way.

A new type of infra-red lamp with an internal reflector which does not require cleaning or polishing has been introduced.

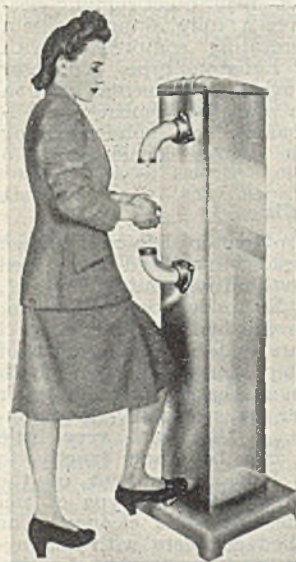
### *Exhibition Results*

IN a report on the results of the "Britain Can Make It" Exhibition, Mr. S. C. Leslie, director of the Council of Industrial Design, which organised the undertaking, said it seemed beyond dispute that in industrial prestige, in export orders, and in the direct promotion of higher standards of industrial design, as well as from the standpoint of the British public, the exhibition had been fully justified by its results. There would be other national exhibitions of the same kind. In the meantime it was intended to organise a series of local "design weeks" in provincial centres. A feature of them would be a small travelling exhibition. Records of the trade inquiry section at South Kensington showed that 43 300 people from this country with a commercial interest in the goods, visited the exhibition, and there were undoubtedly thousands more with trade interests who went in as members of the public. The organisers also had contact with 7 106 overseas buyers from 67 countries. More than a quarter of them came from the British Dominions and colonies. Unofficial estimates of the value of orders resulting from the exhibition varied from £25 million to £50 million.

# Equipment and Appliances

## Electric Hand Dryer

Announcing their "Pyrobit" electric hand dryer, the Acru Electric Tool Manu-



"Pyrobit" electric hand drier shown in use

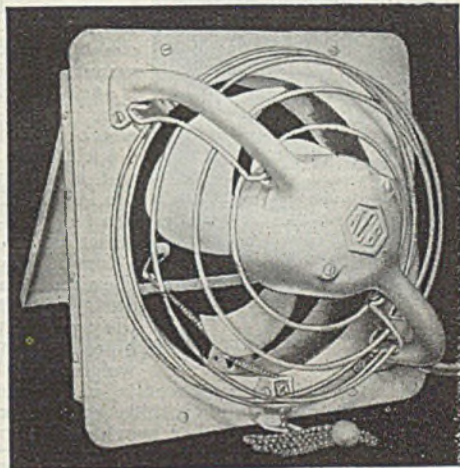
facturing Co., Ltd., state that its use in public wash-places, hospitals, factories, etc., will appreciably reduce the expense otherwise incurred in the supply of clean towels, etc., as well as giving advantages from the hygienic point of view. The model 2 drier, as illustrated, comprises two F. H. P. motors, which pass a stream of air through heating elements

and out through two opposed porcelain nozzles. The hands can be completely dried in 20 to 30 seconds. Since the nozzles are non-conductive and are of low heat conductivity compared with metal, the user is protected from shocks and burns. The drier is controlled by pedal switch, projecting from the front of the base. This switch controls both blower units and heaters and is spring loaded to return to the "off" position after use. A safety relay is provided in order to cut off the supply to the elements in the event of the air-flow being obstructed or failing. With a stove-enamelled body and an attractive overall design, the drier is made for a.c. mains and normal supply voltages. The total power consumption is 2.5 kW. In addition to the model described, there is also a smaller version.

## Small Domestic Fans

The ventilating fan illustrated below is the "window-fixed" model, one of a range now being manufactured by the Air Conditioning and Engineering Co., Ltd., of 3, Bayley Street, London, W.C.1. This particular fan is designed specifically for permanent installation in windows. It can replace a window pane in steel sash

or other small panel windows, and is also suitable for fitting in double-hung windows with wood or metal mullions round the panel. The position of the weather-tight door and the running of the motor are simultaneously controlled by the pull-chain. Among the other domestic fans following the same general construction are a built-in model, for embedding in brick or concrete walls, a general purpose fan, for special applications, and a removable

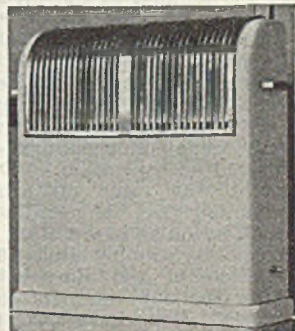


The "window-fixed" ventilator

model for window fitting. Each is made in a variety of sizes, and the motors are a.c. single-phase, 50-60 cycles, 200-250 V.

## Home Convector Heaters

The accompanying illustration shows the largest of a range of three stream-lined convector heaters, manufactured by Rowe Bros. and Co., Ltd., of 123, Pall Mall, London, S.W.1. Each model is of robust all-metal construction, finished in durable stove cream enamel with the grille and side handles chromium plated. The completely enclosed elements remain at black heat during operation, and there is a kick-switch for halving consumption and a con-

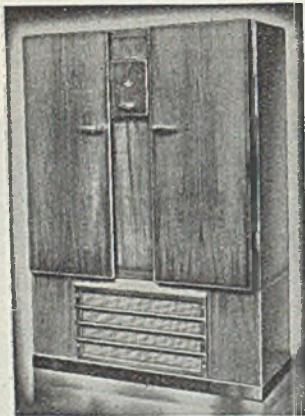


Rowe streamlined convector

cealed illuminator. Suitable for a.c. or d.c. mains, these convectors are supplied with a length of three-core flexible cord. The model illustrated is rated at 3 kW, and measures 24 in. high, 25 in. wide and 8 in. deep.

### Large Cabinet Refrigerator

Frigidaire, Ltd., have recently introduced a new product to their existing range in the form of a standard service cabinet or "reach-in" refrigerator. The exterior, of natural-colour teak veneer, is of "stressed skin" plywood on an oak frame, and is highly polished. This construction, developed by the aircraft industry during the war, combines light weight with rigid construction and results in greater ease in handling and installation. Expanded vulcanised rubber provides the in-



"Reach-in" refrigerator cabinet

sulation. Inside, the finish is a polished corrosion-resisting light alloy sheet. A direct-expansion evaporator, employing "Freon-12" non-toxic refrigerant, is used. Access to the interior is by two doors mounted on concealed hinges, and seven bar-type shelves, giving a total storage area, including floor rack, of 22 sq. ft., are provided inside. A small, quiet-running electric motor drives a fully automatic twin cylinder, reciprocating compressor, with an air-cooled radiator type condenser ventilated through the ornamental grille in the base. The whole equipment is available in ice-making or non-ice-making models and has a gross capacity of 25.5 cu. ft.

### Steel Slide Rails

A new type of motor slide rail, known as the "Rogerail," has been introduced by the London Shafting and Pulley Co., Ltd., of 18/22, Northdown Street, London, N.1. The rails are made of welded steel sections and are suitable for a range of motors, sizes at present offered being from 10 in. to 28 in. in the slot. One of their advantages over cast iron rails, the manufacturers state, is that with very little difficulty they can be made exactly to specification. Finer adjustment of the motor is possible with this type of rail since the inside surface is cleaner. The rails are supplied complete with holding-down bolts and an improved adjusting screw.

## Garcke's Manual

COINCIDING with the publication of the Electricity Bill, we received a copy of the 1946-47 edition of Garcke's Manual, which makes a welcome re-appearance after an absence of eight years. In the light of present events, the editorial foreword, which reviews the progress of the industry from the time of the first edition of the Manual to the present day, makes apposite reading. It begins with a reference to the Act of 1882, conceived in "a political atmosphere of 'Municipalism' and resulting in stagnation." In the six years that went by before an Amending Act (1888) was passed to relieve the situation only nine undertakings came (and remained) in operation. During the first world war came an awareness of the advantages of large-scale production of distribution and soon after, the contentious Electricity Supply Bill, 1919, led to the creation of the Electricity Commission. After the publication of the "Weir Committee" Report, in 1925, followed by the creation of the C.E.B. a year later—"a Conservative Government measure supported by the Labour Opposition"—came a period of comparative quiet, concerned

largely with the planning, construction and development of the grid and its interconnected selected stations. One may trace the origins of the present Bill back to 1932, when the Labour Party issued a report demanding the complete nationalisation of supply and the establishment of a National Electricity Board. How these aspirations of 1932 became the reality of to-day is described in detail. The Manual itself contains all those features which have long made it an almost essential work of reference to those concerned with the supply industry. Financial, technical, commercial and general information relating to approximately 850 electricity authorities, including public and private companies in Great Britain and Ireland, are given, together with a "Progress" section which includes a statistical analysis of the aggregate capital invested in the industry and of rates of dividend and interest paid. Another section of value and interest is the personal directory of 4 000 names and addresses of directors and officials.

It is published by Electrical Press, Ltd., Great Queen Street, W.C., price £3 3s.

