

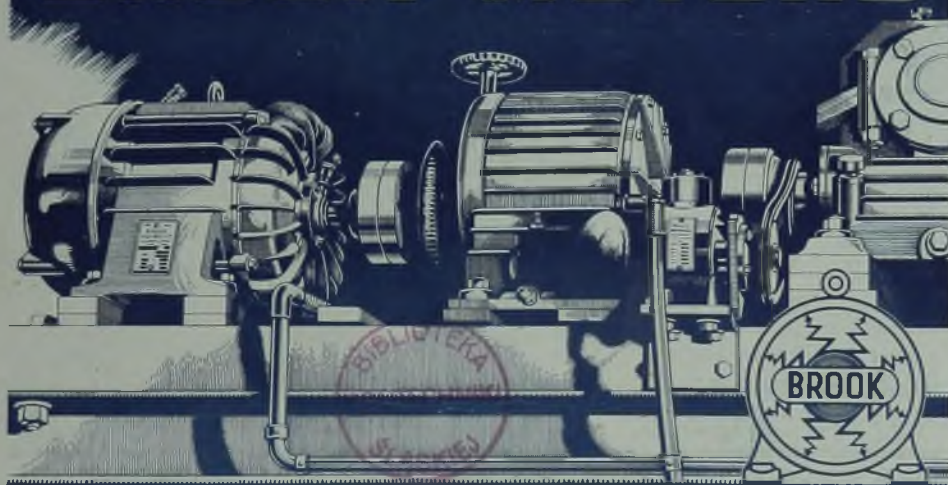
# ELECTRICAL FOUNDED 1872 REVIEW

Vol. CXXXVI. No. 3504

JANUARY 19, 1945

9d. WEEKLY

# POWER FOR VICTORY BROOK MOTORS



EMPRESS WORKS • HUDDERSFIELD



**ARM OF THE LAW...**

THERE HE STANDS—symbol of authority in an orderly World — controlling — directing — obeyed because absolutely trustworthy and reliable.

What a fitting comparison with BIRCH RESISTANCES *Arms of the Ohm's Law.*

Backed by many years of practical experience in which their reliability has been tested under all conditions, BIRCH RESISTANCES, in their various applications, stand up to their job and can always be depended upon to provide specified service because of their first-class workmanship.

**Birch**

*Please call upon us to help you solve any Resistance problem.*

# Resistances

May we quote you for any of the following:—

**DIMMERS — REGULATORS (Field, Shunt, Voltage) — RESISTANCES (Arc Lamp, Charging, Regulating, Sliding) — RHEOSTATS — ELEMENTS and SPIRALS. ASBESTOS WOVEN RESISTANCE NETS AND GRIDS**

**H. A. BIRCH & CO. LTD.,** Wilohm Works, Wood Street, WILLENHALL, STAFFS.  
 Telegrams : "WILOHM" Willenhall. Telephone : Willenhall 494-495

**ARMS OF THE OHM'S LAW**

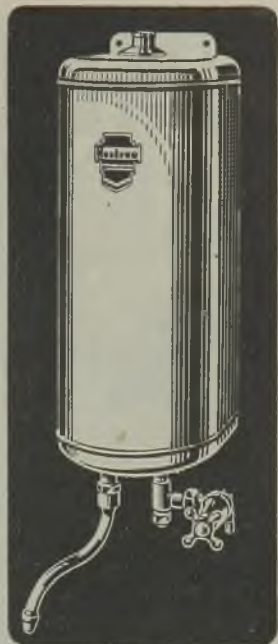


## The VALUE OF CONTRAST

The positive—in all items of life (including Electrical practice) would be valueless without the negative. Both must oppose each other. Without difficulties by “negative” forces, “positive” advancement in design could never record increasing improvement. For it is the overcoming of existing difficulties that measures the pace of progress.

### LEADERS IN ELECTRIC WATER HEATING

# HEATRAE



HEATRAE LTD., NORWICH

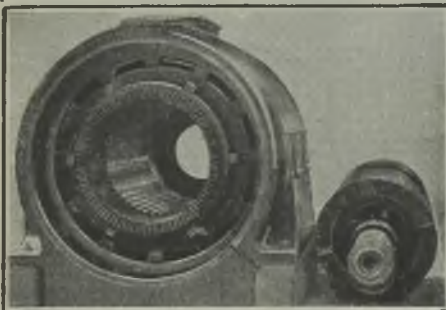
PHONE: NORWICH 25131

GRAMS: HEATRAE, NORWICH

## REPAIRS

The **WESTMINSTER ENG. Co. Ltd.**

Victoria Road, Willesden Junction, N.W.10



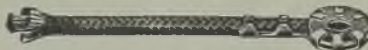
1500 kVA Turbo Generator Stator and Rotor  
Entirely Rewound

Makers of Electric Welding Machines,  
Photo Printing and Process Arc Lamps.  
"Partridge" Pressure Detectors

Telephone:  
Willem 1700-1

Telegrams:  
"Regency, Phone, London."

## SOUND TERMINAL WITHOUT SOLDER



Suitable for Telephone Lines

FOR CABLES  
AND WIRES  
OF ALL KINDS



SIZES FROM  
1" to 1"  
HOLE

**ROSS COURTNEY & Co. Ltd.**

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## TERMINAL POSTS



To the specific  
requirements of our  
customers

Makers of all  
types of re-  
petition pro-  
ducts from  
the bar in all  
metals



M C L and REPETITION LTD.  
Pool Lane - Langley - Birmingham

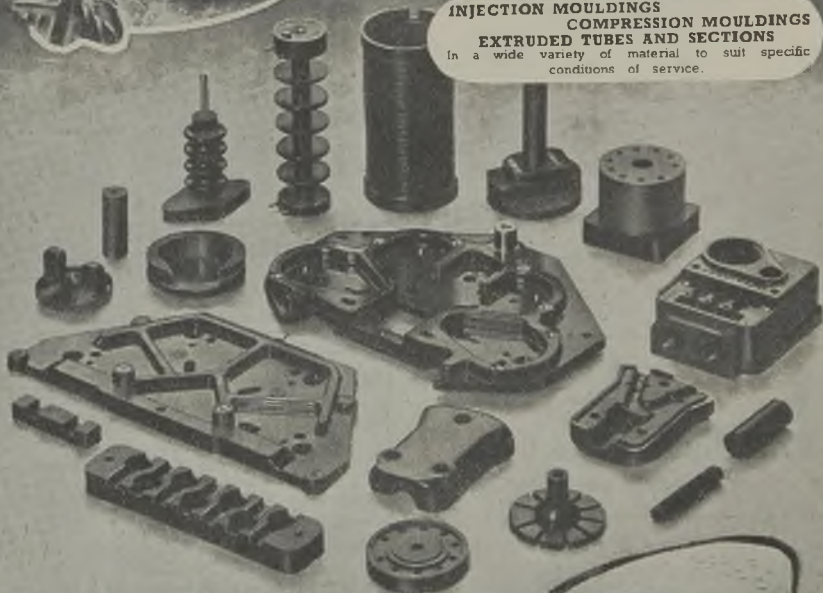


# EMPIRE PLASTICS



*For to-day-*

INJECTION MOULDINGS  
COMPRESSION MOULDINGS  
EXTRUDED TUBES AND SECTIONS  
In a wide variety of material to suit specific  
conditions of service.



*and to-morrow*

We offer you a complete service from original design to delivery of the finished job . . . a service backed by our unique experience and well known research facilities.



ENQUIRIES INVITED

**EMPIRE RUBBER CO.**

**DUNSTABLE • BEDS.**  
Phone: **DUNSTABLE 533**

# QUALITY—



Recommend your  
customers to install  
Elasta Lamps, the lamps  
they can rely upon.

# Elasta

E.L.M.A. LAMPS  
MADE IN ENGLAND

## ELECTRIC LAMPS

**POPE'S ELECTRIC LAMP CO., LTD.**  
5, EARNSHAW STREET, NEW OXFORD ST., LONDON, W.C.2

Telephone : TEMple Bar 6074. Telegrams : "Duramentum, Westcent, London."

Branches holding stocks from which supplies can be obtained :—

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18 Pool St., Market Street.

Tel. : Deansgate 5687.

Grams :

"Pope's, Deansgate 5687."

**BIRMINGHAM :** 3 Grosvenor Chambers,  
Broad St. Corner, Broad Street.

Tel. : Midland 2580.

Grams : "Pope's, Midland 2580, Birmingham."

**BELFAST (Managers : Campbell, Gardner & Co.) :** 27 Franklin Street.

Tel. : Belfast 25171.

Liverpool Representative : Mr. B. Marks, 29 Lascelles Road, Liverpool 19

**LEEDS :**

6 Park Square.

Tel. : Leeds 22119.

Grams :

"Pope's, Leeds 22119."

**LEICESTER :**

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Tel. : Leicester 59028.

Grams :

"Pope's, Leicester 59028."

**BRISTOL :**

123 Victoria Street.

Tel. : Bristol 23239.

Grams : "Pope's, Bristol 23239."

# Can you see far enough ahead ?



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

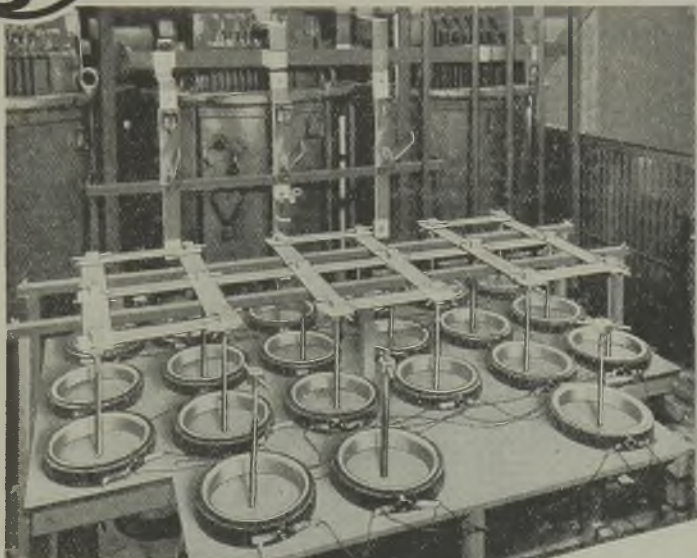
# KYE

## FOR GOODWILL AND SALES





# BUSBAR PROTECTION



Proving Test "set-up," shewing heavy current supply transformers in the background.

**PERFORMANCE  
PROVED  
BEFORE DELIVERY  
ON SPECIAL  
TESTING  
PLANT**

**Protect the  
key point of  
distribution**

Simple schemes applicable  
to any installation—  
new or existing.

Earth and Phase Faults.

# BTH

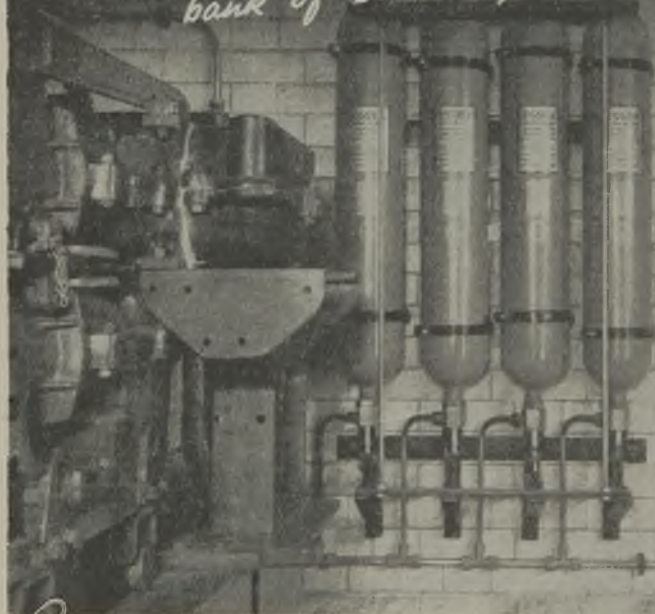
THE BRITISH THOMSON-HOUSTON CO., LTD.  
CROWN HOUSE, ALDWYCH, LONDON, W.C.2.



A3476



*Four Automatic Essex Methyl Bromide  
Extinguishers completely protect this  
bank of switch gear —*



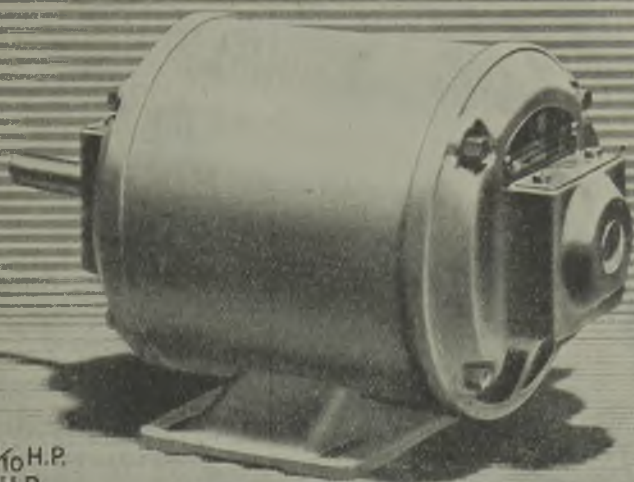
NFP

DESIGNED • MANUFACTURED AND INSTALLED BY  
**The NATIONAL FIRE PROTECTION COMPANY Ltd.,**  
RICHMOND • SURREY • Telephone RICHMOND 2342-3-4





# FRACTIONAL H.P. MOTORS



From  $\frac{1}{10}$  H.P.  
to 1 H.P.



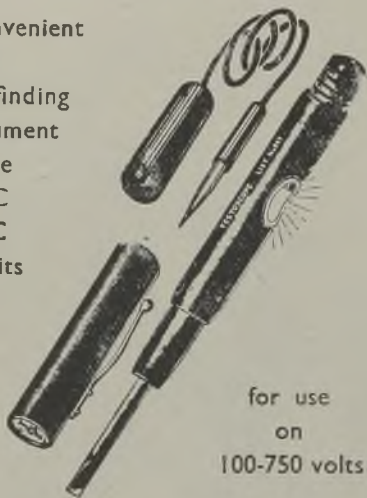
*Specify  
'English Electric'  
for  
Excellence & Efficiency*

**THE ENGLISH ELECTRIC COMPANY LTD.**  
— STAFFORD —

# THE POCKET TESTOSCOPE

Size of a Fountain Pen

A convenient  
rapid  
fault-finding  
instrument  
for use  
on AC  
or DC  
Circuits



for use  
on  
100-750 volts

## FOR TESTING

SWITCHES	OPEN CIRCUITS
LIVE CONDUCTORS	LEAKAGES
EARTHS	INSULATION VALUES
NEUTRAL WIRE	POLARITY
CONTINUITY, ETC.	

*The Electrician's Good Companion*

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# WIRING FOR LIGHTING & POWER



Seamless Copper Sheath  
Mineral Insulant  
H.C. Copper Cores

*Virtually*  
**INVULNERABLE**  
and  
**EVERLASTING**

Pyrotanax Cables will withstand gross ill-usage and are entirely unaffected by oil, water, condensation or accidental over-load. Composed entirely of copper and a mineral insulant, they are fire resistant and also non-ageing. They need no conduits or protection of any kind. Installation is simple and easy, any form of clip, saddle or clamping device serves to hold them in position. They can also be bent to any shape and fitted snugly in and around awkward corners.

Pyrotanax Cables conform to all recognised requirements and are adaptable to all standard electrical fittings. Further information on request.

Supplied with single or multiple cores in a wide range of current ratings.



Pronounced PYRO-TEE-NAX  
**PYROTENAX**  
MINERAL INSULATED · COPPER COVERED

*Cables*

Are giving safe and permanent service in —

Electrical Generating Stations, Factories and Workshops, Aerodromes, Shipyards and Ships, Oil Pumping and Storage Installations and Buildings of every kind.

**PYROTENAX LIMITED**  
HEBBURN Co. DURHAM

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London Office : 7 VICTORIA STREET, S.W.1  
Telephone : ABBey 1654



Composed of moulded insulating material; no earthing required; simple assembly

A wood bush is provided at the lower end for the entrance of the cable. At the upper end there is a spigoted cap of the same material as the box, with five "knock-outs," all or any of which may be used for taking out the cores.

Suitable for single, twin, three, four and five core cables.

Available in two sizes.