# More Coal for Electricity

## Power Stations to Have First Priority

IN announcing in London on Monday a revision of the allocations of coal to industry made necessary by increased consumption, especially for the generation of electricity, Sir Stafford Cripps, President of the Board of Trade, declared "that the power stations will be made "absolutely first priority even if industry has to suffer in its solid fuel requirements. That is essential because selective cuts of power cannot be made; they have to be made over a whole area. As we know by experience it is not possible to cut off supply to the least desirable users in an area and at the same time allow the more important users to get the power they require, so we intend to generate as much power as we can."

Earlier in his speech Sir Stafford Cripps said production, consumption and transport had contributed to our present difficulties in the coal situation. Production had suffered from the general man-power shortage which was apparent in all our industries. The men working in the mines

to-day were doing a very good job. Production was steadily rising and the latest figures showed an increase of 170 000 tons a week with a labour force which had decreased by 3 400 compared with the same period last year, so that fewer men were producing much more coal. During the Christmas and New Year holidays about a million tons more were produced this year than during that period last year. On the consumption side there had been very large increased industrial production since last year. Mechanisation on a considerable scale had been going forward all over the country. That meant more consumption, particularly of electricity, and at the same time there had been a very much increased demand for electricity for domestic purposes, and especially for the use of all kinds of electrical appliances.

There was a most urgent obligation upon everyone to save electricity so as to avoid cuts and keep people employed in the factories. He mentioned that the average weekly consumption of coal by the power stations was 650 000 tons.

---

## Building Science Exhibition

AS part of the celebrations commemorating the twenty-first anniversary of the Incorporated Association of Architects and Surveyors, an exhibition, organised by the Department of Scientific and Industrial Research in conjunction with the association's Building Science Convention at Caxton Hall, Westminster, was opened by Mr. George Tomlinson, Minister of Works, on Monday. It will remain open until 7 p.m. tomorrow (Saturday). The exhibition is intended to present to all interested in the building industry the results of research and development in building science, and to show the professional man and the practical builder where and how to find the latest knowledge he wishes to apply to his work.

The sections dealing with heating, heat insulation and artificial lighting are of particular interest to the electrical industry, and the D.S.I.R. has had the benefit of the collaboration of the E.D.A., the E.R.A. and the E.L.M.A. in the preparation of the exhibits. The E.D.A. display consists of examples of boiling plates illustrating the development that has taken place in the last twenty years from the open coil to

the present-day enclosed type, and the radiant type with the sheathed wire element. With the aid of model rooms, heaters and specially designed thermometers, the British Electrical and Allied Industries Research Association demonstrates that the lining of rooms with wall-board or the use of metallic surfacing reduces the time required to produce comfortable conditions after switching on an electric fire to about one-third of that necessary for a room with the ordinary plastered and papered walls. This is an example of the wide scope of modern electrical research, which is not confined to the improvement of equipment, but extends to the investigation of the conditions under which the equipment will be used.

The lighting display shows that an installation can be designed to give any required lighting effect, and indicates the notable advance in lighting efficiency brought about by the development of fluorescent discharge lamp. The extent to which the lighting of a room can be affected by the decoration of the surrounding surfaces, and the speed of vision by colour is demonstrated.

# Industrial Information

## Beama Price Adjustment Formulæ

For purpose of calculating variations in (a) rates of pay, the rate of pay for adult male labour at January 11, 1947, shall be deemed to be 110s.; (b) costs of material: the index figure for intermediate products last published by the Board of Trade on January 11 is 204.1, and is the figure for the month of December, 1946.

## Private Coach Service

A service of passenger coaches has been instituted by Philips Lamps, Ltd., between



*The start of the coach service to Philips' Mitcham Works. MR. S. S. ERLKS, managing director, Philips Lamps, Ltd., is seen about to enter the vehicle, MR. VAN DER LAAN, financial controller (nearest coach), stands by*

the company's head office at Century House, Shaftesbury Avenue, and their factories at Mitcham and Haddon, in Surrey. These coaches will operate four times daily in each direction from Monday to Friday with two services each way on Saturday morning. The use of the service will be restricted to members of the staff of the Philips group of companies who are engaged on business between the points mentioned.

## Disposal of Radio Components

Large quantities of radio components are among the Government surplus stores, for which the Ministry of Supply is responsible. Already £500 000 worth have been sold. In addition, components to the approximate value of £30 000 have been sold to universities, technical schools and other educational establishments. It has been decided to release for sale another twelve million paper tubular fixed condensers.

## Hydro-Electric Contract

For the Errochty power station in the Tummel Garry scheme, the North of

Scotland Hydro-Electric Board has placed a contract with the General Electric Co., Ltd., for the manufacture and installation of three vertical-shaft water turbo-alternators with turbines of Boving manufacture. Each alternator will have an output of 27 800 kVA M.C.R. at 11 000 V, and the Boving turbines a specified rating of 35 000 H.P. against a 525 ft. head of water. As much of the plant as possible will be made in Scotland, where the water turbines will be built and all the heavy forgings for the alternators produced. The electrical equipment will be manufactured at the G.E.C. engineering works at Witton. It is hoped to complete the installation for the winter load of 1948.

## Mersey Bar Light Vessel Refitted

The Mersey Bar light vessel has undergone a complete refitment, and Chance Bros., Ltd., undertook the construction of modern optical and fog-signalling equipment. The illuminant is now electrical, and the optical apparatus is mounted upon a constant-level arrangement of latest design and is revolved by an electric motor contained within the constant-level mechanism. Electric current for the optic lamp, driving motor, radio beacon, half-mile signalling lamp, fog signal character mechanism, domestic lighting on the ship and for the refrigerator is derived from a large battery which is kept in a charged state automatically by means of duplicate alternate-running engine-driven generating sets. The range of the Diaphone fog signal is at least four miles and ranges up to twenty or thirty miles have been obtained with these instruments.

## Paint Drying on 'Buses

Infra-red ray heating is shortening the time taken to repaint London 'buses. Instead of eighteen hours previously needed to dry a 'bus panel after repainting, the whole process of painting with undercoat, colour coat, and varnish and drying can now be completed in two-and-a-half hours. The process has formerly been employed mostly for rapid drying of mass-produced articles, but the unit now in operation applies it to individual 'bus panels. It is a portable set.

## Defective Colour Vision in Industry

A report on "Defective Colour Vision in Industry," by a Committee of the Colour Group of the Physical Society, just published by the Society (price 3s. net, including postage), states that the majority of electrical firms who supplied information reported that they had met with few colour defective subjects, that there was no difficulty in finding alterna-



tive employment for those few, and that they had, therefore, not found that any definite scheme of testing was required. The few firms who had made tests agreed that the proportion of abnormal operatives was small; one firm found it less than 1 per cent. when its employees were tested. A return to the former procedure of marking the number of ohms or megohms upon resistances seemed very desirable, with or without some system of colouring. The Committee recommend school tests, and that pre-employment testing should be instituted forthwith in all industries and professions where normal colour vision is important.

### Conference of Sound Recording

A conference on sound recording, organised by the British Sound Recording Association, will be held in the hall of the Royal Society of Arts, John Adam Street, Adelphi, London, W.C., on January 25 at 4.15 p.m., following the annual general meeting at 2.30 p.m. Original papers on sound recording technique, with special reference to war-time applications, will be presented. A few tickets are still available to non-members from the general secretary, 3a, Pembroke Buildings, Camberley, Surrey.

### Contracting Industry Wages

"Failure to Agree" has been recorded in respect of an application by the Electrical Trades Union for a substantial increase in the wages of electrical contracting operatives. In view of the fact that the existing wages agreement between the Electrical Trades Union and the National Federated Electrical Association expired on the second pay day in this month for the period covered by that pay day, it has been decided by the National Federated Electrical Association that for all classes of labour covered by existing agreements the rates determined thereby shall remain current until further notice.

### Industrial Decoration

The third sessional meeting of the Birmingham Centre of the Illuminating Engineering Society on January 3 was addressed by Dr. J. H. Nelson, one of the members, on "Industrial Decoration." Colour harmonies and psychological effects were dealt with at length, and it was shown how, in a boring or monotonous occupation, a stimulating colour could be an asset, while in a process involving high temperatures, a cool colour could be used with good psychological effect, and so on. The conclusions and recommendations were: That the ceilings should be white, preferably with an eggshell finish; machine tools should be decorated with light colours; walls should be light in colour; floors should be light, but not

as light as any other part of the building. Shops so treated were kept cleaner, were more popular, helped seeing, reduced labour turnover and gave an atmosphere of cheerfulness.

### Five-Day Week Adopted

Asea Electric, Ltd., associated with Fuller Electrical and Manufacturing Co., Ltd., Fulbourne Road, Walthamstow, E.17, announces that the company has adopted the five-day working week as from January 6.

### Domestic Electrical Instruction

An evening class at which instruction will be given on the maintenance and use of electrical domestic appliances is being arranged at Jarrow Grammar School. Twelve lectures are to be given by Mr. K. M. MacKenzie, of A. Reyrolle and Co., Ltd., Hebburn, dealing with all types of electrical domestic equipment.