Write for full particulars.

# A neat and inexpensive TERMINAL BOX for L.T. Cables

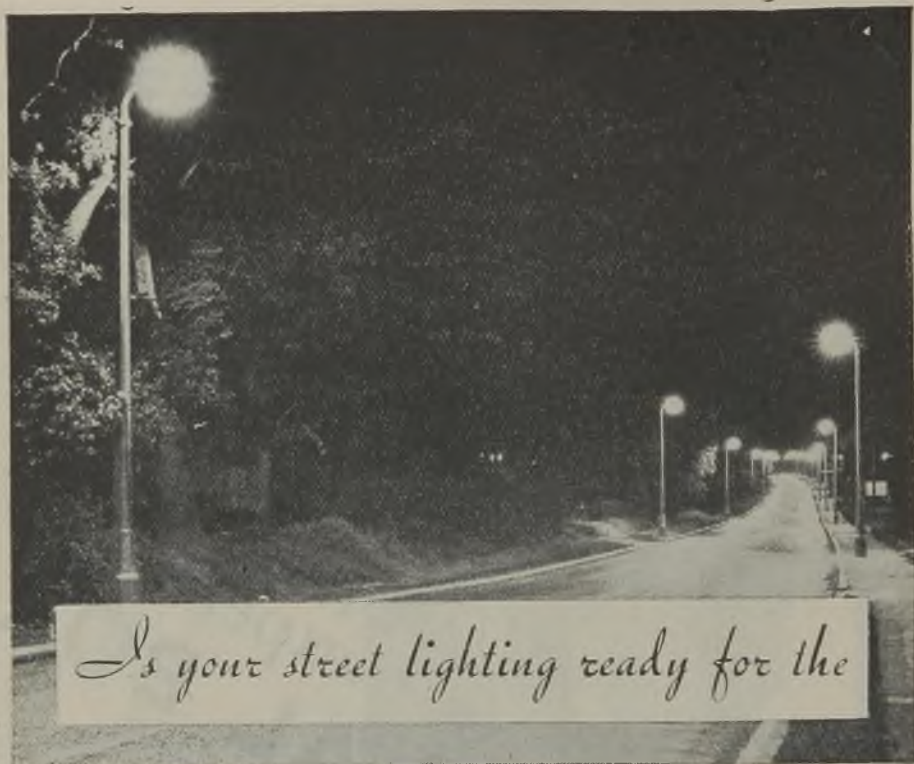


**BRITISH INSULATED CABLES LTD.,**

Head Office:—PRESCOT, LANCs.

Tel. No. PRESCOT 6571.





*Is your street lighting ready for the*

## FIRST NIGHT OF PEACE?

Peace may not give long notice of its coming. Keep your street lighting equipment in good order, ready! We shall be ready to serve you, as in the past, with street lighting fittings and equipment of the highest efficiency.

**ENGINEERING & LIGHTING EQUIPMENT CO. LTD.,**  
DEPT. W.S., SPHERE WORKS, ST. ALBANS, HERTS.





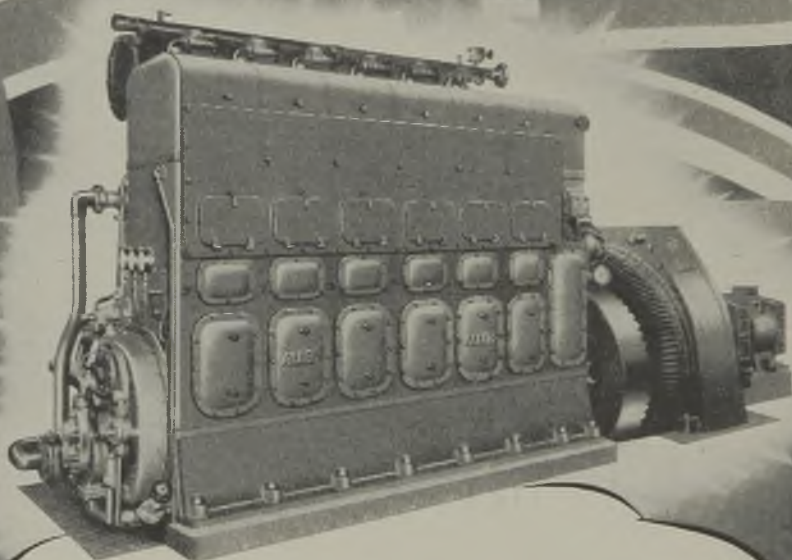
## *The* MINEX

This popular small portable fire is one of the models which we plan to put into production again as soon as conditions allow . . . to meet the more urgent demands of your customers for efficient radiant heating.

FIRST FOREMOST  
HOTTEST

*Ferranti*  
RADIANT  
ELECTRIC  
FIRES

# The **ALLEN** *Two-Stroke* **DIESEL ENGINE**



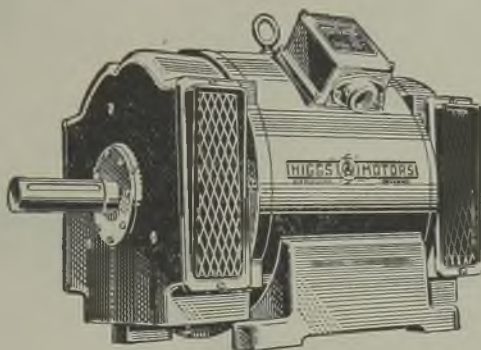
**Type T47.** This type of engine operates on the Harland and Wolff Burmeister and Wain uniflow scavenge system and covers a range of from three to eight cylinder units giving power outputs from 324 to 1,080 b.h.p. (218 to 720 kW.). The engine illustrated is a 6-cylinder, 810 b.h.p. unit direct-coupled to a 520 kW. alternator.

These engines are built for dependable operation over long periods of continuous running, with the minimum expenditure on fuel and maintenance. Their compact and robust construction has been achieved without resort to high running speeds, yet the design affords easy access for routine adjustments and service overhauls.

Particulars of the Allen two stroke and other ranges of engines for power requirements from 100 b.h.p. upwards, can be obtained on application.

**W. H. ALLEN, & SONS & CO. LTD.**  
**BEDFORD ENGLAND**





### 4,000 MOTORS

*This represents the quantity of machines of various sizes and types which are always available for immediate delivery from our stocks.*

*We suggest that your current requirements can be fully accommodated from this extensive range.*

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Nottingham, Peterborough, Sheffield, Wolverhampton.



Are you missing the extra profits you could make by handling Atlas Lamps? They sell easily because of their obvious value for money and our advertising—appearing in every main thoroughfare and regularly in the National and Provincial daily and evening papers and magazines—is creating a bigger than ever demand. Atlas dealers get extra good discounts, attractive sales aids and perfect freedom to stock whatever make of other good lamps they like.



# ATLAS LAMPS

*Nothing better has come to light*

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 Northern Branch: 55 Blossom Street, Manchester. 'Phone: Central 746.  
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SAVE TIME • INCREASE OUTPUT • CONSERVE ENERGY

**INDUSTRY** *uses*  
*thousands of Wolf Electric Tools*

**Wolf**

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PORTABLE ELECTRIC TOOLS

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Ensign Lamps conform in all respects to rigid B.S.I. specifications. In other words, they are superlatively good lamps—as good as lamps can be. there's none better

Yet they offer definite price advantages.

Well worth while enquiring from your Wholesaler or direct before placing orders elsewhere.

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London (North): Clay Hill, Bushey, Watford, Herts  
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Birmingham 1: 40 & 42 Summer Row.  
 Leeds 1: Wellington Street.  
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**U**SERS of Bakelite Laminated who may wish to know more about the physical, mechanical or electrical properties of any particular grade should ask for the Data Sheet bearing the number of the product.

If you are a prospective user of laminated plastics and desire information, kindly state the purpose and the essential qualities expected of the product and let the Bakelite Technical Staff choose the correct grade of material for you. Thereafter the grade number is your infallible guide to repeat orders.



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**BAKELITE**  **PLASTICS**  
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*Pioneers in the Plastics World*

T24

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# FOR COLLIERY ELECTRIFICATION



## INSTALLING CALLENDER 3,300 VOLT SHAFT CABLE IN A SCOTTISH COLLIERY

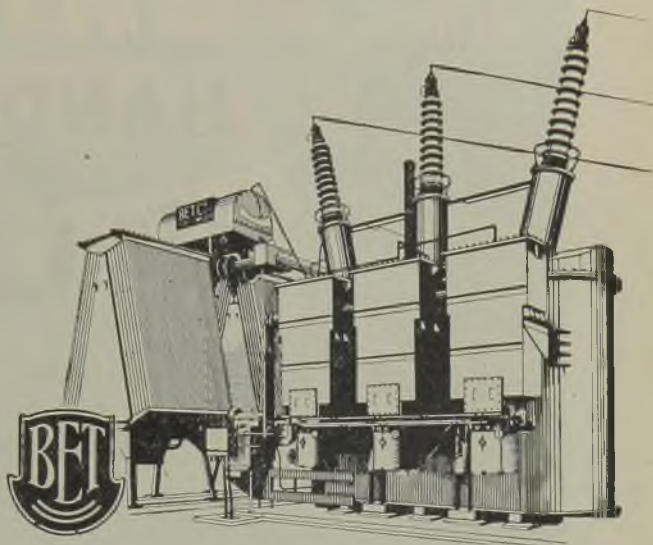
This illustration shows 160 fathoms of 19/0.83 three-core paper insulated lead sheathed double wire armoured, jute braided and compounded 3,300 volt cable in process of erection. Underground Callender 7/0.64 3,300 volt cables are used for individual circuits. From the gate-end boxes Callender spiral copper screened T.R.S. trailing cables are employed.

CALLENDER'S CABLE & CONSTRUCTION CO. LTD. HAMILTON HOUSE, VICTORIA EMBANKMENT, LONDON, E.T. 4

*All over the World*



# Built by B.E.T.



## ... a 45,000 kVA 'Grid' transformer.

B.E.T. have supplied over 3,000,000 kVA of transformers to the C.E.B. Large and small users of transformers find B.E.T.'s exceptional experience and technical resources to be invaluable in arriving at efficient and reliable designs.

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**British Electric Transformer**  
*Company Limited*

In association with CROMPTON PARKINSON LIMITED

ELECTRA HOUSE VICTORIA EMBANKMENT LONDON, W.C.2  
C

# SUPER GRIPPER

## ALL INSULATED HANDLAMP

*For use in  
conditions  
of special  
danger*

**17<sup>8</sup>/<sub>8</sub>**

**+33<sup>1</sup>/<sub>3</sub>%**

(SUBJECT)

plus Purchase Tax

(Ref. A.55)

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# CONNOLLY'S

WAR EMERGENCY

## LIMPET ADHESIVE TAPE

To meet the shortage of rubber we have temporarily ceased manufacture of the famous "Blackley," "Limpet" and "Jockey" tapes and in their place is introduced a "War Emergency Limpet" tape, which will meet all the exacting requirements of B.S.S. 1078-42 consistent with the lowest possible consumption of rubber.

This tape represents the highest quality which can now be manufactured. It is sold only on a yardage basis in  $\frac{1}{4}$ ",  $\frac{3}{4}$ " and 1" widths, in rolls of 50-yds., 25-yds. and 10-yds.

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Electricity Supply Commission of the Union of South Africa

constructed and operated by the

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on behalf of the Commission

Twelve 33,000 kW. and Four 7,000 kW.

3,000 r.p.m. Turbo Generator Sets, supplied by



# METROPOLITAN Vickers

ELECTRICAL

CO. LTD.

TRAFFORD PARK · MANCHESTER 17.

**INCREASE PRODUCTION BY** *Consulting* **METROVICK'S**  
**ILLUMINATING ENGINEERS**





WE CANNOT MAKE ALL THE METERS, SO WE MAKE ONLY THE BEST

BRITISH ELECTRIC METERS LIMITED  
MORDEN ROAD, MITCHAM, SURREY



## *Distribution Curves*

Holophane have handled so many distribution curves of all kinds from poor little curves of carbon and vacuum lamps to the accurate results of to-day. Holophane laboratories have built up the data over many years, Holophane designers have acquired increased skill in the control of light and Holophane Engineers have gathered experience over more than forty years. All this is at your service to ensure the best lighting for your own particular needs.

# HOLOPHANE

LIMITED

ELVERTON STREET, LONDON, S.W.1

Specialists  
in Lighting  
Research  
and  
Application  
since 1898

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# IGRANIC

## *Electric Control Gear*

Equip your electrically driven machines with the "right" control gear — IGRANIC, which will give positive protection to motor and machine and keep them working to secure maximum production.

*Illustration shows IGRANIC Contactor Panel for control of Travel motion of 6-ton Slab Charger for Steel Mill.*

IGRANIC ELECTRIC CO. LTD  
BEDFORD & LONDON

# mica

**I**F you are users of Mica or Micanite we would like the opportunity to show you what keen, energetic, enthusiastic people we are.

The good service which we have rendered cheerfully and willingly during the War has won us a host of friends so that our clientele to-day includes some of the foremost firms in the Electrical Industry.

MICA STRIPS, STAMPINGS, SEGMENT SEPARATORS, MICANITE TUBES AND BUSHES—all come within our range and we should welcome your enquiries.

**LANGLEY LONDON LIMITED**  
161 Borough High Street, London, S.E.1

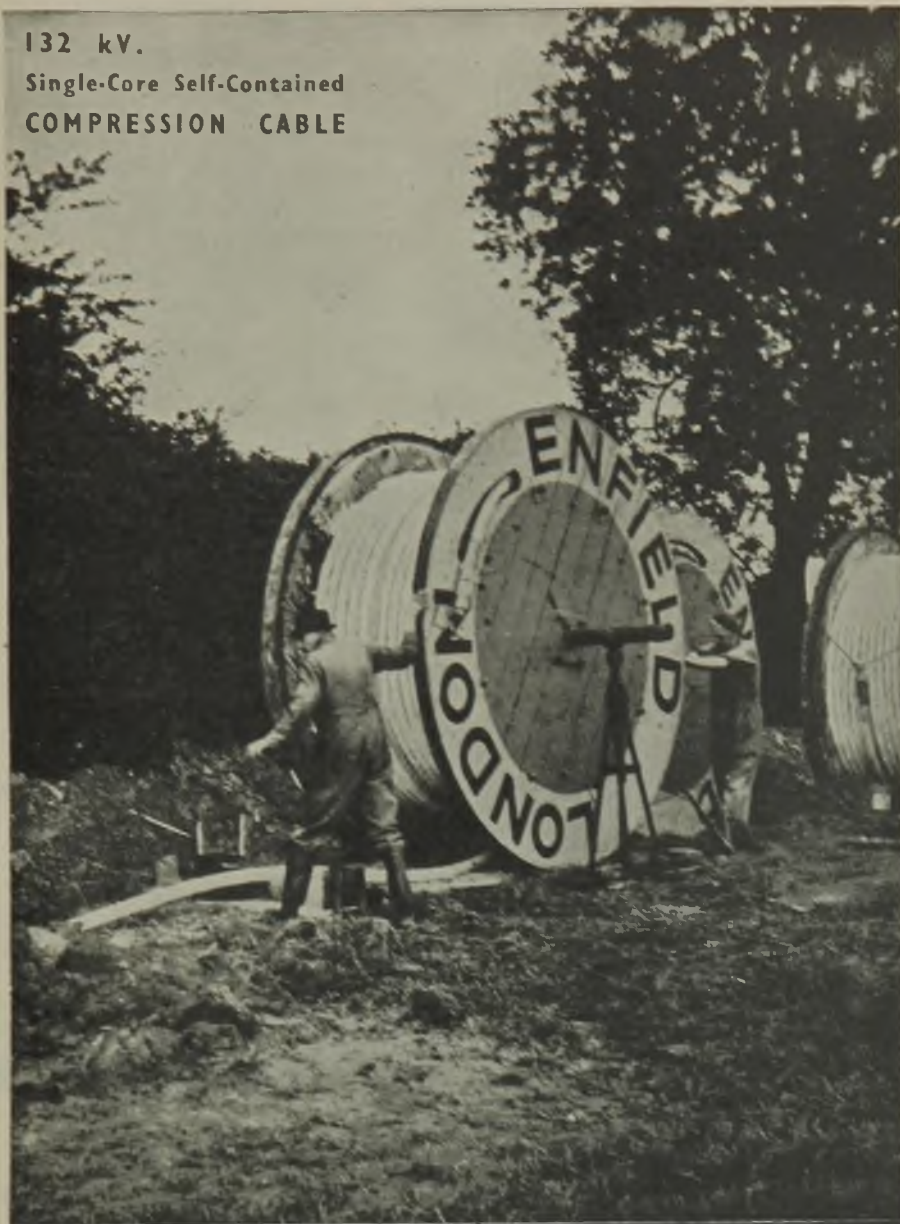
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Grams : Laglycol, Phone, London



132 kV.