### "Mrs. Ekco" in Pantomime

Rehearsals for the pantomime "Ekco and the Beanstalk," to be presented in the works canteen of E. K. Cole, Ltd., Southend-on-



CLARK RAMSAY, the script writer, with LEN BROWN (Mrs. Ekco) rehearsing in the pantomime, "Ekco and the Beanstalk"

Sea, on January 20 and 21, are nearly complete. Here the illustration shows Clark Ramsay, Ekco relations officer, who wrote the script, flirting with Mrs. Ekco (Len Brown), lighting laboratory assistant, at her cottage window.

### Leaded Alloy Steels

One of the important developments that took place during the war was that of producing leaded alloy steels to meet various requirements. Following successful American experiments with lead bearing steels, investigations in this country began at the works of Samuel Fox and Co., Ltd., into the application of the

process to alloy steels and the first leaded ingot was made in March, 1941. Now that leaded alloy steels have progressed beyond the development stage and large scale trials are in progress, production experience is rapidly becoming available. Varying results have been obtained, but the variation has been confined to one of degree. Practically without exception, users report not only a reduction in the time necessary to accomplish one operation as compared with straight alloy steels, but also a considerable improvement in the life of the cutting tool and a superior finish obtained on the completed part, in spite of the higher cutting speed. The adoption of such steels in the engineering industry is showing rapid growth.

### B.G.E. Brisbane Showrooms

The new premises and showrooms of British General Electric Co., Pty., Ltd., at 371-373, Adelaide Street, Brisbane, Australia, were officially opened by the Queensland Premier, the Hon. E. M. Hanlon. The Lieutenant Governor of Queensland, the Hon. F. A. Cooper, and the Lord Mayor of Brisbane, Ald. J. B. Chandler, were also present. The illustration shows the refrigerators and heating equipment on the first floor.

### Manchester E.A.W.

The Manchester and Salford branch of the Electrical Association for Women is preparing to celebrate its coming-of-age in March. No definite arrangements have yet been made, but officials propose to mark the occasion with a luncheon followed by a non-commercial exhibition of electrical equipment. Mrs. R. A. Thwaites, chairman of the local association and wife of the City Electrical Engineer, hopes to persuade more women to join the association which now has a membership of nearly 300.

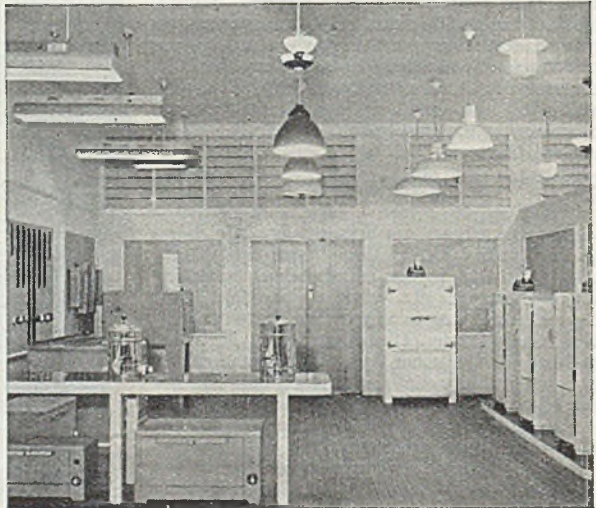
### "Fuel and the Future" Reports

Owing to printing difficulties it was not possible in all cases to supply copies of all papers read at the "Fuel and the Future" Conference arranged by the Ministry of Fuel and Power and held in London last October. These have now been reprinted and sets are available for reference purposes. They comprise "The Wythenshawe Scheme," by R. Nicholas; "District Heating in Relation to Town and Country Planning" by W. G. Hollford; "Proposed District Heating Scheme at Urmston," by

E. L. Leeming; "Prospects of District Heating in the United Kingdom," by S. B. Donkin; "District Heating as a Public Service," by A. Stubbs; and the Report of the Coal Grading Committee on the Size Grading of British Coals.

### Reports from Germany

Among further reports containing scientific and technical intelligence from German industry, now available at the Stationery Office, are the following:— B.I.O.S. 781, Some German Synthetic Resin Moulding Plants and Processes (4s. 6d.); B.I.O.S. 951, the Magnetophon Sound Recording and Reproducing System (10s.); B.I.O.S. 226, Metallised Paper Capacitors (6s. 6d.). Selected evaluation reports containing useful information not included by the authors in their more comprehensive final reports, will be available for purchase at a uniform price of



*Refrigerators and heating equipment displayed on the first floor of the new showrooms of the British General Electric Co. Pty., Ltd., at Brisbane, Australia*

2s. each. Reports, as they are published, will be distributed to the chief public libraries, chambers of commerce, universities, professional and scientific institutions and to the trade associations concerned.

### L.E.P. News Bulletin

The current number of the "News Bulletin" of the Lancashire Electric Power Co., contains a new feature entitled "Back on the Job," recording the feelings of men and women who have returned from the Forces and resumed their peace-time occupations. There are also reports of executive and staff changes and of presentations to Mr. C. D. Taite,

late chief engineer and manager, and Mr. J. Purrett, his deputy, on the occasions of their retirements.

### Textile Machinery Starters

Brookhirst Switchgear, Ltd., of Northgate Works, Chester, have informed us that they have received from a textile machinery manufacturing group an order for 1500 of their new 10 A, air-break, contactor-type starter for use on textile machinery, which was described and illustrated on page 48 in our issue of January 3.

### Modern Homes Exhibition

The 1947 Modern Homes' Exhibition will open at Dorland Hall, Regent Street, S.W.1, on March 25. Features of the exhibition will include a full-scale electric kitchen, fully equipped with the latest ideas and inventions to help the housewife.

### Domestic Refrigeration

This month's "Cheerful Rationing" card, issued by the E.A.W., 35, Grosvenor Place, London, S.W.1, is devoted mainly to the subject of refrigeration in the home. There are also recipes for jellied veal, orange jelly and ice-cream.

### Light Intensity

The August issue of the "Philips Technical Review" contains an article dealing with the problem of the most suitable light intensity for offices and homes and giving conclusions as to the effect of increasing that intensity. The construction and features of the Philips dynamo pocket torch are described in another contribution.

### Brush Products in S. Africa

An agreement has been made for the products of Brush Electrical Engineering Co., Ltd., to be produced, under royalty, in South Africa. Signatories to the agreement are the Brush Company, its subsidiary, Brush (South Africa), and New Union Goldfields. Issued share capital of Brush (South Africa) is to be acquired by one of New Union Goldfields subsidiaries, New Union General Industries, and a further subsidiary, First Electric Corporation of South Africa, is to manufacture the Brush products. These products will be sold by Brush (South Africa), which will continue to act as agents for British companies.

### Birchley Rolling Mills Arrangement

Thos. W. Ward, Ltd., Albion Works, Sheffield, have purchased the whole of the share capital of Birchley Rolling Mills, Ltd., Oldbury. The company will con-

tinue to operate under the present name. Messrs. H. W. Secker (chairman and managing director), C. Leslie Fry, W. W. Hickman, R. B. Trotman, S. J. Dyal, A. J. Wainford and P. T. Ward have been appointed directors of the company.

### B.S.S. for Drawing Papers

Four more British Standards, in the drawing office equipment and material series, have been issued in a single booklet, covering prepared tracing paper, detail drawing paper and cartridge drawing paper. The price is 2s., post free, and copies can be obtained from the publications sales department, British Standards Institution, 28, Victoria Street, London, S.W.1.

### Social News

A very enjoyable New Year's staff party was held by the Colston Electrical Co., Ltd., of 29, Orchard Street, Bristol, at the Berkeley Café. It was organised by the firm's welfare committee, and nearly 200 were present. Entertainment was provided by various artists, and competitions were held. Dancing continued until midnight.

The members of the Ekco Social and Sports Club held their third annual party for members' children on Saturday, January 11, when over 600 boys and girls were conveyed in motor coaches to and from a local theatre in Southend. Tea, a visit by "Father Christmas" and a distribution of gifts followed in the works canteen.

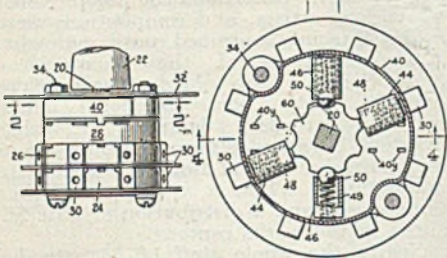
Nearly the whole staff of 55 attended the Frank Westerman (Wholesale), Ltd.'s staff annual dinner at the Grand Hotel, Birmingham, on Saturday, January 4. Mr. G. H. Levenger, domestic appliances manager of the General Electric Co., Ltd., responded to the toast of "The Visitors." Mr. Frank Westerman, managing director, proposed the toast of "The Staff," to which Mr. Ford, sales manager, replied. Party games and entertainments continued until 11 p.m. Mr. A. E. B. Wallis, manager of the Birmingham electricity showrooms, one of the guests, gave an interesting performance with his Elma-phone, an instrument which gives out musical notes when light beams are interrupted by the hands. Other guests were Mr. B. I. Powell, Midland sales manager, Simplex, Ltd.; Mr. W. Parker, manager, Monmore Conduits, Ltd.; Mr. P. McFall, sales manager, Sanders (Wednesbury), Ltd.; Mr. R. S. Whaley, managing director, and Mr. J. Greening, director, Speedy and Eynon; Mr. P. Tate, Midland manager, Frank Wheeler, Ltd.; Mr. Cheetham, managing director, Precision Electric, Ltd.; and Mr. Robbins, managing director, Robbins and Bradley. See p. 200.