Single-Core Self-Contained  
COMPRESSION CABLE



**THE ENFIELD CABLE WORKS LTD.**

Telephone: Howard 2661 (10 lines)

**BRIMSDOWN · MIDDLESEX**

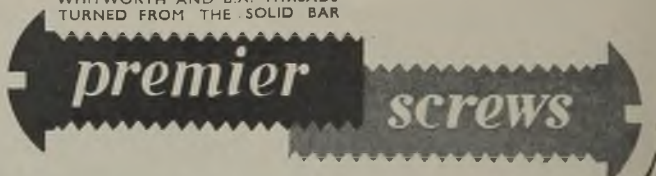


"By the way, Smithson, I want all the small steel screws for this contract to be Premier make, as it is most important we use turned from the bar screws exclusively.

"I know the Premier people carry stocks, so there should not be any delay in getting the size you require quickly. Will you ask Jones to send Premier an order, right away?"

WHITWORTH AND B.A. THREADS  
TURNED FROM THE SOLID BAR

London Office :  
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VICTORIA STATION  
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The PREMIER SCREW & REPETITION CO. LTD., WOODGATE, LEICESTER. Tel. 5695-6



*Watertube*  
**Boilers**  
by

**CLARKE, CHAPMAN**

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AND CO. LTD



The TUCKER G 44 Price List is a complete guide to present day electrical installation supplies for essential Services. Included are such well-tried favourites as the B 4000 QMB Heavy duty switches for surface mounting and in iron boxes for screwed conduit circuits.

*Whilst production is at present restricted to high priority Service needs the list will prove a useful reference when Post War installations are under consideration.*

**J. H. TUCKER & CO. LTD., Kings Rd., Tyseley, Birmingham 11**

Makers of First Grade Electrical Accessories for 50 Years





# ROTARY STRAINERS

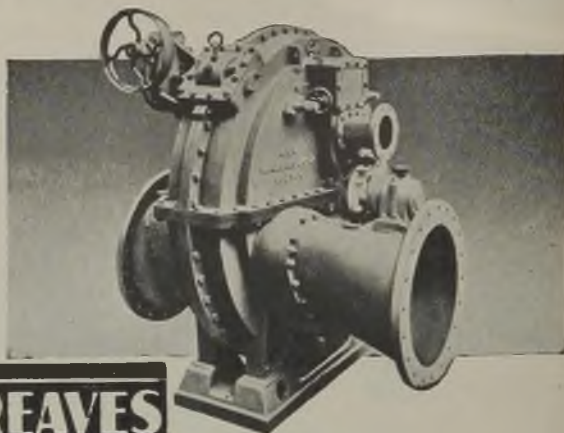
## for CLEANSING CONDENSER CIRCULATING WATER

Entirely automatic and self cleaning.

Completely enclosed.

Airtight system maintained.

Made in various sizes with capacities from 100,000 to 3,500,000 gallons per hour.



# HICK HARGREAVES

AND COMPANY LIMITED

Phone:  
1373 (3 lines)

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"HICK, BOLTON"

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*You can really  
rely on  
MACROME*



"THE MACROME STEEL TREATMENT" AND GENERAL CATALOGUE OF MACROME SMALL TOOLS.

There is still a limited number of copies available to all who are interested in maximum production in present and post-war manufacture.

Write NOW to our head office at Alcester, or telephone ALCESTER 191/192, 193.

*The Toughest  
Tools in the World!*

## MACROME LIMITED, ALCESTER, WARWICKSHIRE

Works at ALCESTER, Warwickshire, and ENDERBY, Leicester

Branches at LONDON - GLASGOW - MANCHESTER - LEEDS - COVENTRY - BRISTOL - BASINGSTOKE  
NEWCASTLE-ON-TYNE - BIRMINGHAM

# **Now—Sunlight!**

ROYAL

## **“EDISWAN”**

### **WARM-WHITE**

80 watt, 5 ft.

## **FLUORESCENT LAMP**

Ediswan have available  
WARM-WHITE & DAYLIGHT  
Fluorescent Lamps.

Restrictions on the supply of  
these lamps are now removed.

# **24/-** each

*For further details of Fluorescent Lamps and Lighting Equipment—  
write for Brochures LE. 1237 and L. 1250.*



THE EDISON SWAN ELECTRIC CO. LTD.,  
155, CHARING CROSS ROAD, LONDON, W.C.2

# CRYSELCO



## LAMPS

*Use good lamps and use them sparingly*

· C R Y S E L C O · L I M I T E D · B E D F O R D ·





## LIGHTS ON!

*Are you ready with STREET LIGHTING CONTROL*

**D**IM Out has been decreed. Complete freedom of lighting may be expected to follow. Are you ready with your plans for effective Street Lighting Control?

The Standard D.C. Bias System offers you the following advantages :—

Centralised control of street lighting, off-peak load, etc.

Low initial cost combined with negligible maintenance.

Systems can be built up and extended indefinitely from original installation.

Freedom from interference from high-frequency harmonics or induced ripple currents.

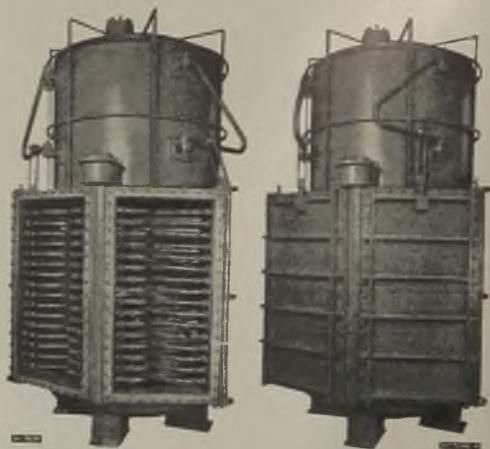
*Where new mains are required, Standard Power Cables are unsurpassed. Send us also your enquiries for V.I.R. and Synthetic insulated cables of all types.*

***Standard Telephones and Cables Limited***  
NEW SOUTHGATE, LONDON, N.11

*Mirrlees'*

## MODERN POWER STATION EQUIPMENT

SURFACE AND JET  
CONDENSING PLANT  
DE-AERATORS ; LOW AND  
HIGH PRESSURE HEATERS  
STEAM EJECTOR AIR PUMPS  
CONDENSATE EXTRACTION  
AND  
CIRCULATING WATER PUMPS

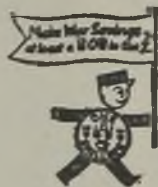


FEED WATER EVAPORATORS

*The* **MIRRLEES WATSON**  
COMPANY LIMITED  
ENGINEERS GLASGOW

## *Frames and Cases for Electrical Equipment*

**FEEDER PILLARS,  
CUBICLE AND  
TELEPHONE BOXES,  
BUSBAR CHAMBERS,  
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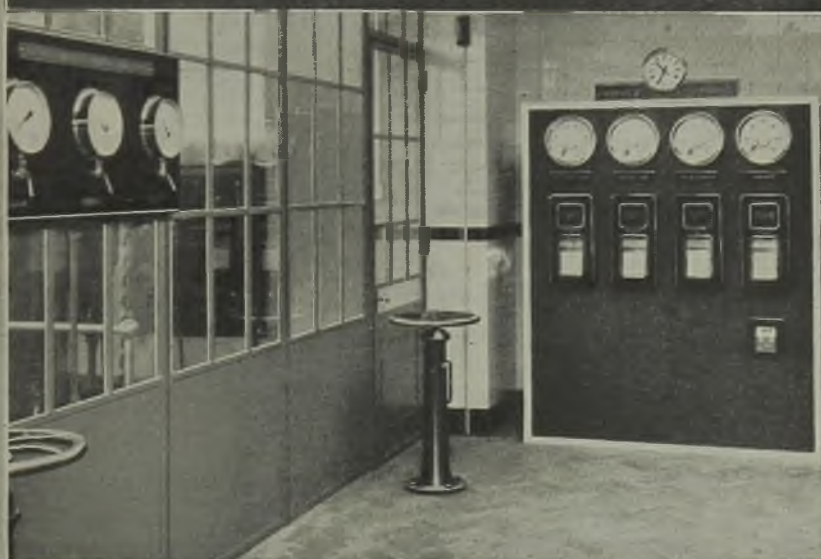
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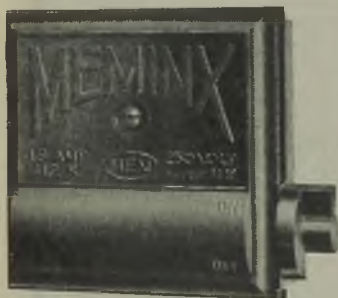
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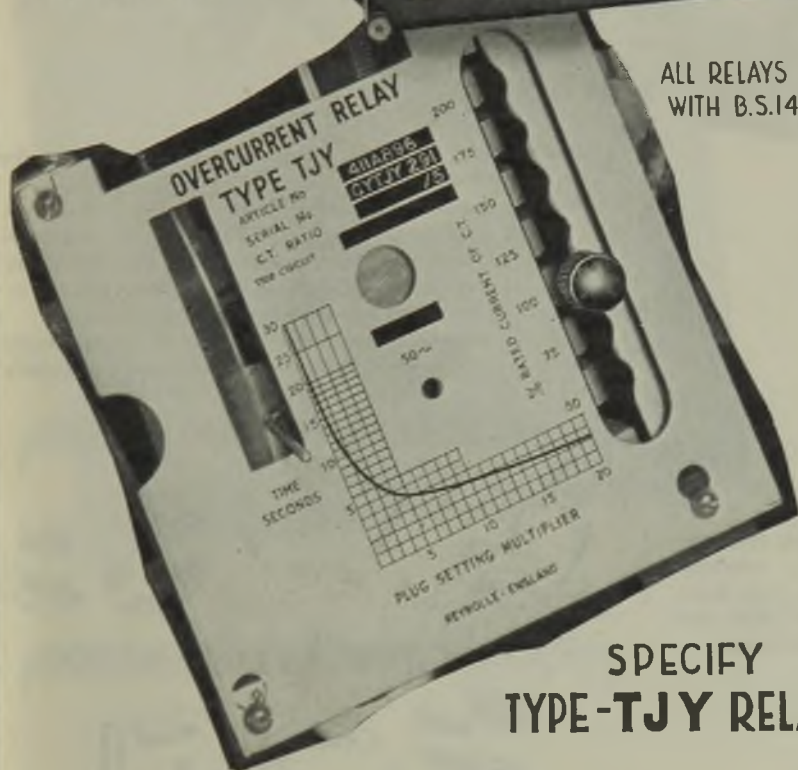


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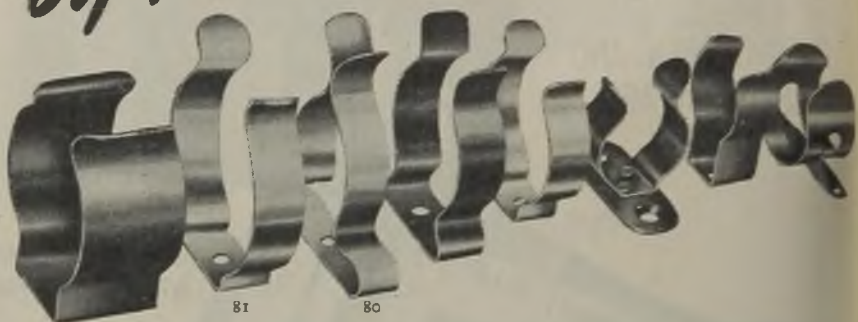
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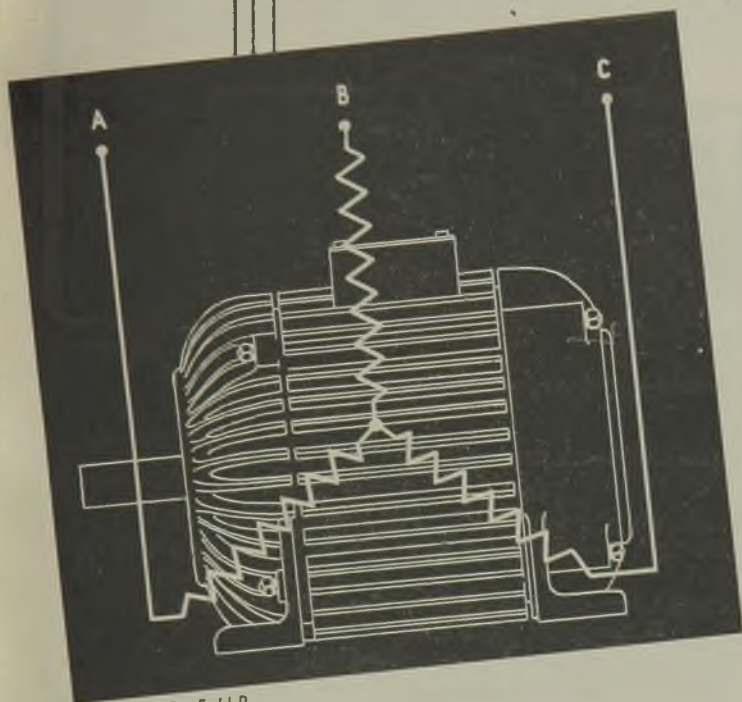
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# ELECTRICAL REVIEW

January 19, 1945

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# ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872



Vol. CXXXVI. No. 3504.

JANUARY 19, 1945

9d. WEEKLY

## Wartime Power Stations

### Arrangements at Little Barford

**A**FTER a lapse of nearly five and a half years, during which there has been a complete "black out" in regard to the design and performance of new generating plant, we are now able to publish particulars of the first station, we believe, to have been put into commission during the war. That is the Little Barford station of Edmundson's Electricity Corporation, Ltd., which we visited as long ago as 1941 and described in a draft article with the intention of publishing it as an example of advance in design, on proven lines, within the range of steam conditions in general use in this country.

Nevertheless, although no reference was then made to the name, location or ownership of the station and no external view was to be shown, publication of the article was deemed to be inadvisable on security grounds, since references to certain technical features might have enabled the station to be identified by the enemy.

#### Boiler-Turbine Units

Among these special features the most notable is probably the adoption of normally entirely separate generating units, each comprising one boiler and one turbine. In the place of the walls that usually divide the boiler-house from the turbine room is a control board, which includes provision for completely automatic control of the steam production, an arrangement that is in itself remarkable for a medium-sized station and, taken in conjunction with pulverised-fuel firing, has given a flexibility that has proved of great value in dealing with wartime in-

consistencies in the quality of coal obtainable. Apart from the single boiler-turbine house, the only buildings which have been erected are for the pulverising mills and switchgear.

Steam conditions were decided at 650 lb. per sq. in. and 910 deg. F. as the maximum figures that had been proved in practice, although the latter is somewhat higher than is found in general use, except in stations of a more "experimental" type.

#### Wartime Slowing-down of Progress

Since the outbreak of war an inevitable period of "marking time" has affected the design of new stations and extensions to existing stations alike. That is not to say that no departure has been made from initial designs, as the opportunity has been taken to bring the new installations into line with more modern developments. Thus at Clarence Dock, the first of these wartime extensions (of which a description was published in our last week's issue), among other improvements, is the raising of the steam conditions for the new unit to 630 lb. and 825 deg. F., the earlier section of the station having been designed for 4,000 lb. As in the case of new stations, though with less apparent justification, censorship difficulties have prevented earlier publication of information regarding extensions, although the easing of them before the general relaxation enabled us to gather the requisite data.

In the generating plant commissioned during the war and in its methods of operation may be found evidence that immediate hazards rather than ultimate



efficiency have been controlling factors. In short, it may be regarded as representing generally what was coming to be recognised as the best pre-war practice.