# Electrical Inventions

## Indexing Rotary Switches

An indexing device is described, applicable to rotary switches, for which two main advantages are claimed: the switch can be built up of a number of individual sections and the number of positions which it may occupy may be doubled by moving the indexing device, without the necessity for adding to the switch in any way. One form of the invention is shown in the diagrams.

The indexing movement is provided by the engagement of the balls 48, 50, in the recesses of the cam member 60. In the position shown, the balls 48 rest upon the high points of the cam, while the diametrically opposed balls, 50, engage with the recesses, and there are thus sixteen possible positions for the switch member. If, now, the two cages 44 are rotated so that their lugs rest in the sets of apertures



40y of the plate 40, the balls will all engage cam recesses simultaneously, and there will be, in this instance, only eight available positions for the switch. The left hand figure illustrates the indexing mechanism 40 assembled with the other components of the switch.

*Arrow Electric Switches, Ltd. Convention date (U.S.A.) September 1, 1943. No. 582 687.*

## Self-Recording Telephone

The specification describes a method whereby a normal telephone instrument may be made to record messages automatically. The proposed equipment includes a sound recording unit, employing wax cylinders, discs or ribbons, powered by an electric drive or clockwork, and various relays. The recording unit, which can be taken into use without modification of the telephone itself, is arranged to commence operation a predetermined time after the beginning of the calling signal and to close down after a fixed duration of each call. It will then reset itself and be available for recording a further incoming message. Since the receiving subscriber can use his telephone in the nor-

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

mal way during recording, a record of a two-way conversation may be made, if desired. Provision may be made, it is stated, for the transmission of audible signals to the distant subscriber to indicate that his message is being recorded, or that recording is about to cease.

*N. E. W. Carter. Application date, April 5, 1945. No. 582 735.*

## Transformers in Air Blast Switchgear

It is an advantage, in oil circuit-breakers, to incorporate the current or voltage measuring transformers beneath the switch cover, the insulators of the switch thus serving at the same time as insulation for the transformer. In the case of air-blast switches, the low dielectric strength of air at atmospheric pressure has sometimes made it necessary to resort to separate oil insulation for the transformers.

In the proposed construction, use is made of the dielectric properties of compressed air, by incorporating the transformer within the air vessel. The transformer can be suspended on the closure lid, and is preferably mounted on the side facing the switch, in order to obtain the shortest possible connecting leads.

*Maschinenfabrik Oerlikon, Zürich. Convention date (Switzerland), November 2, 1943. No. 581 669.*

Plans for a considerable expansion of the Copper Development Association's activities have been put into effect and all departments have now come into full operation, it is stated in the association's annual report. Considerably more work is being undertaken concurrently, with satisfactory results, than at any time before. The new headquarters at Kendal's Hall, Radlett, the report adds, have been operating throughout the year and have proved very satisfactory. As envisaged in the first stage of the planned expansion, they are now practically complete, including the workshop, and a cordial invitation to visit them is extended to all members.

# Electricity Supply

**Crewe.**—The annual accounts show a loss of £20 000. The Council is considering raising tariffs by 15 to 20 per cent.

**Manchester.**—At the request of the consultants for the civil engineering work at Carrington power station, the Chief Engineer and Manager will act with them in a consultative capacity.

**Maidenhead.**—As a result of a recent census of council houses that have no internal hot-water systems or electric lighting, a scheme is to be prepared for installing electric water heating in 101 houses, as a first instalment.

**Manchester.**—Loan sanctions obtained include: £8 000 for meters, £28 300 for cookers, £17 000 for electrical apparatus, and £21 600 for sub-station equipment. Sanction is also being sought for £140 000 for mains extensions.

**Norwich.**—Following the successful trials of the heat pump, the Electricity Committee is to heat the City Hall by this system, at a cost of £13 000. The Electrical Engineer has been authorised to accept tenders for the work.

**Grantham.**—After new mercury vapour lamps were switched on at the railway station recently, it was noticed that engine drivers entering the station confused the yellow "caution" signals for green. Until some form of screening is arranged, five of the lamps will not be used.

**Bedford.**—Although smoke had been seen coming through the grating about 24 hours before the outbreak was discovered, the electricity works was not informed of a fire—caused by overloading and melting snow—in an underground sub-station. As a result, one transformer burned out and supply was interrupted for eight hours.

**Exeter.**—The off-peak heating tariff to new consumers has been increased from ½d. to ¾d. per unit. Old consumers will continue at the existing rate for the present. The Electricity Committee has arranged a hire-purchase scheme for cookers, which are no longer provided free to council tenants. Those unable to afford the initial payment may be charged an extra ½d. per unit consumed until a quarter of the list price of the cooker has been paid.

**Electricity Generation.**—The Official Returns rendered to the Electricity Commissioners show that during the past 12 months of 1946 (i.e., up to the end of December) the total number of units generated by authorised undertakers was 41 240 million, as compared with the re-

vised figure of 37 287 million for the corresponding period of 1945, representing an increase of 3 953 million units, or 10.6 per cent. Last month 4 372 million units were generated by authorised undertakers, as compared with the revised figure of 3 679 million in the corresponding month of 1945, representing an increase of 693 million, or 18.8 per cent. The total number of units sent out by authorised undertakers during December, 1946 (i.e., units generated, less units consumed in the stations by auxiliary plant and for lighting, etc.), was 4 140 million. The total number of units sent out from these generating stations during the past twelve months of 1946 was 38 922 million.

**Chester.**—The electricity department is to put into operation new tariffs, which will mean a reduction in the running charges for domestic users in the rural areas and slightly increased charges in the city. There will be an all-round increase for power. At a council meeting it was explained that because of increased costs of production and materials the undertaking had been losing money for the last three years and the estimated loss for 1946-47 would be £27 770. With the application of the new tariffs and a substantial reduction in establishment charges, a profit of £9 500 was calculated for 1947-48. It is understood the city flat rate for lighting will be increased from 4.4d. per unit to 5d. with additional units over 1 000 per quarter at 4d. The industrial two-part tariff with a previous fixed charge of £4.5 per kW per annum will be £1.5 per kW per quarter. In the rural areas immediately encircling Chester, the rate for general consumers will be reduced from 6.6d. to 6d. per unit with units over 1 000 at 5d. Motive power is increased from 2.47d. to 2.75d. per unit. In the more distant rural areas, the flat rate for general users will be increased from 7.15d. to 7.5d. for the first 1 000 units and 6d. for all additional.

**Edinburgh.**—The report of the undertaking, for the year ended May 28, 1946, shows a surplus on the year's trading of £29 375, which is carried forward to next year's revenue account. The total output of the Portobello station, amounting to 431 507 825 units, with a maximum load of 111 120 kW, was supplied to the C.E.B., purchases from the Board being 373 859 225 units, with a maximum load of 116 920 kW. Total electricity sales increased during the year by 8.55 per cent. over the previous year's figures, the largest increases being recorded for

street lighting (402 per cent.), domestic heating (23 per cent.) and bulk supply (14 per cent.). The only decrease registered (1.34 per cent.) was in power sales. Detailed proposals had been made, Mr. J. F. Field (engineer and manager) stated, for the reconstruction of the Portobello station with much larger and more efficient turbines. About 90 per cent. of the cable for the 33 kV distribution scheme had been laid, and the new switch house at Portobello should be completed by August, 1947. In the analysis of generation costs, expenditure on coal amounted to £610 077, or 69 per cent. of the total of £886 147, interest and sinking fund charges to £131 329 (14.82 per cent.) and repairs and maintenance £61 349 (6.92 per cent.). Distribution costs of £455 755 included 17.98 per cent., for special expenditure, cables, services, appliances, etc., 29.08 per cent. for income tax and 15.56 per cent. and 12.76 per cent. for interest, sinking fund charges and management and miscellaneous expenses, respectively.

**Cheltenham.**—The total units sold during the year, including those used on the undertaking, amounted to 36 489 222, compared with 37 424 470 in the previous year, a decrease of 2.5 per cent. During

the same period, the revenue from sales decreased from £224 181 to £221 174. The effect of this is seen in a net deficit for the year of £1 720, which compares with a profit, in 1944-45, of £4 428. An analysis of the units sold shows an increase of 1.86 per cent. in lighting, separately metered, of 14.23 per cent., in sales for combined lighting, heating and cooking, and of 522 per cent. in public lighting. Sales at power and contracts rates, however, fell by 19.45 per cent. during the year. Development work carried out included the completion of a 500 kVA and a 25 kVA sub-station, and the conversion of a sub-station from switching to distribution by the installation of a 250 kVA transformer. Work is still proceeding on the replacement of an unsatisfactory 11 kV cable, 7 000 yds. of which had been renewed by the end of the financial year. As an encouragement to domestic consumers to electrify, the department has instituted a free service and wiring scheme, under which the consumer is given five free fixed wiring points for domestic apparatus, as well as a free cooker and water heater, subject to supply being taken on the domestic tariff and the running charge being increased by  $\frac{1}{4}$ d. per unit.