**Generation and Fuel** A QUERY in our correspondence section serves to draw attention to the magnitude of the contribution made by power station engineers to fuel economy—a contribution that has been largely concealed because successive increases in the price of coal have prevented its being adequately reflected in a lessened cost per kWh. Thus at Ironbridge, which was started up towards the end of 1932 to operate with the moderate steam conditions of 400 lb. per sq. in. and 800 deg. F., the fuel consumption was 1.48 lb. per kWh sent out in 1938 (according to latest available returns of the Electricity Commissioners) compared with 0.9 lb. at the later Battersea station with its more elevated steam conditions of 625 lb. and 900 deg. F. In view of differences in calorific value Dunston B (625 lb. per sq. in. and 825 deg. F. with reheat), which headed the thermal efficiency table for 1938, although burning 1.11 lb. per kWh, probably provides a fairer comparison.

**Future Stations** FUEL costs at Ironbridge in 1937-38 were 0.134d. per kWh generated and an increase to 0.235d. indicates an advance of about 75 per cent. in price per ton. Assuming for present purposes standing charges of coal to be roughly equivalent to the running charges of other operating items, the total coal cost may be regarded as the station running cost, and at Ironbridge, based on Dunston conditions, would now have been only 0.176d. per kWh. The small margin over 0.163d. should be easily bridged by the adoption for future stations of steam conditions of, say, 1,420 lb. per sq. in. and 975 deg. F., as selected for the newer section of Battersea, leaving enough in hand to cover most variations in circumstances, such as those due to differences in site.

**Good Illumination** As lighting that is adequate for health and utility depends upon the effect on the eye of qualitative characteristics, such as glare, contrast and colour, as well as upon more easily

measured quantitative factors, problems in illuminating engineering are necessarily complex. One of the merits of the Ministry of Works Post-War Study No. 14, "Lighting of Buildings" (Stationery Office, 2s. 6d. net), which has been prepared by the Lighting Committee (chairman, Dr. C. C. Paterson) of the Building Research Board, is its lucid presentation of the principles governing lighting and vision and their influence on design. The value of the reasoned recommendations made is enhanced by the examples and other data given in eight appendices which occupy roughly half of the 163 pages, and include 67 diagrams and also ten plates that are as informative in regard to detail as they are decorative.

**Balanced Loads** OPINION is divided on the subject of the encouragement of the electrical heating load. It is held to be the main cause of the excessive peaks experienced in cold spells, but to most people a ban on the use of electric heating at such times naturally seems unreasonable. In the Tennessee Valley consumers are more fortunate. There is at all times power to spare and they are being encouraged to use it for heating. But to even out the load the T.V.A. is investigating suitable summer uses such as air conditioning and reversed-cycle refrigeration for summer cooling and winter heating. The latter arrangement is considered feasible only in moderate-winter areas. In this country, although winters are not usually very severe, summers are rarely such as to require the expenditure of much energy for cooling.

**Inter-dependence** CO-OPERATION between the various branches of the British electrical industry is constantly being urged. In the United States the realisation of the necessity for such co-operation is more picturesquely manifested. At a recent Convention of the National Electrical Manufacturers' Association members were asked to sign a "Declaration of Electrical Interdependence," commencing with the historic words:—"We hold these truths to be self-evident . . ." and setting forth the belief that to bring about the electrical age the electrical manufacturers and all others concerned must work closely together.

# Rural Industries

## How Electricity Facilitates Development in the Boston Area

**D**ESPITE much recent discussion on the importance of extending the benefits of electricity to the more remote rural areas, it is doubtful whether it is generally realised to what extent industry in rural areas already depends on electricity. Yet to-day many enterprises established in country districts owe their very existence to the availability of electricity or are made practicable and economic only by the adoption of up-to-date electrical methods of operation.

Few better examples of the way in which electricity has permeated the life of a rural community could be found than in the area served by the Boston & District Electric Supply Co., Ltd. (engineer and manager, Mr. H. Payn, M.I.E.E.), which is associated with the British Electric Traction Co., Ltd. As to the rural nature of the area there can be no dispute, for its 270 sq. miles contain, besides Boston itself (population 22,000), only two other towns of any size, Holbeach and Long Sutton, which between them have less than 9,000 inhabitants. There are only about 60,000 inhabitants in the area altogether.

The company first commenced supplying electricity in the borough of Boston and the few surrounding

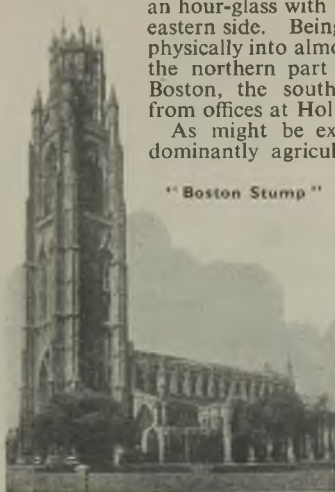
Vegetable dehydration is a new industry of the district. This is a new plant just installed at the works of F.M.S. (Potato) Factories, Ltd.

parishes in the Boston rural district in October, 1924. Four years later powers were obtained to supply the remainder of the Boston rural district, the urban districts of Holbeach, Long Sutton and Sutton Bridge, and the rural district of East Elloe (the three urban districts were "de-urbanised" three years ago and added to the East Elloe rural district). The resulting area is roughly in the shape of

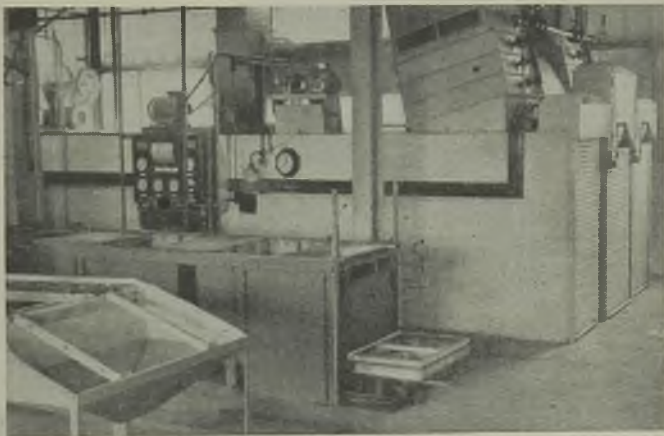
an hour-glass with the Wash all along the eastern side. Being thus virtually divided physically into almost equal sections, only the northern part is administered from Boston, the southern half being served from offices at Holbeach.

As might be expected in such a predominantly agricultural area, practically all the industries served are in some way or other connected with the land. There are no really heavy industries, the nearest approach being the Boston Docks (and associated firms engaged in ship repairs) and timber mills. Both these enterprises have been very adversely affected by the war. With the fall of

France, coal exports from the former almost ceased, while the cessation of timber imports from the Baltic caused a big drop in consumption of the mills. Although this has resulted in a slight decline in the sales of energy in the area covered by the original Special Order (4,501,536 kWh in 1943, as compared with 4,831,892 kWh in 1939), the increasing applications of electricity



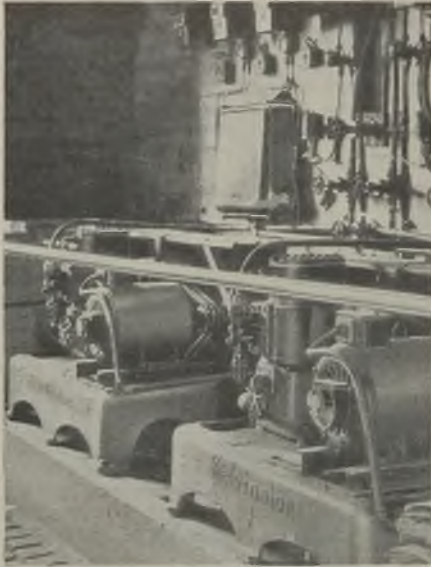
"Boston Stump"



generally have resulted in the annual sales for the whole area rising since the war started from 6,807,725 to 7,623,498 kWh, and the total connected load from 17,566 to 20,217 kW (at December 31st last). The

number of consumers connected has advanced by 588 to 8,969.

Since the beginning of the war, particularly, farmers have been relying more and more on



Refrigeration plant is used for bulb forcing

the use of electricity. Many of them now employ electrically driven mills varying from 3 to 35 HP (the company claims to have installed the first "Essex" mills outside the original plant) and a surprisingly large number have electrically equipped workshops for machinery repairs. Among other recent applications which are becoming increasingly popular are grain drying and seed dress-

**A surprisingly large number of farmers have electrically equipped workshops. Here is a portion of Mr. A. C. Cunningham's plant at The Grange, Luton**

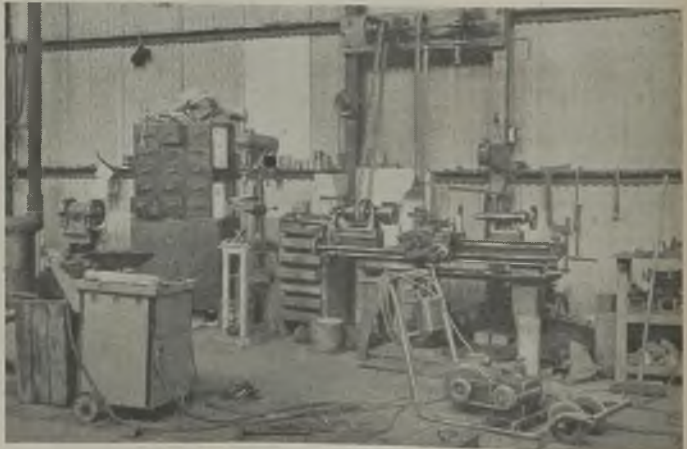
ing, poultry breeding and intensive horticulture. Plans are prepared too for heating the piggeries of the Holland County Council Emergency Farm at Kirtou. Practically no dairy farming is carried on in the district.

Vegetable and fruit preservation, as well as the manufacture of animal foodstuffs (not to

mention shrimp and prawn bottling), is undertaken on a big scale in the district, and includes canning, bottling, pickling, jam making, and drying. In many cases the canneries grow their own fruits and vegetables for preservation. Fruit orchards actually adjoin the factory of United Canners, Ltd. Here Mr. Lloyd Williams, the works manager, showed us to what a large extent manual labour has been eliminated and production stepped up by electrical methods. In the jam making and canning sections all the conveyors, pulpers, canning and lidding machines (which handle 60 tins a minute), coolers, lacquering plant (100 tins a minute) and labelling machines are electrically driven. In this way a daily output of 15 tons of jam alone is achieved. Incidentally it is noteworthy that in spite of the damp conditions under which the electric motors have to operate breakdowns of the plant are practically nonexistent.

Another section of the same works deals with drying and grading of peas. Fresh from neighbouring farms, these are removed from the plants by means of "viners." Seven of these machines are installed at the works and another eight have been provided for use on the farms of local suppliers. In addition to carrying out cleaning and grading operations, ingenious electrically driven plant picks out maggoty peas. The majority of the plant throughout the factory is constructed by the company's own engineers who have at their disposal electrically equipped machine and carpenters' shops. The whole installation of the factory accounts for just under 100 kVA.

Drying or dehydrating other vegetables—potatoes, carrots, cabbage, etc., is a new



industry of the district, so new in fact that when we visited the works of F.M.S. (Potato) Factories, Ltd., where it is undertaken, all



the equipment had not been installed. When the plant is complete it will turn out approximately 75 tons of dried vegetables a week (from a throughput of 375 tons of vegetables) and will require approximately 100 kVA. The processed vegetables which will be produced here will

An electric groover in use on a pole for the G.P.O. at Calders Timber Works



be suitable for either human consumption or for use as cattle food. What probably strikes a visitor to the factory most is the way in which mechanical handling, employing a series of conveyors, elevators and "lowerators," is designed practically to eliminate handling. The timing and synchronisation of the various processes and the system of remote control and safety devices are other electrical features in which the manager, Mr. C. W. Thomas, rightly takes a pride.

Boston is, of course, famous as a bulb growing district. The growers have found electricity helps them, not only for grading, but also for controlling the growth of the bulbs. By creating an artificial winter earlier than the real one by the use of cold storage plants, the bulbs make exceptionally rapid growth when planted out, while in a similar way by keeping them warm in autumn and early winter their flowering date can be retarded. Since the beginning of the war the bulb business has, of course, had to be drastically curtailed and the cold storage plants have been utilised for storing apples, while the heating plants are brought into service for market gardening work.

Some of the bulb growers have become very electrically minded. Besides employing the electrical aids mentioned above, a root cutter, hedge cutter and a machine for mixing soil, Mr. A. C. Cunningham, of The Grange, Luton, possesses an extensive engineering workshop, complete with lathes, drills, hacksaw, emery wheel, grinder, welding equipment, wood-working machinery, air compressor, battery chargers, and a 1-HP multi-speed portable motor for general use. Mr. Cunningham actually uses the welding equipment to fabricate his own farm buildings. His home, too, is just as well-equipped and has an electric cooker, water heaters, washing machine and ironer, clocks, radio and a booster pump for the water supply. Mr. Cunningham's only complaint is that he

cannot get hold of a cake mixing machine. To overcome petrol shortage he has ingeniously adapted a petrol-driven lawn mower to battery operation. Altogether he has an annual consumption of about 8,760 kWh.

All the agricultural machinery works in the district have been extensively electrified and even the village blacksmith has already found that it pays to use electricity. Employing an electric welder, drill, grinder and forge



To reduce initial cost single-phase supplies are given to a number of hamlets, with provision for conversion to 3-phase later on. Above is a pole-mounted transformer stepping down the 11-kV, 3-phase supply to 230 V, single-phase, to serve Gedney Dyke

blower, Mr. H. Baxter, of Star Cross, has been able to double his output with a consumption of less than 70 kWh a month.

An interesting development arising out of an application of electric welding is to be found in the work now undertaken by Geest Horticultural Products, Ltd. Commencing with the fabrication of tubular wheel-barrows, they now produce a self-balancing truck, which though intended originally for horticultural purposes is in considerable demand in all manner of other industries. Twenty different models are now available. Besides welders the company includes amongst its electrically operated plant shears, hacksaws, grinders and wood working machinery. Other industries closely connected with farming which have availed themselves of the

assistance electricity can bring are fertiliser production, strawberry chip manufacture, and feather purifying and bedding manufacture.

Included among the timber works already referred to is one specialising in making poles and sleepers. Calders, Ltd., so Mr. S. D. Ashley, the manager, told us, normally produce 29,000 overhead line poles a year and the same number of G.P.O. poles, as well as sleepers, fencing, gates, agricultural and horticultural requisites. Altogether the company has now supplied over a million poles for overhead line and G.P.O. use. Saws, planers, pole-dressing machines and a new type of combined scarfing and boring machine, pressure creosote tanks and a number of portable units comprising drills, chain saws and groovers together require about 60 kVA.

### Large-scale Tag Production

Pressure on space prevents our referring to more than one other industry served by the company. For over 80 years Fisher, Clark & Co., have specialised in the production of labels and tags and its Tagcraft Works now extend over 5 acres. The present-day output is enormous and one of the orders being executed when we visited the works was for no fewer than 55 million tags. Nearly every operation is carried out automatically and the provision of a conveyor system entirely eliminates carrying. Nearly all the special machinery used is designed by the company's own staff, Mr. E. W. Rigg, the managing director, told us. Specially interesting features of the equipment include electrically heated metal pots for the printing machines, vacuum and compressed air services for the whole building, electro-deposition plant for colour printing, photogravure apparatus, well equipped machine shops and laboratory, and a "Keopalite" emergency lighting system.

Apart from the various industries mentioned, the company also supplies public buildings, hospitals, schools, cinemas, Land Army hostels, offices, shops, etc. Many school kitchens are now being made all-electric (except for one emergency coal range) and six installations now in hand for the County Council each include an electric cooker, hot-cupboard, bain marie, chipper, water heater and refrigerator, representing in all a load of approximately 23 kW at each school.

Ordinary domestic consumers have not, of course, been forgotten and for them special facilities are (in normal times) provided for assisted wiring, hire and deferred payment for apparatus. An interesting feature inaugurated in the days when agricultural workers were poorly paid and had no unemployment pay was the provision of four lights and an electric iron with no rental charge. With the improvement in

conditions an assisted wiring scheme employing a slot meter was introduced. The company claims to have originated the home safe scheme to assist small working class consumers to meet quarterly accounts.

Special tariffs are designed to suit the manufacturing processes of the district, but the standard charge for small factories is £5 per kVA of maximum demand per annum (minimum 25 kVA) plus 0.65d. per kWh (subject to coal clause). Two-part tariffs with a "unit" charge of 1d. are available for power, business and domestic purposes, while the flat rates are 7d. per kWh for lighting, 1½d. for heating and cooking, 2½d. for power and ¾d. for water heating.

To provide these supplies a considerable amount of construction work was put in hand in 1929 and was continued up to the outbreak of war, by which time about 150 miles of overhead lines and 99 miles of underground cables (feeding about 200 transforming points) were in commission. Originally generation was by turbo-alternators at 3,300 V, but with the development of the rural area the pressure was stepped up to 11,000 V for transmission to the outer areas. Generation ceased in 1932 since when the whole of the company's supply has been taken from the Central Electricity Board's system.

Combined h.v. and l.v. construction has been widely adopted and much of the h.v. overhead line system has been designed for the future addition of l.v. lines on the same poles if required, while to save cost single-phase, 3-wire supplies have been given to several of the smaller hamlets with provision for simple conversion to 3-phase later. Isolated premises requiring electricity are asked for a guarantee of £25 a year for a 3-phase and £10 for a single-phase supply.

We should like to thank the company for granting us facilities to inspect its area, and also Mr. Payn for his assistance in the preparation of this article.

### Light and Character

IN a recent lecture delivered to members of the Illuminating Engineering Society in London, Mr. R. GILLESPIE WILLIAMS explained how light could be used to impart character as well as to emphasise certain aspects of objects and people. Future developments on these lines were considered in relation to theatres and cinemas, shop windows and stores, exterior floodlighting and interior decoration.

The lecturer explained how objects were perceived by the light reflected from them into the eyes of the beholder, creating visual impressions of line, plane, outline, mass, etc. The perception of colour was discussed and its dependence on comparison and contrast demonstrated. It was shown that the appearance of any single object was not fixed, but changed as different features were revealed when emphasised by suitably controlled illumination.

# Scientific Management

## Application to Electricity Undertakings

**A**LTHOUGH it is impossible to assess the quantity of time, effort and money being wasted in any enterprise, and therefore the standard of comparative efficiency remains nebulous, there is, nevertheless, an abundance of indication that scientific management is practised far less amongst British electricity undertakings than is the case in the United States, or was the case in some of the more enlightened Continental concerns before the war.

If this is disputed it will probably be due to a misconception of the phrase "scientific management." This has been defined as "the attempt to obtain the maximum economic return on the capital employed by the prevention, or prompt detection and elimination of all wastage and leakages . . ." The word "prompt" is perhaps the most important. It denotes something more than mere efficiency—simply a term used to express the comparative results obtained by a number of organisations to some extent in statistical competition, as distinct from the undertaking which employs every facility known to increase the quality of its service to the community. He who still looks askance at suggestions of room for improvement is referred to one branch of organisation alone—accountancy—and the acknowledgment by the National Institute of Economic and Social Research that "accounting in this country has been directed almost wholly to ascertaining the financial results of business operations."

Scientific management in its full interpretation means far more than "soundly organised." It is an unfortunate fact that a monopoly may not even be soundly organised to be successful. As the growth of a public service assumes proportions and characteristics which render the removal of competition advisable, and with it the assessment of productive efficiency inherent in competition in a free market, so more importance must attach to the statutory returns of the industry. That these returns should be made is not enough—they must be analytical as well as summarised, and the analysis must be standardised. The future may yet show

By **R. C. Golding,**

M.Sc. (Eng.)

that B.E.A.M.A., in policy and operational problems a closely allied concern to the supply industry, has of late years indicated the path to be followed by adopting a system of standardised cost accounting.

There are three essential factors to be studied by the industry adopting scientific management in its entirety—anything less is but a sop, entailing a further step of reorganisation in the future. It includes (a) Budgetary control, planning and estimating of all work; (b) Proper cost accounting and progressing. Before these are introduced the following must be available: (a) Suitable training; (b) Office equipment designed for the purpose; and (c) Facilities for optimum utilisation.

### Training and Equipment

Those in future control of the supply industry must devote the same serious consideration to their education—both theoretical and practical—in a business capacity, as they do to their technical training. What form should this training take? The question of examinational status is a contentious one, not to be indulged in here, but in advocating knowledge one can hardly transgress. Knowledge of the law is always beneficial—at least the law of electricity supply—with the law of trading as a useful adjunct. There is business management and office organisation, all of assistance in avoiding many possible offences both of omission and commission in the business world.

It is, however, the consideration of the second essential to scientific management which brings home the necessity for a further branch of training, that of accountancy. The trading account is to the manager as the log sheet is to the control engineer, and within limits the greater the detail shown in either the more conclusions can be drawn, tending towards greater efficiency.

A study of the science of detailed cost accounts soon convinces the expert of the impossibility of carrying out such a scheme economically without the aid of accounting machinery. However, the preparation of the most detailed list of cost accounts is useless without proper interpretation, and the demands in this direction on the executive manager, together with those of budgetary control, require a detailed knowledge of accountancy. It is for this reason that an engineer and manager who is not an accountant can have no more valuable assistant than an accountant who is prepared to learn a certain amount of the engineering work,



Mr. Golding is deputy borough electrical engineer of Great Yarmouth



since in the cost accountant's office lie the secrets behind scientific management.

This will not always be easy to arrange. Apart from interfering with the natural divisions of responsibility, so necessary in a properly organised office, accountants themselves have admitted that they become unpopular with engineering staffs when trying to acquire knowledge of such processes; and therefore, with an engineer at the head of the organisation, the inclusion of accountancy in his training would appear to be fundamental.

### Budgetary Control

Budgetary control in progressive concerns is now accepted as the basis of scientific management. It involves the cost of any process possible in the undertaking, the preparation of estimates for future work based on the optimum results obtained in the past, and a comparison of results obtained with the forecast. It is often the cause of resentment among inefficient executives who are obliged to make close forecasts and to hold to them, until with increasing practice comes skill, when the resentment is usually replaced by a certain pride of achievement.

For obvious reasons, budgetary control in its widest sense, the control of markets to afford the optimum return, is neither desirable nor necessary in the case of a public service. Proposals to introduce such a scheme raise from the uninitiated a protest on the score of superfluous statistics, and if care is not used in the methods selected this will undoubtedly be justified. The aim should be to introduce a scheme which needs no more basic records than existing systems of normal accountancy which have withstood the test of time. We are, therefore, limited to time sheets, invoices, stores notes, receipts, etc., for our basic information.

### Analytical Records

At the same time it must be conceded that budgetary control may require more information on these records, but this can often be provided at a negligible expense. If "repairing cookers" is normally allotted job No. 8, giving type A cookers job number 81 and type B cookers number 82 involves no more time than the writing of an extra figure by the operator, since in normal accounting it is still job No. 8, the other figure being ignored in summarising. For analysis purposes, however, the difference in cost between maintaining A and B cookers is now recorded and the only remaining work is that of extraction.

It is this portion of the work which becomes uneconomic without accounting machinery, and except in a few of the more glaring instances of waste, remains uneconomic with accounting machinery unless it is designed for analytical as well as summarising pur-

poses. This fundamental distinction was realised in pre-war Germany where in a national system of standardised accountancy, cost accounts (*Betriebsbuchführung*) were statutorily separated from normal accounts. It is not conceded that this is desirable or necessary, but the instance serves to emphasise the importance of segregating the two classes of accounts mentally—and the purpose for which they are used. It is, of course, only the "normal" or "proper" accounts which are statutorily controlled in Britain.

Accountancy machinery designed mainly for summarising performs the analytical process by a system of control cards, posted each time their particular function is incorporated in the daily work. The posting is done at the same time by the machine which posts the ledger account, the time wasted depending upon the number of controls and the time occupied in finding the cards and picking up balances. It will be obvious that since a control card represents a combination of at least two factors, e.g., a size of cable and the cost of laying it, then the number of combinations desirable with several scores of operations proceeding is large. Should a control card not be kept for a particular process, the information remains unextractable except by hand, even though it is recorded in the basic records.

### Departmental Obstacle

Thus machinery for budgetary control should be specially chosen and designed to avoid unnecessary statistics in the form of controls which may never be consulted, but to be able to analyse the basic records on demand and provide the statistics required by the manager in investigating any particular problem.

As stated previously, the essence of such work is speed. With a proper organisation it is possible to lay on the manager's desk on a Monday morning the analyses of costs which he is watching at that time made up to the previous Friday night. Here we encounter the factor which has perhaps militated more than any other against budgetary control in British electricity undertakings.

The fact that accounting is often carried out by a different municipal department presents an almost insuperable obstacle to speed. A borough treasurer has many calls on his time other than those emanating from the fact that in such an instance the machines must be designed to operate rates, rents, gas and a diversity of other departments which usually preclude their use for more than their summarising duties. Companies are, of course, in a more favourable position, but while the control of costing and billing remains in the hands of others than those who can directly derive benefit from budgetary control it is doubtful if the full benefits of scientific management can be obtained.

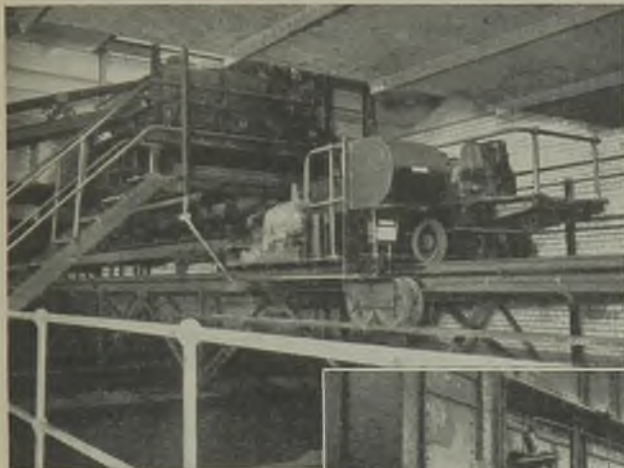
# Little Barford

## Layout of First Wartime Power Station

**T**HE first public supply generating station to be completed during the war was that constructed for the B. C. & H. Power Station Co., Ltd., by Edmundsons Electricity Corporation, Ltd., at Little Barford, Bedfordshire. The governing feature of the station is unit operation. This idea is interpreted broadly and each boiler and turbo-alternator combination is operated as a separate power

absence of auxiliaries on the operating floor; they are all installed in the basement.

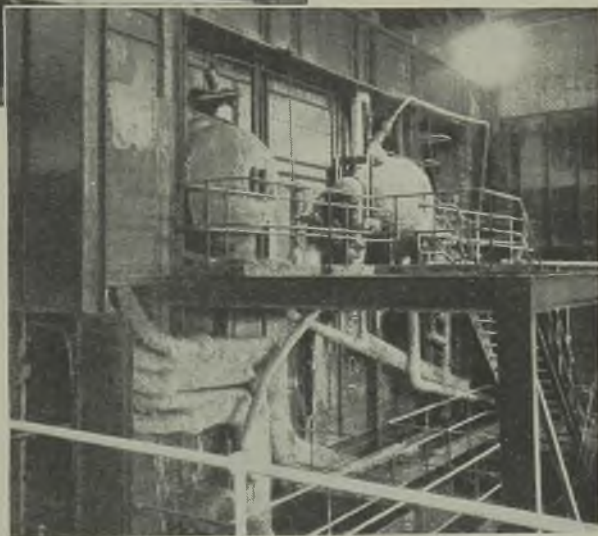
Simplification of piping is also soon evident as another result of the unit system idea which also facilitates the adoption of centralised control. There is for each boiler-generator combination a control board between the boiler and turbine-set components of each generating line. Pulverised-fuel firing has been adopted without particular regard to the type of coal consumed and the steam conditions of 910 deg. F. and 650 lb. per sq. in. have been chosen as representing the maximum conditions so far proved for commercial practice. Complete automatic combustion control is another outstanding feature, the significance of which, we feel, lies in the medium size of the station, the capacity of which is 120,000 kW, made up of



From the last belt the coal falls on to a traverse conveyor from which any one of the bunkers can be fed

station from the intake at the boiler bunkers to the delivery of electricity outside the building, and the unit control embraces all the essential auxiliaries. It is true that interconnection provides for running any turbo-alternator from any boiler, and for parallel operation of the sets on the steam side, but this is for emergency use only.

As an inherent feature of the design the boilers and generator sets are installed without any partitioning wall or structure; indeed, apart from consideration of floor levels, the only two sections of the whole station which are separately housed are the pulverised-fuel mills and the switchgear for the larger station auxiliaries. A pleasant surprise for the visitor is the complete



Drum ends of one boiler taken from the raw-water tank bay

four generating lines, each with a 300,000 lb. per hour m.c.r. boiler and a 30,000-kW English Electric turbo-alternator. We may describe the station as a riverside installation with cooling tower boosting, and we believe

that at least 60,000 kW will be possible on the river water at all times.

The following notes on the general layout of the station are intended merely to assist in an understanding of the operational circuits to be referred to later with most of the details of the numerous plant components, and in this way we hope avoid anything in the nature of a tedious catalogue of plant items. The building is about 250 ft. long and the operating floor both for the boilers and for the turbo-alternators is 28 ft. above the basement level. The

generating sets are placed axially across the building, centring with their corresponding boilers, and right through the building at the basement level is a full-gauge railway line with two generating-set-boiler combinations on either side of it. Spanning the turbo-alternator bay is a 65-ton crane; the largest component, the alternator, weighs 62 tons. All the essential auxiliaries are at the basement level, including the circulating water pumps; the feed pumps, which are arranged in a line between the turbo-alternator and boiler bays in a subsidiary structure which also accommodates eight surge tanks at the 56-ft. level; and softened- and raw-water tanks at the 72-ft. level.

Close to the station building is a coal

storage ground for 60,000 tons, which is connected to the station by modern handling plant, while on the far side of the building there is another subsidiary bay with cubicles for auxiliary supply transformers at the



The centrifugal vertical circulating pumps are driven by 265-HP direct-starting motors

ground level and the auxiliary switchgear for the main units at the operating floor level. Between these transformer and switchgear sections is a main cable channel which leads to many ducts in the floors and foundations.

The pulverising mills are arranged under the bunkers on the coal storage side of the building, and the economisers are situated between the bunkers and the boilers above the bottom drum level. The condensers and the feed heaters are, of course, in the basement, immediately under the turbo-sets, and the air heaters under the economisers. Four Sturtevant electrostatic precipitators, one for each boiler, are situated at ground level in an outside bay abutting on the main building. This bay also accommodates the i.d. and f.d. fans, the former being situated practically at the chimney bases.

### Combustion Circuits

The coal wagons from the sidings, which will accommodate 120 wagons, pass on to a rotary tipper which will handle 20-ton wagons, discharging their coal to a below-ground hopper. The first stage in the conveyor system is an inclined belt which carries the coal to the top floor of the first conveyor house, where it passes through a magnetic separator and



View from the 65-ton crane which spans the turbo-alternator bay

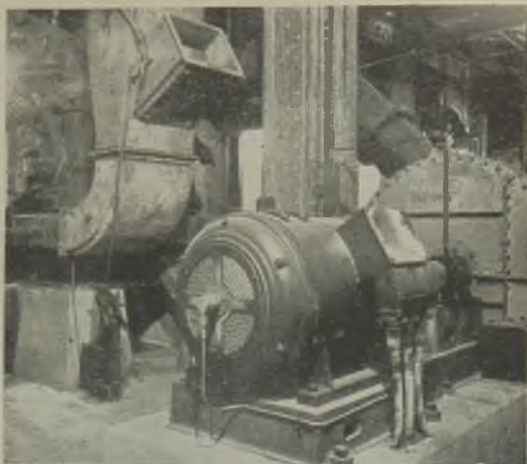


down through a mechanical screen to be inclined again to a second conveyor house where a butterfly valve diverts it either immediately to the storage ground, or by a third conveyor to the boiler house bunkers. Between the winch in the second conveyor house and a concrete anchoring truck on a semi-circular

From the bunkers the coal is passed direct to the pulverising mills ; roller mill and fan

rail track at the outer edge of the stock ground, is operated a drag scraper which either distributes the coal over the ground from the conveyor house, or draws it to the house for delivery to the boilers. The coal is automatically weighed at the commencement of the third stage of the conveyor system and over the bunkers.

The whole 120-ton per hour conveyor system is electrically driven and arranged for single central control on the sequence



the centre line of the four 500-ton bunkers. The traverser is about half the length of the bunker line, so that by propelling it to

any point and discharging from either end any one of the four bunkers can be fed.