## Coming Events

### Friday, January 17 (To-day)

**JUNIOR INSTITUTION OF ENGINEERS.**—London. "Design Considerations for Draughtsmen in Connection With High-Speed Rotative Machinery," J. M. Tebby. 6.30 p.m.

**I.E.E., N. EASTERN STUDENTS' SECTION.**—Newcastle-on-Tyne. Chairman's address, by T. M. Ayres. 6.30 p.m.

**NORTHAMPTON POLYTECHNIC.**—London. First of twelve lectures on Television Practice. 7 p.m.

### Saturday, January 18

**I.E.E.—London Students' Section.** Visit to the B.B.C., Brookmans Park Station. 2.30 p.m.

**I.E.E., N. MIDLAND STUDENTS' SECTION.**—Leeds. Main Centre. Chairman's address by A. G. Connell. 2.30 p.m.

### Sunday, January 19

**BRITISH KINEMATOGRAPH SOCIETY.**—London. "Projection Equipment," R. Robertson and Major Bell. 11 a.m.

### Monday, January 20

**BIRMINGHAM ELECTRIC CLUB.**—Symposium. Railway electrification in relation to the Birmingham district.

**INSTITUTION OF ELECTRONICS.**—London. At the Royal Society of Arts rooms. "The Welding of Plastics," H. P. Zade. 5.30 p.m.

**I.E.E., MERSEY AND N. WALES CENTRE.**—Liverpool. "Survey of the Development of Radar," Dr. R. A. Smith. 6 p.m.

### Tuesday, January 21

**I.E.E., N. WESTERN CENTRE.**—Manchester. Transmission Group. "Three-Phase Distribution and Electric Welding and Furnace Loads," A. Langley Morris. 6 p.m.

**INSTITUTE OF PHYSICS.**—Edinburgh. At the University. "Photography of Atomic Tracks," Prof. P. I. Dee.

**I.E.E.—Rugby Sub-Centre.** "The Analysis of Vibration Problems," Dr. A. J. King. 6.15 p.m.

**I.E.E.—London. Radio Section.** Discussion on "Radio Versus Line for Communication Systems," opened by A. H. Mumford. 5.30 p.m.

### Wednesday, January 22

**N.E. COAST INSTITUTION OF ENGINEERS AND SHIPBUILDERS.**—Newcastle-on-Tyne. Students' Section. "Turbines," W. Millar Lawson.

**INSTITUTION OF POST OFFICE ELECTRICAL ENGINEERS.**—London. "Auto Exchange Maintenance," A. Hudson. 5 p.m.

**I.E.E.—London. Measurements and Transmission Sections.** Discussion on "Switchgear Alarms and Indications," opened by T. S. Andrew and T. R. Reyner.

### Thursday, January 23

**ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS.**—London. At the Lighting Service Bureau. "Delicolor Equipment," E. E. Faraday. 6.15 p.m.

**I.E.E., SOUTHERN CENTRE.**—Brighton. Joint meeting of I.M.E. and I.C.E. "Power Stations of the Future," G. M. Martin.

### Friday, January 24

**INSTITUTION OF MECHANICAL ENGINEERS.**—London. "Materials New to Engineering," F. T. Barwell and J. C. W. Humphrey. 5.30 p.m.

**I.E.E.—London. Measurements Section.** "The Application of Electrical Technique to the Service of Some Other Industries," H. Cobden Turner and G. M. Tomlin. 5.30 p.m.

**NORTHAMPTON POLYTECHNIC.**—London. Second of twelve lectures on Television Practice. 7 p.m.

# ELECTRICAL INDUSTRY IN ITALY

BY OUR RESIDENT CORRESPONDENT

ARE the Italian electrical industries to be nationalised or will the present position based on the exploitation of private initiative remain unaltered? The problem is considered to be of the greatest concern in Italian engineering quarters, particularly in view of the fact that in order to build the new generating stations necessary to raise the output capacity to 30 milliards kWh, an investment of 450 milliards lire will be required, the bulk of which must be found abroad. While at first it appeared that the Italian Government would nationalise the electricity supply industry as a whole, reports from Rome now confirm that the Cabinet has approved a scheme according to which the Government will confine its intervention to the control of distribution lines and water reservoirs throughout the country.

It should not be forgotten that the Italian Government already controls at least 50 per cent. of the Società Idroelettrica Piemonte, of the Società Vizzola, of several electricity supply companies in the Bolzano/Trento district, of the Unione Nazionale Esercizi Elettrici in Rome, of the Terni and of the Società Meridionale di Elettricità, through the Istituto per la Ricostruzione Industriale (I.R.I.), the capital of which is in the hands of the Italian Ministry of Finance, viz., of the State. In these circumstances it is evident that in the present financial situation of the country, the Italian Government has little need to develop the nationalisation theme.

## NATIONALISATION AND THE OPPOSITION

The argument between those who oppose nationalisation and those who favour it, continues, however, and it is interesting to note that the Italian Association of Users of Electricity has taken advantage of the situation to suggest to the Association of Italian Electric Companies, the possibility of their financial co-operation in connection with the expansion of the industry on condition that against the investment of capital by the users, the power companies will grant them special facilities with respect to tariffs.

The High Commissioner for Electric Power has applied certain restrictions in the consumption of electricity, including each week, two days without power from 7.30 a.m. to 5 p.m. Owing to the fact that the rainfall has continued to be very limited during the last few months, the difficulties of the hydro-electric authorities have not been reduced by the restric-

tions, and it is forecast that a third day without electricity will be introduced; in the event of this many industries will have to close down. The shortage of power has also been felt by the railways and it has been necessary to reduce the number of trains on both the electrified and steam traction lines. Efforts are being made to overcome the difficulty by the use of Diesel engines, and expedition in the building of new generating stations in the vicinity of the lignite mines.

## GAS OPERATED POWER STATION

The Italian State Railways Administration is proceeding with the reconstruction of a methane gas operated generating station at Lardarello which, when completed, will have an annual output of 1 000 000 000 kWh.

The reconstruction of the Italian electrical industry as a whole, including the electrified railways, has been delayed by the shortage of raw materials required in the manufacture of electric motors, accumulators, appliances, fittings and so on. On many railways, trains are travelling without lighting and heating, due to the impossibility of obtaining deliveries of equipment. In this connection it is suggested that the situation might with advantage be investigated by British exporters of electrical equipment, bearing in mind the fact that the Italian market pre-war accepted considerable supplies in this field from the German and from the Hungarian electrical engineering industries. Trade relations between Italy and these countries have not yet been re-established, but efforts are being made by Sweden to secure a share of business previously enjoyed by Italy's neighbours.

Next month the British Export Trade Research Organisation completes its first year of full active work, and the chairman of the Council, Mr. Leslie Gamage, president also of the Institute of Export, reports that approximately 600 overseas inquiries and research commissions have been handled by its trained research staff during the period. A large number of these have come from firms in the engineering and allied industries. Accurate up-to-date information has been sought and given on the sales possibilities of a very wide range of products covering almost every country in the world. Close liaison with the Export Promotion Department of the B.O.T. has been maintained.

# 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:—

**Burnley**, January 20.—Supply and delivery of (a) e.h.t. cables; (b) transformers. Particulars from Borough Electrical Engineer, 43, Grimshaw Street, Burnley.

**Kettering**, January 20.—Tenders invited from British manufacturers for (a) two 400 kVA three-phase transformers, 11 000/420 V; (b) six 500 kVA, three-phase transformers, 11 000/420 V. Specification from Borough Electrical Engineer, Rockingham Road, Kettering; deposit, £1 ls.

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

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

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

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

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

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

**Plympton St. Mary**, January 23.—Supply and delivery of: (a) cables, p.i. and rubber insulated; (b) cable accessories; (c) house service meters; (d) l.t. dis-

tribution switchboards. Specifications, etc., from Clerk to the Council, Council Offices, Plympton.

**Reigate**, January 25.—Wiring large garage. Particulars from Electrical Engineer and Manager, Electric House, Linkfield Corner, Redhill, Surrey; deposit, £1.

**Cardiff**, January 29.—Installation of electric lighting and heating circuits in ten existing council houses at Taff Terrace, Radyr. Particulars from Electrical Engineer and Manager, 20, Park Place, Cardiff.

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

**Portsmouth**, January 30.—Supply, delivery and erection of three 1 500 kVA 11/6.3 kV transformers, connected delta/interstar for direct connection to existing 30 MW alternators for works auxiliary supplies. Particulars from Engineer and Manager, Electricity Undertaking, 111, High Street, Portsmouth; deposit, £1 ls.