From the bunkers the coal is passed direct as required to the pulverising mills via a weigher which tips 5 cwt. at a time on to the motor-driven feeding table at the entrance to each mill. The operation of the two-speed motor driving the coal feeder is determined by the pressure drop across the mill, and this pressure is regulated by a damper between the fan and the mill, and its amount determines the out-

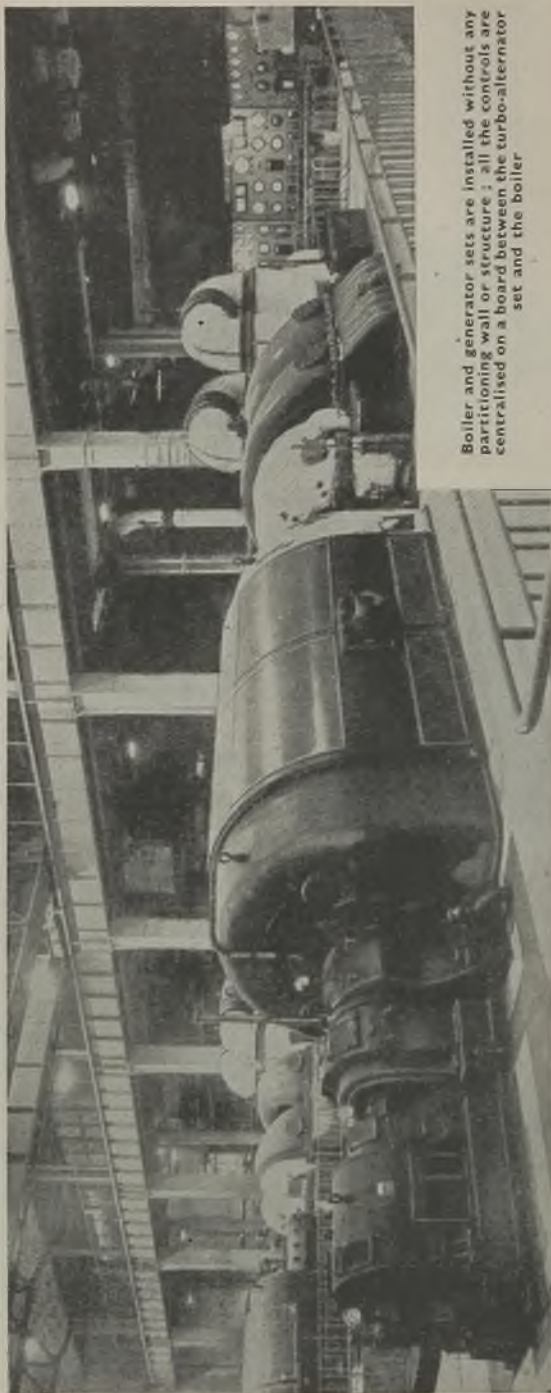


Above: There are six burners in two triangular groups of three at one end of each Stirling boiler combustion chamber

Right: On the International boilers there are two burners at each corner of the combustion chamber

operation principle. The main drives have fluid flywheel transmissions to even out the torques on the belts. From the last belt of the third conveyor the coal falls on to a traverse conveyor mounted on rails along





Boiler and generator sets are installed without any partitioning wall or structure; all the controls are centralised on a board between the turbo-alternator set and the boiler

put of the mill. The fan is a pressure unit, the coal and air mixtures being blown through the burners by means of the air supplied on the clean-air side of the mill. An essential feature of the p.f. installation is unit firing, so that the ground coal is passed direct to the boiler burners together with preheated air by the mill fan.

There are three mills for each boiler; they are of the Babcock & Wilcox ball type for the Stirling boilers and of the Lopulco roller pattern for the International boilers. There are six burners in two triangular groups of three at one end of each combustion chamber on the Stirling units, and each mill is connected with one burner of each group. On the International boilers there are two burners at each corner of the combustion chamber. One mill serves one boiler at each corner, and each of the other mills two diagonally opposed burners of the remaining four.

The boilers, being designed for high availability, have combustion chambers such that at 270,000 lb. per hour the maximum heat release is 17,500 BThU per cu. ft. The whole of the furnace of each Stirling boiler is constructed with Bailey cast-iron block walls, with the exception of a band half way up the combustion chamber in which there are Bailey refractory blocks to promote slagging for ignition purposes. The combustion chamber of each International boiler is lined with Lopulco fin tube walls and at its base is a water screen for ash cooling.

Babcock & Wilcox automatic oil burners for starting up the boilers are served by a neon-tube type of transformer at 10,000 V for ignition at the burner tip on starting up, when the oil pressure causes the burner to move forward to the firing position. The gases from combustion are passed on to the stacks in the air circuit (to be described), while the solids pass to the hoppers at the bottoms of the combustion chambers and out to a Hydrojet ash-removal system in the boiler basement. High-velocity water jets sluice the ash into an underfloor ducting from which it passes to a crusher

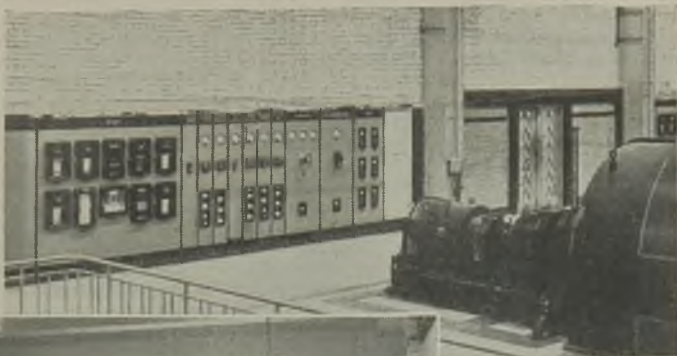


and from this to a plinth-mounted concrete reservoir for delivery to road vehicles for final disposal. Continuous quenching of the ash in the boiler hoppers is effected by water nozzles, and the majority of the water flows down the sluiceway to a sump from which the quenching pumps draw their supply so that the system is circulatory. Associated with the ash removal is an air-operated dust-collecting system in which a high vacuum is created by water ejectors supplied by the recirculating pumps.

The f.d. fans take in

going from there to the precipitator and finally to the induced-draught fan.

There are two induced-draught and two forced-draught Howden fans per boiler and each is driven by a two-speed motor. Further



The control panels for the 3.3-kV switchgear are flush-mounted with the recording instruments in the wall opposite the electrical end of the set



Only two sections of the whole station are separately housed — the auxiliaries switchgear (shown) and the p.f. mills

the cold air from the bunker level and pass it first through a Ljungström rotary air pre-heater and thence to a secondary air windbox from which some air passes to the combustion chamber direct to aid the firing. The remaining air is passed to the pulverising mill fan and thence delivered as primary air with the coal to the burners. The hot gases after combustion pass through the economiser on to the air heater for an exchange of heat with the incoming cold air,

fan regulation is afforded by movement of the fan vanes.

Each turbine is bled at six separate points. Three high-pressure tappings serve three heaters, while three



The main control room is isolated from the station proper

low-pressure tappings serve two direct-contact heaters and an evaporator. Air is removed from the condenser by three main ejectors, and a quick start ejector is employed



for establishing a vacuum in the condenser. Two extraction pumps pass the turbine set condensate to the first direct contact heater, collecting en route the drainage water from the station steam traps by means of tee-offs in the main water line. At this point there is a connection to a cold-water surge tank which maintains a head of un-deaerated water.

It is at No. 1 direct contact heater where the system receives the necessary make-up water, this being passed to the heater as vapour from an evaporator with the bled steam to the heater. The water supply to the evaporator in the first place is received from the softened-water tanks at the 72-ft. level. The four 18,000-gal. softened-water tanks are served by similar raw-water tanks at the same level through a Permutit water softener which reduces the water hardness to about two degrees. The softening is by the cold process, sodium aluminate being added to the lime and soda to promote coagulation. The dosing is effected automatically in proportion to the water flow by means of a raw-water meter which controls the dosing pumps.

#### Feed-Water Pumping Plant

The condensate from the first l.p. heater is passed by an extraction pump *via* a surface cooler to the second l.p. direct-contact heater. The surface cooler is arranged in the continuous blow-down circuit from the boiler mud drums and passes its condensate to the evaporator. From the second l.p. heater an extraction pump passes the condensate on to the boiler feed pumps and on the suction side of the feed-pump range is a connection to a hot surge tank by means of which a constant head of water is maintained. The eight surge tanks for the whole station that is, four hot and four cold, are at the 56-ft. level.

There are for each boiler one motor-driven normal-operation and one steam stand-by pump, but in addition to the complete installation of eight feed pumps there are two spare motor-driven units making a line of ten Weir units in all. The motor pumps are direct coupled to Laurence, Scott 3.3-kV, 630-HP, 2,970-RPM motors. The feed water from the pumps is passed to numbers 3, 4 and 5 high-pressure heaters, progressively, and then direct on to the boiler economiser which it enters at 370 deg. F. through two-element "Flowmatic" Copes regulators. The economiser of each Stirling boiler is of the Stirling continuous-loop steel-tube type, while that of each International boiler is of the Heenan steel-tube type. Each of the Stirling boilers is of the three-drum high-head bent-tube design, while each of the International plants is a four-drum high-head equipment. The superheater outlet steam conditions for all the boilers are 675 lb. per sq. in. and 910 deg. F.

Condenser circulating water is taken from

the river at a point about half-a-mile from the station through ducts to an inlet chamber where there are five Brackets band screens. The circulating pumps, which draw the water directly from these screens and pass it to the condensers *via* a Patterson chlorination system to prevent organic fouling of the tubes, are Drysdale centrifugal vertical-spindle units driven by 265-HP, 3.3-kV, 422-RPM direct-on-starting contact-controlled "Emcol" motors. There are five of these pumps, one for each generating set and one spare. An unusual feature of each condenser is that the tubes are expanded at both ends, differential expansion being allowed for by an expansion piece between the body and the water box, with the latter free to move horizontally on a roller bearing.

Two pumps, similar to the circulating water units, lift the discharge from the condensers to the Film reinforced-concrete cooling tower which is 200 ft. high and has a maximum diameter of 180 ft. It will reduce the temperature of  $2\frac{1}{2}$  million gallons of water per hour from 90.4 deg. F. to 75 deg. F., with 55 deg. F. atmospheric temperature. The cooled water is conveyed to the inlet culverts where it mixes with the river water.

#### Combustion Control

Complete automatic combustion control is provided for by means of the Bailey air-operated system in which air pistons and cylinders directly operate the fan vanes, the brush shifting gear of the variable-speed motors and the dampers. The loading air pressure is transmitted through selector valves associated with each cylinder, the amount of the pressure depending on the demand for steam as shown by the varying steam header pressure and the ratio between the air and fuel inputs. This ratio is further adjusted and kept constant by a steam-flow air-flow recorder controller which acts as a subsidiary control to the master pressure controller, the latter having an overriding influence on the fuel input. Individual manipulation of the loading pressure is provided for emergency conditions, while an alternative to shafting and gearing to the fan and feeder motors is Lockheed oil pressure gear.

All the electrical control gear and the manual pneumatic valves associated with this combustion system for each set are centralised on the control board between the turbo-alternator set and the boiler, and all the auxiliary motors are started from the panel desks.

By means of Kent "Multilec" instruments CO<sub>2</sub> is sampled at four economiser points, *i.e.*, both inlet and outlet left and right, and two air heater points, left and right. The following boiler and turbine temperature recordings are provided for by Foster Instruments: Superheat, secondary air, air

heater, economiser gases, condensate delivery, condensate from No. 2 heater and the feeds to all the high-pressure heaters. The following flows are recorded by Bailey equipments: Steam to turbines, boiler steam and boiler blow-down condensate. All the recording instruments are flush-mounted in the building wall opposite to the corresponding turbo-alternator set at the electrical end. At the front of each unit centralised control board there is a log sheet desk for the unit and mounted at the back of the desk are lamp indicators and alarms for the notification of the tripping of important motors, dangerous bearing temperatures, and so on. All the Hopkinson high-pressure valves associated with the boilers have extended spindles to the operating-floor level from which all important main and drain valves are controlled.

### Electrical System

A unique feature, we should think, for this country, is that no main switching whatever is carried out in the power station proper, for the only external supply is at 132 V direct. The 30,000-kW alternators generate at 11 kV and are solidly electrically coupled to 37,500-kVA, 11/132-kV transformers, situated together with the 132-kV switches in an outdoor substation. Protection is provided by negative phase sequence relays for the alternator and the Merz Price system for the generator and main transformer. Operation of the relays on the transformer trips the high-voltage switch. No overload relays are employed on the alternator. The alternator is also solidly coupled to a 3,000-kVA step-down 11/3.3-kV transformer for the main auxiliaries of each turbo-boiler unit. Relays on the unit transformer trip the switch on the low-voltage side only, while tripping of the Merz Price or Buchholz relays operates the field suppression switch, steam supply, cooling fans, and damper gear, thus substantiating the conception of unit operation in its broadest sense.

The unit transformer supplies all the main auxiliaries through an English Electric 3.3-kV air-break draw-out truck cubicle switch-board separately housed immediately opposite the main building wall at the electrical end of the boiler-turbo combination. The 3.3-kV auxiliary busbars of each unit are coupled to a station board served by two 3,000-kVA, 33/3.3-kV transformers from which a unit board takes its supply during running up or out-of-commission periods.

Auxiliaries such as coal- and ash-handling equipments which are not directly associated with unit operation are served by a 400-V supply from two 1,000-kVA, 3.3-kV/400-V transformers supplied from each unit switch-board. The control panels for the 3.3-kV switchgear are flush-mounted in the wall

alongside the recording instruments referred to and they include Metrovick control switches, ammeters and indicating lights. The main 400-V switchgear, consisting of contactor switchgear panels, is situated in the basement between the boilers and turbines. Certain subsidiaries such as a fire-pump motor, cranes and lifts are DC operated and are supplied from two 80-kW English Electric rectifiers and a 500-Ah Chloride battery.

Isolated from the power station proper the main control room has two storeys with the control panels on the first floor. These are of the Reyrolle cubicle type arranged round the room in polygon fashion with the 132-kV equipment on one side and the 33-kV and 3.3-kV equipment on the other. The control switches and instruments associated with each generator are mounted on a desk opposite one of the operator tables. Remote indication of the steam pressure on each generating unit is afforded by a shadow-type receiving meter to which the pressure gauge readings are electrically transmitted.

The whole station was designed and constructed by Edmundsons Electricity Corporation, Ltd., to whose chief engineer, Mr. H. Ewbank, we are indebted for permission to visit the station and to take photographs and, with members of his staff, for help in producing this article.

### Vehicle Headlamps

**A**LTHOUGH the relation between street and vehicle lighting requires consideration, automobile headlamps only are dealt with in a paper by Dr. J. H. NELSON submitted in London to the Illuminating Engineering Society.

It is explained that apart from obligatory side and tail lamps that merely mark the presence of the car to other road users, the headlamps needed to light the way for the driver have to function correctly under three distinctly different sets of conditions; first, on the open highway when (the author states) other road users need not be considered; secondly, without dazzling passing drivers; and, thirdly, when fog seriously reduces visibility.

The principles on which headlamps are designed to project an open road beam are first considered; next the significance of the setting of the lamps with respect to the car in relation to passing beam dazzle is discussed, lamp cleaning being dealt with in the final part.

While details of lamp construction necessary to project the kind of beams specified are not described, certain aspects of the user's reactions are discussed in so far as they directly affect the beam itself. Dazzle is dealt with at length and the reasons why the ideal means of its suppression (use of polarised light) are impracticable explained. A method of beam control is described and data quoted to indicate that the visibility attainable with that system is far better than is generally supposed. Recent studies of the way in which light is scattered in fog are referred to briefly and means of aiding movement in fog suggested.

# Theatre Lighting

## Special Installation Requirements

**S**OME installation, maintenance and operating aspects of theatre-lighting equipment are commented on in a paper read by MR. L. G. APPLEBEE before the Association of Supervising Electrical Engineers.

Commencing with socket outlets recessed into the stage floor, more often called "dips," the author indicates how their design and installation might be improved. Although individual loading has been nearly halved, sizes have remained unaltered for the sake of interchangeability of the apparatus of companies travelling from one theatre to another; also the plugs need to be mechanically very strong to withstand the heavy weights frequently rolled over them.

The author points out that the lid of the trap should be self-closing and the sockets should not be installed directly under the lid, but under the stage within the operator's sight and reach. As many as four sockets may be fitted in each trap, so that the inclusion of a 15-W "Pigmy" pilot lamp fitted with a shade to direct its light into the sockets would assist plug manipulation when making "dark" changes on the stage. The construction of the steel socket box and trap as one unit has been known to introduce earth-fault danger.

Colour coded signalling lamps, sometimes called "cue lights," need to be silently switched from the control panel. The suspension of battens and their trailing cables from the grid above stage needs more attention.

### Illumination of Dressing Rooms

Dressing-room lighting should not be controlled from the stage switchboard, but by two master switches in the stage doorkeeper's office. There should be two separate circuits; one to serve a ceiling point in the centre of each room (linked with the corridor lamps) for the convenience of cleaners in the daytime and the second circuit for all other dressing-room lamps. The latter should be on wall brackets over the mirrors, each with an ironclad tumbler switch (not push-bar or key holder) immediately below the bracket, which needs to be very securely fixed to the backplate. Pendants and flexible cables should not be allowed in dressing rooms. All lampholders should be locked to prevent the use of clothes irons, for which a separate circuit could be provided in the wardrobe room.

In the dressing rooms of "stars" plugs and sockets should be provided for floor-standard and table lamps while the full-length wall mirror will require points up

each side and across the top, to provide an intensity equal to that under which the artist will appear on the stage.

It should be possible to lift footlights on to the stage for maintenance while local lamps around the stage should be in bulk-head fittings. The noise made by "black-out" switches on the stage board must not reach the audience. If remotely controlled contactors are employed, they should be DC to avoid chattering and AC hum. The latched-in type leads to complication and push-button actuation is not considered positive enough.

Tumbler switches of the two-way-and-off type have greatly facilitated master control of contactors. Built-in spot lights should have forced ventilation, with an exhaust fan that starts automatically when the lamp is switched on.

### Heating in Tennessee Valley

**A** LARGE proportion of the houses built in the Tennessee Valley area are equipped with electric heating facilities. It is estimated that within five years after wartime building restrictions are removed, more than 100,000 homes will be put up in the Tennessee Valley, and a tenth of them will probably be equipped with electric heating.

The average cost of electricity in the Tennessee Valley is 1.88 cents per kWh. The national average, according to the Edison Electric Institute, is 3.55 cents. The winter is said to be warmer than in most parts of the United States.

The T.V.A., co-operating with other power boards, has been making a detailed study of electrical heating. An analysis of the data thus compiled shows, for example, that from 20 to 35 per cent. less energy was needed for homes with proper insulation than for those with poor insulation or with none at all. With few exceptions, the electric homes in the area use individual thermostatically-controlled room heaters, providing for different temperatures in various parts of the house. Installation costs, including heaters, wiring and additions to the service and metering equipment, have averaged about \$25 per kW.

As the major part of the electricity used for heating is confined to a period of three or four months there is a need for some type of compensatory load in the summer months. Air conditioning and the use of reversed-cycle refrigeration for summer cooling and winter heating have been suggested. After the war there may be limited use of the latter principle in moderate-winter areas, but some features of it must be perfected before its use will be widespread. In the meantime it is considered that a combination of electric space heaters and room cooling units may become the first step to all-year air conditioning in the home.

—*Reuter's Trade Service.*



## CORRESPONDENCE

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

### Force Between Parallel Conductors

IN the paper in Applied Electricity in the external examinations of June, 1944, for the degree of B.Sc. of London University the following question appeared: "Derive an expression for the force per unit length between two long parallel conductors carrying current, justifying the result for conductors of finite cross-section." This was followed by a numerical example of two cylindrical conductors.

The writer has received a letter from an experienced lecturer in one of the leading technical colleges, an honours graduate of many years standing, saying that he thought the justification of the result for conductors of finite cross-section too stiff for such an examination. He added, "I have not seen or tried a rigorous proof, but is not the formula  $2I_1I_2/100D$  approximate for conductors of finite section?"

Now anyone in this position need not look any further than p. 36 of Moullin's "Principles of Electromagnetism" for a proof, the

same centre B, the magnetic field outside the conductor will be unchanged and therefore the force on the other conductor, whatever its radius, will be unchanged. The force between the conductors is thus quite independent of their radii. This is equally true if the solid cylinders are replaced by hollow cylinders, since this does not affect the magnetic field external to the conductors. Hence the formula  $2I_1I_2/100D$  gives the force quite correctly for solid or hollow cylindrical conductors if the current is uniformly distributed over the cross-section.

A more difficult problem is that of the inductance of a line consisting of two parallel conductors of finite diameter; this was solved along somewhat similar lines in the editorial of the *Wireless Engineer* of October, 1944.

Glasgow University. G. W. O. HOWE.

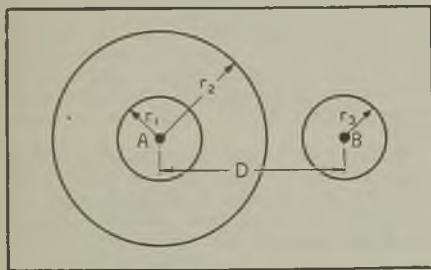
### The Post-war Cooker

IN Post-war Buildings Studies, No. 11, "Electrical Installations," under the heading cookers, one reads the following:—"In reaching decisions on the type of cooker for use in the post-war housing we have been guided by the views expressed by the women of the country through their various organisations." The main features for which preference has been expressed include the following:—(1) An oven at table height, involving a "horizontal" arrangement of the grill boiling hob and the oven. (2) At least one boiling plate in addition to the grill boiler. These points are confirmed in the E.A.W. interim report on post-war reconstruction.

The illustrated description in the January 5th issue of the *Electrical Review* of the full-scale models of the four all-electric kitchens designed for the British Electrical Development Association for post-war houses prompts one to ask: What efforts have been made to meet and satisfy the known requirements of our housewives?

In order to retain a table top 3 ft. above ground level, the Electrical Development Association has been unable to lift the oven more than 5 in. above the pre-war normal with the result that the housewife still has to stoop. I submit that this type of oven arrangement is not in keeping with the development one should expect from the E.D.A., and that in this case the utilitarian point of view has been sacrificed to the æsthetic.

It appears that strict adherence to this dimension of 36 in. working height is placing the designers upon the horns of a dilemma—



rigorousness of which is equalled by its simplicity. It is on the following lines:—If A and B represent the end view of two long wires of very small diameter, the magnetic field strength at B due to the current  $I_1$  in A will be  $2I_1/10D$  where D is the distance between the wires, and the force on the wire B carrying a current  $I_2$  will be  $2I_1I_2/100D$  dynes per cm. of length. The force on the other wire is, of course, the same. The magnetic field strength at B is not changed by replacing the fine wire at A by a cylinder of radius  $r_1$ , or even of radius  $r_2$ , so long as it carries the same current  $I_1$  uniformly distributed about the same centre A. Hence the force on the fine wire at B is unchanged and therefore also the equal force on the other conductor.

Now if the fine wire at B be replaced by a cylinder of radius  $r_3$  carrying the same current  $I_2$  uniformly distributed about the

they wish to retain a table top and at the same time elevate the oven. Another design, in my opinion, is only a compromise, for although the oven has been lifted, the table top becomes a shelf. One is led to the conclusion that the oven cabinet cannot serve two purposes, and that it must either be retained at the old level and still force the housewife to stoop or, as in the Poplar kitchen unit, it must be elevated to such a height that stooping is altogether eliminated.

Regarding item (2), provision of hot-plates, the E.D.A. kitchens embody a grill boiler and only one hot-plate. The Type 1 kitchen is supposed to be suitable for a family of at least four—would not two hot-plates have been warranted? Even to-day the utility type of gas cooker is fitted with two burners in addition to the grill. I again ask, is this display of one hot-plate good propaganda on the part of the Electrical Development Association? How did E.D.A. come to arrive at such a decision—not, I hope, by a census of cookers now in use? Would it not have been preferable to have carried out a survey as to what the housewives want and not as to what they already have? I think it will be agreed that, given the choice of two types, the housewife will prefer the two-plate type.

It would be of interest to have the views of other supply engineers regarding this particular bone of contention.

*Poplar, E.14.* ROBERT ILLINGWORTH,  
*Borough Electrical Engineer and  
General Manager.*

IT would be interesting to hear more about the electric clothes drying cabinets which now appear to be accepted as an essential part of the post-war kitchen equipment. The model kitchens referred to in recent articles all appear to have been erected in areas where the atmosphere may be presumed to be fairly free from pollution. Has consideration been given to the industrial areas where presumably the majority of houses will be built? Only well-made airtight cupboards with filter air inlets could be useful in such districts.

The ventilation of kitchens raises a similar problem, and some plans embody ducts around the walls at ceiling height, even incorporating lighting units in the ducts. One can imagine how quickly these units would lose their effectiveness after dirt in the atmosphere had passed over them to the intake, and the paint-work around these ducts would soon be very dirty. To obtain the ideal would obviously be more expensive than average installations would warrant, but it has occurred to me that a suitable small extractor fan mounted vertically in the centre of the ceiling, with the duct running to an outside wall between the ceiling and the upstairs floor, might serve to remove

kitchen fumes and steam with the minimum discoloration of paint-work.

I am sure everyone will agree that equipment which will not cater for conditions in industrial areas will only bring discredit on the electrical industry.

*Prestwich.*

W. R. COLEMAN.

### I.E.E. Examinations

MR. W. K. BRASHER, in his two letters on the above subject, states that the model question papers show how the syllabuses will be interpreted. Since the discussion has been concerned with "Applied Heat (with Light and Sound)," it is interesting to note that the section of the syllabus dealing with Properties of Matter is represented by a straightforward question on viscosity in model paper No. 1 and by no questions in paper No. 2. The highly academic items mentioned in my previous letter are completely ignored. Similarly in the sections on Light and Sound, there are no questions on the more advanced items of the syllabus, such as interference, polarisation and measurement of sound intensity.

I fully realise the impossibility of setting questions on every item of such a syllabus in two papers. But if these model papers are to be regarded as interpretations of the syllabus, then the Institution is guilty of a most objectionable form of window-dressing. On the other hand, if the examiners will be free to set questions on any part of the syllabus, the Institution is misleading prospective candidates by issuing such model papers.

Finally, I hope that Mr. Place's excellent suggestion that "Applied Heat (with Light and Sound)" should be divided into two alternative sections will receive serious consideration by the Council of the I.E.E.

EDWARD HUGHES.

*Technical College, Brighton.*

LIKE "Another Graduate" I would be glad to know the views of the profession regarding the Higher National Certificate. I hold the Higher Certificates in Electrical and Mechanical Engineering together with other qualifications.

The work on which I am engaged is of little importance and requires no technical knowledge, but I was urged by my employers to obtain these qualifications as a preliminary to promotion. Meanwhile fellow-employees without any technical qualifications are promoted and "upgraded" into technical posts.

During this war I have been offered several technical posts of importance, with prospects, but my employers have refused to release me. I am enrolled on the Central Register, which is apparently not interested in wasted ability or misuse of manpower.

In the light of these facts it is difficult to believe that this country is short of technicians.

I would like to see the I.E.E., in co-operation with the Ministry of Labour, taking a greater interest in remedying this state of affairs. In view of my experience I should be very wary about advising anyone to give five to seven years of his spare time in order to obtain technical qualifications which, although praised highly by the I.E.E. and the teaching profession, appear to be worthless. Furthermore, it would appear that to any inquiry by the Ministry of Labour the word of one's employer is regarded as final.

DISILLUSIONED GRADUATE.

**W**ITH regard to I.E.E. examination papers: whilst I agree with the synopsis, I feel that a list of formulae should be provided with the question papers. The subjects involve over a hundred formulae, and it is acknowledged that the technician does not attempt to memorise these for general purposes. A comprehensive list could be given, and it would still be necessary for the candidates to express understanding of the question and also to apply the correct formula.

In addition, may I suggest the inclusion of practical questions relative to the design and planning of distribution, lighting and power installations. This would be welcomed by candidates engaged in the contracting side of the industry, and it would also compel careful study of the I.E.E. Regulations.

Leicester.

C. H. BROMLEY.

**T**HE grievance aired by "Belac" applies to all professions, judging by letters in other technical papers. It is time M.P.'s were stirred into clarifying the position. At college the objective marks are known and results posted rapidly. Imagine parents waiting four months for term reports! There is no justification for the present system of making things as difficult as possible for examinees and moaning in the same breath about the lack of qualified individuals.

CANDID.

### I.E.E. Papers

**A**S you said in a leaderette in your issue of December 29th the I.E.E. Sections "were set up in order to meet the wishes of members for fuller opportunities to discuss certain ranges of subjects, but their committees, although representative as far as possible of all major interests, lay no claim to omniscience." You went on to refer to Mr. Forbes Jackson's request for the aid of members in suggesting subjects, and you suggested that suitable authors should be proposed.

It seems to me that there are two present needs of some importance. The first is for

short papers dealing with workaday aspects—practical papers of not too highfalutin a character for the man on the job. These should be well within the power of many members who have neither the time and material nor the peculiar zest necessary for the usual impressive paper. Speaking from recent experience, I may add that writers will find the Institution staff to be meticulous but also very helpful and human.

The second need is for specialist groups to be formed at more Centres. So far, apparently, only one or two Radio and Installations Groups have come into existence. This is not good enough! There is no reason why far more of the papers read in London or making an appearance only in the *I.E.E. Journal* should not be discussed by the provincial members. Subjects will receive more thorough discussion and provincial members will not only benefit technically but will feel that their Institution is alive and is helping them. Let each Centre Committee get going on the formation of the four specialist groups. If it doesn't, the local specialist members should want to know why, but at the same time realise that the onus of proof will be theirs.

Sunderland.

G. E. MOORE, A.M.I.E.E.

### Scottish Inquiry

**Y**OUR report of this inquiry in your issue of January 5th (page 27) states that the comparable costs of production at Ironbridge are £2 12s. 4d. per kW, plus 0.235d. per kWh, whereas costs in the case of the steam station built to-day are put at £3 18s. 5d. per kW, plus 0.163d. per kWh. The latter figure appears to me to be a misprint, as with the present price of coal the running cost surely cannot be much less than 0.20d. for coal alone, and I am wondering whether 0.163d. should read 0.263d. per kWh?

In this area coal, for power station purposes, is costing about 42s. per ton, and as the most efficient power station of which I have ever heard consumes 0.85 lb. per kWh, this automatically gives a basic coal figure of 0.2d. per kWh.

St. Helens.

W. A. HATCH, M.I.E.E.

[This matter is referred to in the leader section of this issue.—Editors, *Electrical Review*.]

**Yugoslav Power Situation.**—The Free Yugoslavia Radio has reported that most of the power stations in liberated Serbia and Vojvodina have been saved from destruction. Exceptions include the Leskovac station, with a capacity of 3,500 kW, which was put out of action, and the larger station at Novisad, which was completely wrecked. Serbia's largest generating station, near Belgrade, with a capacity of 40,000 kW, was only slightly damaged. The Gubava hydro-electric plant of 80,000 kW, the largest in the Balkans, was put out of action by partisans but most of the machinery was saved.



# Views on the News

## Reflections on Current Topics

**T**HE prospect of reconversion of industry to peacetime production is already beginning to occupy the attention of electrical manufacturers. Of course a large proportion of the industry, in particular the heavier side and the section devoted to making installation materials, is fortunate in having comparatively few change-over problems to face, but manufacturers who normally make domestic apparatus are in a somewhat different position. Nevertheless, judging from the conversations I have had recently with several of them, no very great difficulties are anticipated. The position regarding raw materials seems fairly satisfactory and the effect is now being felt of the easier state of affairs occurring some months ago in relation to non-ferrous metals. It must be emphasised, however, that the position is not stable and new war contracts may come along to alter things.

What difficulties there are centre, at any rate in the immediate future, principally around the availability of suitable labour. In this direction matters have not been helped by the recent decision to transfer a quarter of a million men to the Army. With the slackening off of war contracts, manufacturers do not seem to be likely—I may be wrong—to receive very sympathetic consideration with regard to retaining the services of men required for producing the electrical appliances which the Board of Trade has promised will begin to be available in increasing quantities.