**Brighouse**, January 31.—Supply and delivery of (a) two 11 kV switchboards; (b) one 300 kVA and one 600 kVA transformer. Specifications from Borough Electrical Engineer, Huddersfield Road, Brighouse, Yorks.

**Great Yarmouth**, January 31.—Supply, delivery, erection, testing and commissioning of the whole or part of the following transforming plant and apparatus, to be installed at the generating station, South Denes: Two 15/20 MVA, 33/6.6 kV, three-phase outdoor type static transformers; two 10/15 MVA, 33/11 kV, three-phase outdoor type static transformers; all fitted with remote electrically operated "on load" ratio change equipment, and complete with necessary auxiliary plant and control equipment, excluding control panels, which will be supplied under separate contract; two liquid type natural earthing resistors for outdoor service, excluding switchgear. Particulars from Borough Electrical Engineer, Electric House, Regent Road, Great Yarmouth; deposit, £1 ls.

**Irthlingborough**, February 1.—Supply and installation of electrical water boosting plant, comprising pressure tank, duplicate centrifugal pumps, motors, automatic starters, etc., at new water pumping station. Specification from Surveyor, Council Offices, Station Road, Irthlingborough, Northants.; deposit, £2 2s.

**Tottenham**, February 7.—Supply of electric lamps. Particulars from Acting Town Clerk, Town Hall, Tottenham, N.15.



# Company News

**AERIALITE, LTD.**—Trdg. prft. to June 1 £29 195 (£22 283); deduct fees £275, exes. re new cap. £460, deprecn. £3 551, E.P.T. £9 959, lvg. net prft. £14 950 (£12 035). Div. on 6% red. pref. net £1 370, intrn. 10% on ord. net £1 235, inc.-tax £6 099 (£5 224), fin. div. 45% (12½%) £6 116, mkg. 55% (22½%), less tax, on ord., fwd. £8 296. Stk. £113 383 (£106 655), debtors £107 125 (£48 081), creditors £122 874 (£74 118), tax res. £26 780 (£36 091).

**HEENAN AND FROUDE, LTD.**—Presiding at the annual meeting, the Chairman (Mr. Alan P. Good) said that the works of the company and its subsidiaries had been fully engaged during the year. A large percentage of the products were for export, and every effort was being put forward so that this vital artery of the national economy was served to the utmost of capacity. While the demands for their cooling devices were manifold, it was a matter of deep concern that the grave restriction of steel was seriously affecting the output of these products. Most of the cooling units were made of sheet steel, and the plating shop was feeling the full effects of the unfortunate situation. They had received, the Chairman continued, an increasing number of inquiries and orders for their eddy-current-controlled slip couplings, which they had recently developed in line with their American licensors for a variety of drives, including cranes, draw benches, conveyors, fans, etc. They had an up-to-date research and development department and were keeping abreast of all modern requirements and practices, and a subsidiary was taking a very active part in Diesel-electric traction.

**PERAK RIVER HYDRO-ELECTRIC POWER Co., LTD.**—Speaking at the annual meeting, Mr. William Shearer (chairman) recalled that in 1941 the company had showed a record profit of £520 000, but a few months later, Malaya was over-run by the enemy and their properties had to be abandoned. After the liberation, the plant was taken over by the military authorities and operated by them until February 28, 1946, when the company regained possession. The demand on the system on March 1, the Chairman said, was 7 400 kW, which had risen to 12 200 kW by July. Prior to the Japanese occupation, the demand had been in the neighbourhood of 50 000 kW, of which 40 per cent. was taken by the dredging companies and 56 per cent. in open-cast tin mines. By December last, a maximum demand of 16 000 kW had been reached, and the company had expressed the vital necessity of early

advances so that they could continue uninterruptedly the work of restoring their property to a proper operating condition. Estimates showed that the cost of reinstatement would be between £750 000 and £1 000 000. The limited supplies which had been given in their area since the plant was taken over by the military had come from the hydro-electric station of 27 000 kW at Chenderoh. Another station, with an installed capacity of 30 000 kW, was in reasonable condition, but the Batu Gajah steam station, of 22 500 kW, was to a great extent stripped by the enemy and it would be some time before more than 5 000 kW was available from it. Unfortunately, Mr. Shearer said, the turbine of the most modern machine, 12 500 kW, had been moved to Singapore, and the authorities there appeared to be somewhat reluctant to return the plant. There were difficulties in the supply of coal and oil for the thermal stations, which the company would have to operate during the dry weather period of 1947 and certainly when the load exceeded the capacity of the hydro-electric station, which was anticipated to take place in 1948.

## Metal Prices

	Monday, Price	January 13 Inc. Dec.
<b>Copper—</b>		
Best Selected (nom.)...per ton	£115 10 0	— —
Electro Wire bars ... ..	£117 0 0	— —
H.C. Wires, basis ... ..	£133 0 0	— —
Sheet ... ..	£158 10 0	— —
<b>Bronze Electrical quality</b>		
1% Tin—		
Wire (Telephone) basis per ton	£154 15 0	— —
<b>Brass (60/40)—</b>		
Rod basis ... ..	1s. 0½d.	— —
Wire ... ..	1s. 5d.	— —
<b>Iron and Steel—</b>		
Pig Iron (E. Coast Hematite No. 1) ...per ton	£8 19 0	— —
Galvanised Steel Wire (Cable Armouring) basis 0.104 in. ... ..	£33 0 0	— —
Mild Steel Plate (Cable Armouring) basis 0.04 in. ... ..	£21 15 0	— —
<b>Lead Pig—</b>		
English ... ..	£70 0 0	— —
Foreign and Colonial... ..	£71 10 0	— —
<b>Tin—</b>		
Ingot (minimum of 99.9% purity) ... ..	£384 0 0	— —
Wire, basis ... ..	per lb. 4s. 10½d.	— —
<b>Aluminium Ingots</b>		
Spelter ... ..	£70 0 0	— —
Mercury (spot) ... ..	per bott. £25 0 0	— —

Prices of galvanised steel wire and steel plate 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.*

**STAMFORD ELECTRICAL, LTD.**, London, S.W.—November 29, mortgage and charge to National Provincial Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. \*£2 000. December 28, 1945.

**PARSONS OF GLOUCESTER, LTD.**—December 3, charge, to Cheltenham and Gloucester Building Society, securing £3 000 and any further sums, etc.; charged on 49, Westgate Street, Gloucester, with stable and coachhouse adjoining.

## 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.*

**EXPRESS RADIO** (a firm), 36, Southside Street, Plymouth, electrical and radio retailers. £10 12s. 0d. October 24.

**BIRBECK RADIO** (a firm), 68, North Birbeck Road, London, E.11, radio dealers. £13 18s. 7d. October 18.

## Receiving Orders

**SHAW, Thomas**, residing at 65, Perth Street, and carrying on business at 495A, Anlaby Road, Kingston-upon-Hull, radio and electrical engineer, trading as "Radio and Electrical Service Engineering Co." Court: Kingston-upon-Hull. Date of filing petition: December 13, 1946. Date of Receiving Order: December 13, 1946. Debtor's Petition.

**NEWELL, Roland Leslie**, High Bank Mill, Egremont, Cumberland, electrical engineer. Court: Whitehaven and Millom. Date of filing petition: December 7, 1946. Date of Receiving Order: December 17, 1946. Creditor's Petition—Act of Bankruptcy proved in Creditor's Petition—Section 1-1 (G.), Bankruptcy Act, 1914.

## Application for Discharge

**PRENTICE, Donald Walter James**, described in the Receiving Order as D. W. J. Prentice (Male), 59, Brecon Road, Fulham, London, S.W., electrical engineer. Court: High Court of Justice. Day fixed for

Hearing: January 21, 1947, 11 a.m., at the Bankruptcy Buildings, Carey Street, London, W.C.2.

## Orders for Discharge

**HOWARTH, George**, 36, Union Street, Bury, Lanes, radio engineer. Court: Bolton. Date of Order: December 4, 1946. Nature of Order made: Bankrupt's discharge suspended for three months, and that he be discharged as from March 4, 1947.

**GREEN, Samuel Cyril**, 215, The Broadway, Southall, Middlesex, lately a dealer in wireless appliances. Court: Windsor. Date of Order: November 13, 1946. Nature of Order made: Discharged, subject to a suspension of one month, and to the Debtor consenting to judgment being entered against him by the Official Receiver in the Windsor County Court for £300.

## Adjudications

**BRITTON, Albert Sydney**, 9, Moorside Road, Heaton Moor, Stockport, and also carrying on business at 123, Higher Hillgate, Stockport, radio engineer and electrical contractor. Court: Stockport. Date of Order: December 12, 1946. Date of Filing Petition: October 30, 1946.

**NEWELL, Roland Leslie**, trading as R. and R. Newell, High Bank Mill, Egremont, Cumberland, electrical engineer. Court: Whitehaven and Millom. Date of Order: December 30, 1946. Date of Filing Petition: December 7, 1946.

**SPENCER, William Thomas**, 376, Oldham Road, Newton Heath, Manchester, electrician. Court: Manchester. Date of Order: December 13, 1946. Date of filing petition: November 19, 1946.

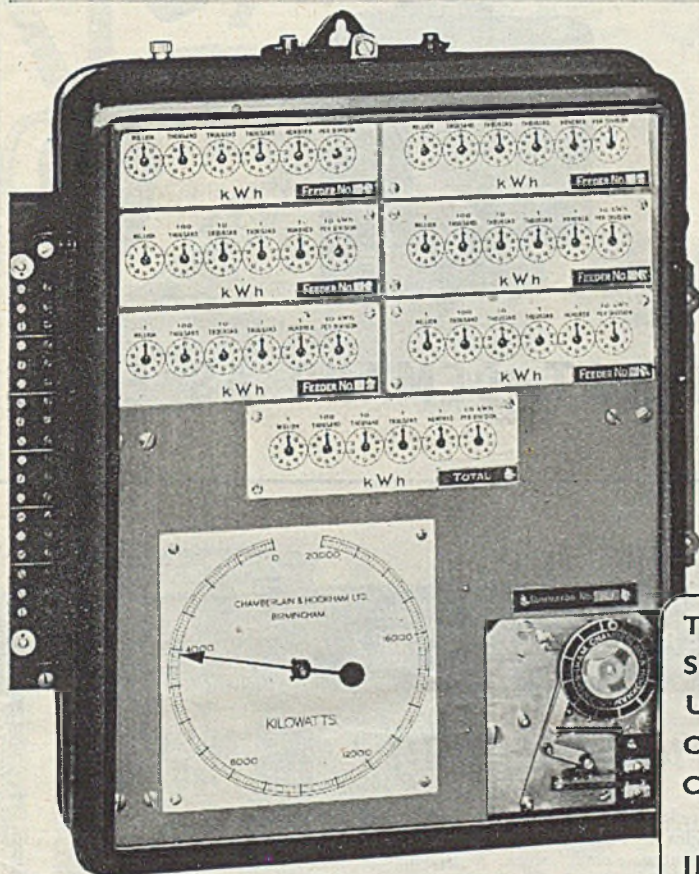
## Intended Dividend

**LEIVERS, Jim**, Victoria Radio Stores, 94, Victoria Road, Kirkby-in-Ashfield, Nottinghamshire. Radio electrical engineer. Court: Nottingham. Last Day for Receiving Proofs: January 22, 1947. Name of Trustee and address: Rogers, Alfred Joseph, 22, Regent Street, Park Row, Nottingham, Official Receiver.

## Dividend

**COUPE, George Francis**, residing at 7, Carrington Road, Stockport, and carrying on business at 2, Spring Gardens, Stockport. Electrical engineer. Court: Stockport. Amount per £—19s. 2d. (making 20s.) and 4 per cent. statutory interest, supplemental. Payable, January 24, 1947, at the Official Receiver's Office, 20, Byrom Street, Manchester.

# C & H MODERN METERING



THE C & H  
SUMMATOR  
USING THE  
C & H FLICK  
CONTACTOR  
AS AN  
IMPULSING  
MEDIUM

Another example of C & H development which has always kept pace with the metering needs of the ever expanding electrical industry

CHAMBERLAIN & HOOKHAM LTD • BIRMINGHAM

# ARON METERS



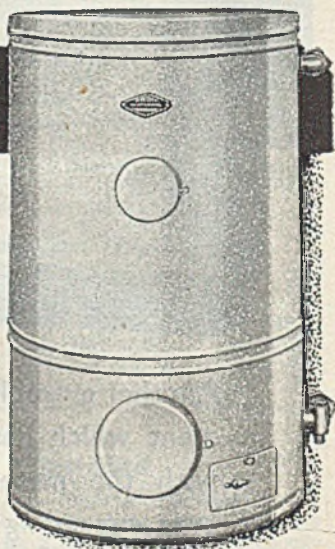
IN AS GREAT DEMAND AS EVER

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.

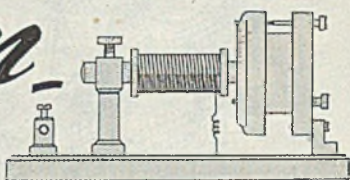
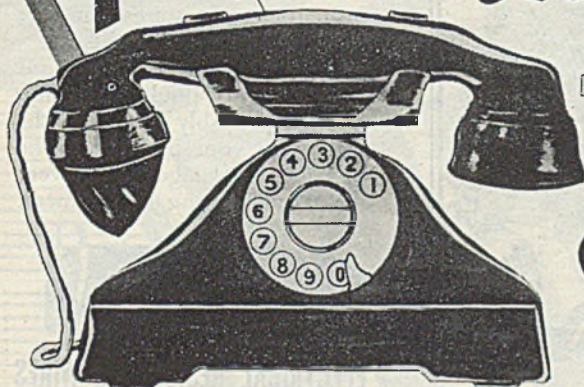


AIDAS ELECTRIC LIMITED, SADIA WORKS, ROWDELL ROAD,  
NORTHOLT, MIDDLESEX

'Phone: WAXlow 1607 'Grams: AIDASELECT GREENFORD

**SADIA**  
TYPE U.D.B. ELECTRIC  
WATER HEATER

**70** Years on



**Ericsson**

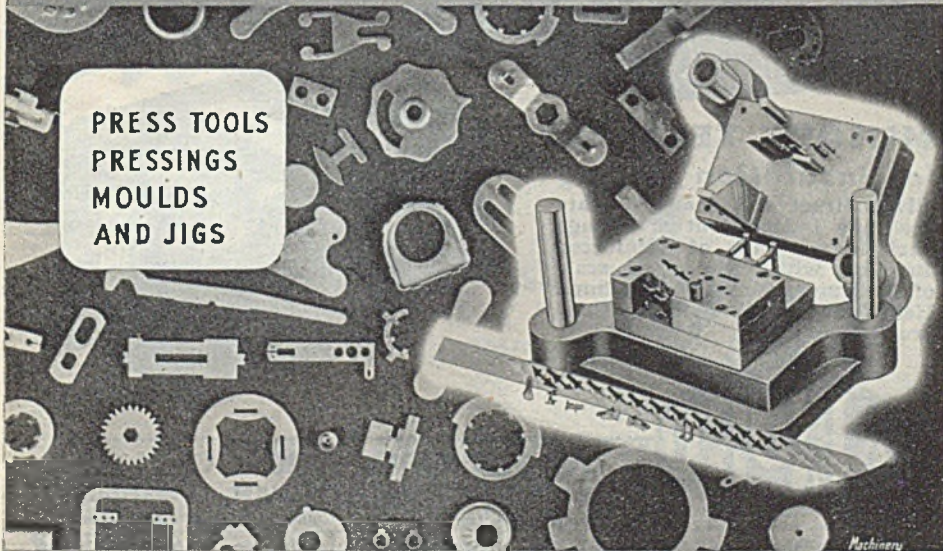
TELEPHONES Ltd.

56, KINGSWAY, LONDON, W.C.2

Tel. 891, 892

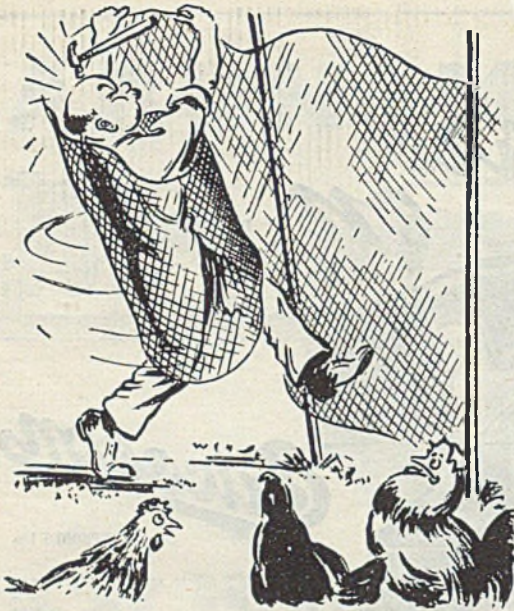
**UNIVERSAL TOOLS LTD**

PRESS TOOLS  
PRESSINGS  
MOULDS  
AND JIGS



Machinery

**TRAMWAY PATH · MITCHAM · SURREY**



## Wire resistance

Some kinds of Wire are very difficult to deal with in the purely mechanical sense as any Poultry Keeper will tell you. Even more difficult are the properties of Wires in the electrical field—and this is a subject we know more about than we do of poultry keeping.

We probably know the answer to your problem. The "CROMALOY" range covers every Electrical Heating requirement.



**ELECTRICAL RESISTANCE WIRES**

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

dm A.S. 3

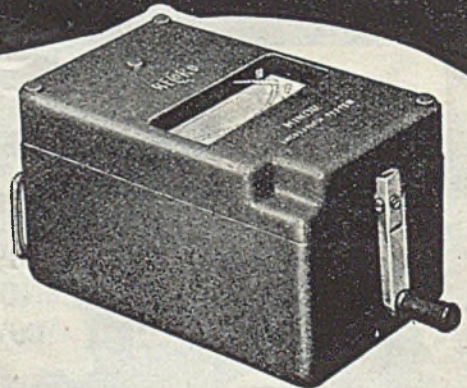


*a dead-accurate* **POINTER**

### 'MINOR' TEST SET

*for insulation testing*

Gives direct and dead accurate readings independent of voltage variation. Case of reinforced Bakelite with clear open scale of 5,000 ohms to 20 megohms. Height allows full swing of Generator Handle.



# RECORD

**THE RECORD ELECTRICAL CO. LTD.**

**BROADHEATH · ALTRINCHAM · CHESHIRE**

'Phone: Altrincham 3221/2 'Grams: "Infusion" Altrincham

London Office: 28 Victoria St., Westminster, S.W.1. Phone: Abbey 5148.

R/S.B.I.

THE ELECTRICIAN

17 JANUARY 1947

# F. D. SIMS *Limited*

HAZELHURST WORKS  
RAMSBOTTOM,  
LANCASHIRE



*We*

DRAW  
ENAMEL  
COTTON COVER  
SILK COVER  
GLASS COVER  
ASBESTOS COVER  
ENAMEL AND  
PAPER COVER

*Wire*

WE MAKE THE "SIMLON" WIRE  
WE MAKE THE "SICOVA" WIRE

ENQUIRIES F. D. SIMS LTD. HAZELHURST WORKS · RAMSBOTTOM · LANCs.

PHONE : RAMSBOTTOM 2213-4.

## 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

WRITE FOR  
ILLUSTRATED LEAFLET  
AND  
TRADE TERMS

® WL. 12

## See the Saving with the Ring Circuit

The modern method with the domestic ring circuit incorporating the D.S. "one-size" fused plug and socket; any number of extra socket outlets can be added simply and cheaply.

The old way with individual circuits employing BSS.546 2, 5 and 15A. unfused plugs. To add further socket outlets is expensive and complicates the wiring still further.



**FUSED PLUG & SOCKET**  
3kw. 250 v

**The NEW**

**The OLD**

**The D.S. Fused Plug made the Ring Circuit possible**

EU 46.

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





# ELEPHANTIDE

REGISTERED

The **BRITISH MADE**  
PRESSBOARD INSULATION

for

**TRANSFORMERS  
SWITCHGEAR  
MOTORS**

and all other  
**ELECTRICAL  
APPARATUS**

**B. S. & W. WHITELEY LTD.**

POOL-IN-WHARFEDALE · YORKS.

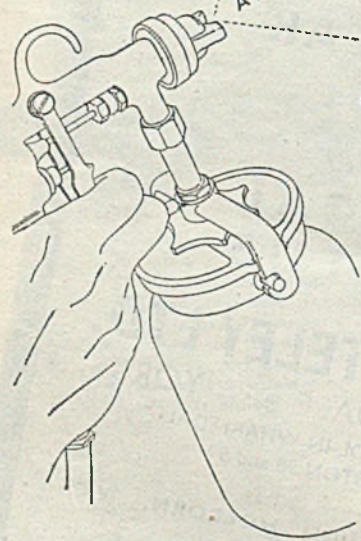
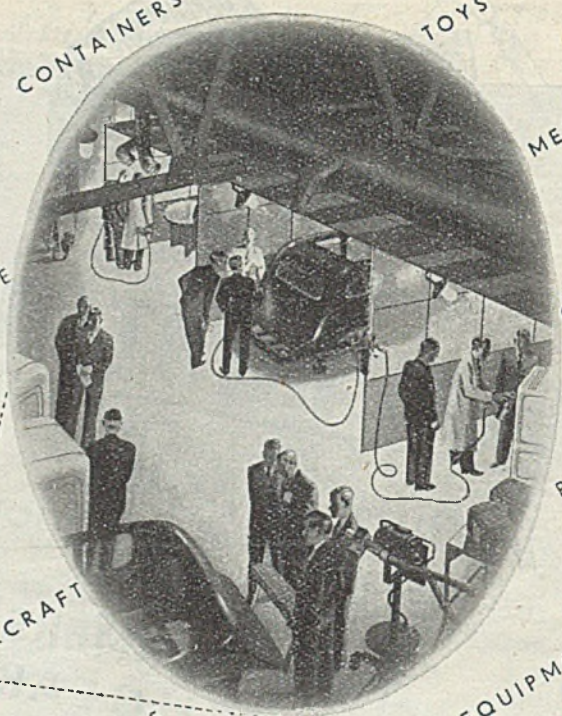
Telegrams: "WHITELEY, POOL-IN-WHARFEDALE"

Telephone: ARTHINGTON 98 and 99

LONDON OFFICE: 104 HIGH HOLBORN, W.C.1

Telephone: CHAncery 7646

BUSES  
 REFRIGERATORS  
 FURNITURE  
 RADIO CABINETS  
 AIRCRAFT  
 CONTAINERS  
 CABLE  
 SAFES  
 TOYS  
 METAL  
 CARS  
 RAIL  
 KITCHEN EQUIPMENT



OUT OF THE SPRAY GUN comes the paint or lacquer which will decide the final finish of the product: its appearance, its durability—and in many cases, its reputation.

Because the finish is so important a factor, I.C.I. Paints Division maintain a Technical Service Station where the industrial paint user can see for himself how best results may be achieved with existing finishes, and learn the possibilities of new finishes and finishing processes as they are developed. Could you make use of this service?

**IMPERIAL CHEMICAL INDUSTRIES LIMITED**  
**PAINTS DIVISION**  **SLOUGH, BUCKS**

(successors to Nobel Chemical Finishes Ltd.)

Telephone : Slough 23851

D.I.739



## HOW LONG DOES IT LIVE ?



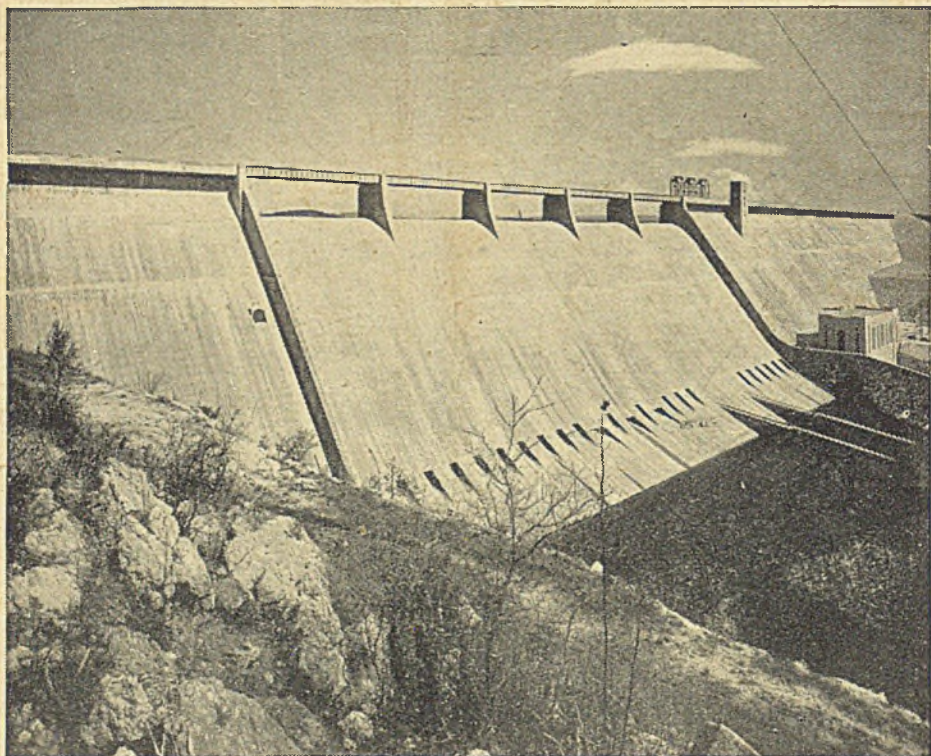
### *The Blackbird . . .*

Opinions may differ as to which is the better songster—the thrush, the nightingale or the full-throated blackbird—but there are no differences when it comes to the choice of a reliable rectifier. Statistics show that the average life of a blackbird is just over 11 years and that many Westinghouse metal rectifiers have already exceeded 20 without any attention, maintenance or renewals, a performance which far exceeds that of any competitive rectifier.



## METAL RECTIFIERS

WESTINGHOUSE BRAKE & SIGNAL CO., LTD.,  
82, York Way, King's Cross, London, N.1.



#### FAMOUS HYDRO-ELECTRIC STATIONS :

*The Marshall Ford Dam, on the Colorado River, Texas, U.S.A., is of the straight gravity type. Completed in 1942, with a height of 270 ft. and crest length of 2,423 ft., the dam was built for flood control, irrigation and hydro-electric power. The volume of 3,579,000 cubic yards provides an electrical power capacity of 50,000 h.p.*



## MEASUREMENT LIMITED

*Electricity and Water Meters of Quality*

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

CM21