This is one of the problems which the new regional organisation of the Board of Trade should be well placed to overcome since it will be working in close co-operation with the Ministry of Labour, as well as the Ministries of Production, Supply, Aircraft Production, and Town and Country Planning, and representatives of both employers and workers. Incidentally the Board of Trade has a colossal task ahead of it in the "de-requisitioning" of the 220 million sq. ft. of factory space it has acquired—158 million for storage and 62 million for production.

Recent correspondence in the *Manchester Guardian* has shown that the United States is not so advanced as we are in the use of electricity for cooking. The availability of cheap gas (very largely natural gas) appears to be the explanation; wood fuel is also very extensively used in areas where neither gas nor electricity can be obtained. The fact that electric cooking is going ahead in this country makes it difficult to understand the attitude of one contributor to the correspon-

dence who signs himself "Electrical Engineer." A previous writer, Mr. R. A. Harvey, prophesied that after the war the use of electricity for cooking would expand at an ever-increasing rate. "Electrical Engineer" says that he sees no reason for this. "We have had both [gas and electricity] in my home and would not think of going back to electric. The facility of immediate adjustment with gas is an over-riding advantage." While it is admittedly an advantage, there surely must be something in electricity which has prevented it from being an "over-riding" one.

Sir John Dalton has rightly refuted a suggestion that inferior coal is being "foisted" on the electricity supply industry. The fact remains, however, that the industry is not always fortunate in its allocations of coal and this has been partly responsible for the shortage of power at certain times. In this matter the Ministry of Fuel and Power is in the hands of the mining industry which itself has wartime difficulties to contend with. But I have heard power station engineers and members of the public arguing that while it may be necessary to accept whatever is available, the necessity for paying as much as three times the pre-war price for coal consisting largely of dust and foreign matter is not so apparent.

In the January 5th issue I referred to the storm about cooling towers which seemed to be brewing at York. Now, it is reported, the chairman of the York Electricity Committee (Alderman C. T. Hutchinson) has stated that the storm will probably be warded off by the use of the water of the Ouse for cooling purposes. In any event, he says, the rumour that three cooling towers were to be erected was without foundation.

Mr. T. Sharp, a town planning consultant, sets his face sternly against proposals to erect a power station near Durham City. In a report on redevelopment which he has prepared for the City Council he argues that the station is undesirable on æsthetic and health grounds. He says that Michael Angelo himself could not fit the "enormous bulk of the buildings" into the setting. At the recent inquiry it was stated for the North Eastern Co. that Sir Giles Scott had designed the station. Maybe Sir Giles will achieve what Michael Angelo (whose work lay in other directions) could not accomplish.

**REFLECTOR.**

# PERSONAL and SOCIAL

## News of Men and Women of the Industry

**T**HE names of Mr. J. M. Lawrence (M.B.E.) and Mr. G. T. Egan (B.E.M.) of the Mitcham Works, Ltd. (part of the Philips factory organisation) should have been included in last week's list of the New Year Honours.

**Sir Louis Sterling**, immediate past-president of the British Institution of Radio Engineers, was the guest of honour at a dinner arranged by the Institution at the Savoy Hotel on January 12th. He was presented with a volume containing an illuminated address recording his services.

As already announced, **Mr. H. Wilson**, M.I.E.E., chief electrical engineer to the Ashford Urban District Council since 1924, is to retire in March on reaching the age of sixty-five.

**Mr. Ramsden Mellor**, borough electrical engineer and manager at Kendal since 1941, will succeed him. Mr. Wilson was educated at Faversham (Wright's School) and the City and Guilds Technical College, Finsbury. After a short period with the London United Tramways he joined the Ipswich Corporation undertaking in 1904, leaving two years later to take up the position of shift engineer with Maidstone Corporation. He remained at Maidstone for fifteen years, becoming mains superintendent, after which he held positions at Croydon and Paisley before being appointed chief electrical engineer at Ashford in 1924.



Mr. H. Wilson

**Mr. Edmund M. Kindersley** has resigned his position as establishment officer of Edmundsons Electricity Corporation, Ltd., to take up a position in Manchester. Mr. Kindersley was with Edmundsons for eleven years. The staff has presented him with a handsome George III silver tankard, silver cigarette box, and a set of books on Persian subjects, in which Mr. Kindersley is specially interested. The presentation was made by Brig.-Gen. Wade H. Hayes, managing director of Edmundsons.

In our announcement of **Mr. R. H. M. Barkham's** appointment as manager of the Urban Electric Supply Co., at Grantham, we mentioned that he had been personal assistant to Mr. A. Anderson. Mr. Anderson should have been described as managing director of the East Anglian Electric Supply Co., Ltd., and the Eastern Group of companies controlled by Edmundsons.

**Col. Sir E. Geoffrey H. Cox**, C.B.E., has been elected to the boards of the Bedfordshire, Cambridgeshire & Huntingdonshire Electricity Co., B.C. & H. Power Station Co., Ltd., East Anglian Electric Supply Co., Ltd., and Newmarket Electric Light Co., Ltd.

**Mr. H. F. Shanahan**, borough electrical engineer of Blackpool, is retiring in March.

Last year his services were extended for twelve months.

**Mr. B. H. Killinger** has joined the staff of Berry's Electric, Ltd. He served his apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd., and since 1938 has been electrical manager and engineer to the British Power Boat Co., Southampton.

At a meeting of the Grand Council of the Federation of British Industries on January 10th **Sir Clive Baillieu** was nominated for election as president of the Federation at the annual general meeting in April. The nomination, which was unanimously approved, was moved by **Sir George Nelson**, who will retire from the presidency in April, having held office for two years.

Those elected to the Board of Management of the newly-formed North-East Engineering Bureau, include **Col. B. H. Leeson** (A. Reyrolle & Co., Ltd.). The Bureau now has 94 member-firms subscribing about £6,000 annually. A general manager is to be appointed and more than 100 applications have been received.

Glasgow Corporation Transport Committee recommends the appointment of **Mr. T. Irvine Kinley**, M.A., C.A., for the post of deputy transport manager, at a salary of £1,000, rising to £1,250 per annum, plus war increases. Mr. Kinley is at present chief assistant to the statistical officer of the London Passenger Transport Board. He is a native of Renfrew and is thirty-nine.

**Alderman Sir Thos. Higham** has resigned his membership of the District Joint Industrial Council for the Electricity Supply Industry (North-Western Area) of which he has been chairman since 1919. He has for many years been chairman of the Accrington Corporation Electricity Committee.

**Mr. W. H. Walton** has been re-elected chairman of the Executive Committee of the E.C.A. Council and **Mr. H. M. Drake** vice-chairman.

**Mr. W. Winwood**, A.M.I.E.E., has been appointed distribution engineer to the West Midlands Joint Electricity Authority in succession to Mr. R. A. Woods who, as already reported, is taking up a similar position at Birmingham.

**Appointments Vacant.** — Stockton-on-Tees Corporation is advertising in this issue for a general manager and engineer of the Electricity Department in succession to Mr. S. G. Marston, who is retiring next month. The salary offered is £850 per annum, plus a cost of living bonus which is at present £33 16s. The Royal Borough of Tunbridge Wells advertises the appointment of deputy borough electrical engineer (£700-£750 plus bonus, at present £33 16s.) and Barking Corporation is also seeking a deputy borough electrical engineer and manager at a salary of £712 with a car allowance of £60 per annum. A chief clerk and administrative assistant (£450, plus £60 bonus) is required by the County Borough of Eastbourne. The position of mechanical maintenance engineer is advertised by the County Borough of Swansea, salary £583

rising to £612. The Ipswich Education Committee is seeking a lecturer in electrical engineering for the School of Technology at a salary in accordance with the Burnham Scale for Technical Colleges.

**Lord Reith** has been invited by the British Government to visit the Dominions and India to discuss with the Governments the future organisation of the telecommunications services of the Commonwealth. He will be accompanied by **Sir Edwin Herbert**, Director-General of the Postal and Telegraph Censorship Department, **Sir Stanley Angwin**, Engineer in Chief, General Post Office, **Mr. John Buckley**, War Cabinet Office, and **Mr. L. V. Lewis**, Post Office. The mission is expected to leave shortly. Consequently on having undertaken the mission, Lord Reith has resigned from the boards of Cable & Wireless (Holding), Ltd., and associated companies.

**Mr. Harry Payn**, M.I.E.E., engineer and manager of the Boston & District Electric Supply Co., Ltd., whose activities in rural development work are described in this issue, has occupied his present position for the past twenty years and was in fact resident engineer for the National Electric Construction Co., Ltd., who were contractors for the original scheme in 1924. He received his early training in the Engineering Department of Exeter University College and with Edmundsons Electricity Corporation, Ltd. Subsequently he held appointments at Dover and Epsom. Mr. Payn served with the London Electrical Engineers R.E. (T) in England and France for over four years in the last war. After the war he was appointed deputy engineer to the Musselburgh & District Electric Light & Traction Co., Ltd., and before going to Boston was engineer and manager to the Northwood Electric Light & Power Co., Ltd., where he changed over the whole system from direct to alternating current.



Mr. H. Payn

**Mr. W. M. Little**, B.Sc., A.M.Inst.C.E., general manager and engineer of the St. Helens Corporation Transport Department, has been appointed to a similar position at Reading in succession to **Mr. J. M. Calder**, A.M.I.E.E., A.M.I.Mech.E., who is retiring. Before going to St. Helens Mr. Little was with the Edinburgh transport undertaking.

**Mr. F. Johnson**, who has been appointed president of the Bell Telephone Co. of Canada in succession to **Mr. C. F. Sise**, began his career forty years ago with the National Telephone Co. at Southport, England, where he was born. He went to Canada in 1910 and joined the Bell Co., with which he rose from the position of division auditor of receipts to comptroller and in 1935 was appointed vice-president in charge of accounts. He was granted leave of absence for two years to serve as director of administration of the British Purchasing Commission in New York.

**Mr. J. W. Sanger**, chief engineer of the Winni-

peg hydro-electric system for the past eight years, has been appointed general manager. Mr. Sanger was born at Bristol and studied at Faraday House, London. After graduating he served for a while with a Midland supply company before going to Canada in 1912 to take up the position of distribution superintendent at Winnipeg.

**Mr. W. A. Slorick**, A.M.I.E.E., assistant electrical maintenance engineer, Bradford Corporation Electricity Department, has been appointed switchgear engineer to Kennedy & Donkin, consulting engineers.

**Mr. W. H. Broad**, secretary of the Dover Corporation Electricity Department, has retired after fifty years' association with the undertaking. At the last meeting of the Electricity Committee the chairman (Alderman J. R. Cairns, O.B.E.) wished him many years of happy retirement. Mr. Broad, in reply, paid a tribute to those who had worked with him during his long service in the town.

**Mr. W. J. Terry**, chairman and managing director of the London Electric Wire Co. & Smiths, Ltd., has been re-elected chairman of the Cable Makers' Association for the third successive year. Mr. Terry is also managing director of the Liverpool Electric Cable Co., Ltd.

**Sir Murdoch MacDonald** has been re-elected president of the Institution of Factory Managers. The new chairman is **Mr. A. Peet** and vice-chairman **Mr. W. S. Anderson**.

**Mr. T. Elder** has severed his connection with Aberdare Cables, Ltd., with whom he held the position of works manager. He was responsible for the design and lay-out of the company's factory and previously for that of the Macintosh Cable Works, Derby.

About 350 guests, including employees and their friends, from Gresham Transformers, Ltd., Hanworth, and its associate companies, were entertained at a New Year party given by the directors. **Mr. J. P. Coleman**, governing director, spoke of the company's recovery from what he described as "almost a knock-out blow." Despite the loss of factory, plant and stocks twice within the last two years, production had not stopped for more than a few days, and the monthly output had never fallen below two-thirds of normal. In appreciation of what he described as their "gallant behaviour" Mr. Coleman presented a substantial cheque on behalf of the directors to each of the fireguards on duty at the time of the last "incident." **Mr. J. A. Clegg**, technical director, thanked employees for their splendid efforts following enemy action. After a high tea the guests were entertained by several well-known artists, and this was followed by dancing and a cabaret given by employees.

Presentations were recently made at the Willans works of the English Electric Co., Ltd., on the occasion of the retirement of **Mr. H. J. Matthews** and **Mr. and Mrs. G. H. Gauntley**. Mr. Matthews, who had been employed as an inspector for forty-seven years, was presented with an illuminated long-service certificate on behalf of the directors and management and a sum of money subscribed by his friends and colleagues at the works. A long-service certificate was also handed to **Mr. Gauntley**,



who had completed forty-two years' continuous service at the works and for many years had been an assistant to the works manager. With his wife, who had been head of the typing department, he received a sum of money subscribed by their friends. Mr. Gauntley was also presented with a set of table glassware by Mr. B. G. Cutler on behalf of the Apprentices' Association.

## Obituary

**Mr. J. A. Hirst.**—We regret to report the death on January 10th, at the age of seventy-three, of Mr. John A. Hirst, founder and until recently chairman of Brookhirst Switchgear, Ltd. In a small workshop in Victoria Road, Chester, in 1893, he started an electrical engineering business, and later, in partnership with Mr. P. S. Brook, as Brook Hirst & Co., was responsible for some of the first electric lighting and power installations in the city and district. Mr. Hirst was the originator of many inventions. In 1935 he was chairman of the British Electrical and Allied Manufacturers' Association.

**Mr. J. L. Brown.**—We record with regret the death on January 9th of Mr. J. L. Brown, at the age of fifty-three. He was sales director of Electrical Components, Ltd., having been with the company for twenty-six years.

**Mr. P. K. O'Brien,** assistant managing director of Murphy Radio, Ltd., whose sudden death on December 31st we reported last week, was only thirty-three. An inquest showed that he had been suffering from acute anaemia. A graduate of the London School of Economics, Mr. O'Brien joined the company in 1934, his work then being concerned largely with sales estimates and production programmes. From 1938, when the company rejoined the Radio Manufacturers' Association, he supported and often deputised for Mr. E. J. Power, the managing director, and became chairman of some of the most important of the R.M.A.'s working committees. He was an all-round sportsman.



The late  
Mr. P. K. O'Brien

**Mr. Walter Luker,** for forty years a member of the staff of Aish & Co., Ltd., electrical engineers and contractors, and until recently an instructor in electrical engineering at the Bournemouth Municipal College, died on December 31st at the age of fifty-five.

**Mr. T. Aldhouse.**—We record with regret the death on January 1st of Mr. Thomas Aldhouse, who for thirty-three years was manager of the weaving department of the Cressall Manufacturing Co., Ltd. Mr. Aldhouse, who was sixty-three, is said to have made the first woven resistance units to be produced in this country.

**Mr. H. Hemming.**—With the death of Mr. Henry Hemming, which occurred on December 26th, there passes one of the best known of the early electro-platers. For fifteen years he was in charge of the electro-plating department of

Baxendale & Co., after which, in 1905, he joined the staff of W. Canning & Co., Ltd. For over a quarter of a century up to the time of his retirement in 1931 he travelled all over the country starting up and servicing electro-plating plants installed by his company.

**Mr. R. S. Downe.**—We learn with regret that Mr. R. S. Downe, who was engineer and manager of the Brompton & Kensington Electricity Supply Co., Ltd., died on January 14th at the age of seventy-five. Before going to the B. & K. Co. Mr. Downe was borough electrical engineer of Southport and earlier was at Liverpool.

**Mr. W. M. Dyson.**—We regret to record the death on January 6th as a result of a road accident, of Mr. William Martin Dyson, installations superintendent to the Hull Corporation Electricity Department which he joined in 1905 as charge engineer. Though he reached retiring age two years ago, Mr. Dyson continued to serve the Corporation.

## Science in Industry

**N**EARLY 300 members of the British Association attended a two-day conference in London last week of the Division for the Social and International Relations of Science. The subject was "The Place of Science in Industry," and at the opening session Sir Richard Gregory, F.R.S., president of the British Association, said that it was no longer possible or desirable to separate pure and applied science.

Mr. Ernest Bevin, Minister of Labour and National Service, urged the importance of bringing the benefits of science to people as quickly as possible and at a price which they could afford. Wartime experience had shown the speed with which progress could be made. He thought that the public had not yet secured the full benefit of Faraday's pioneer work. The structure, size and layout of houses did not change fast enough for the introduction of new scientific ideas and appliances. Manufacturing and distributing costs had not been low enough to bring modern appliances within the means of ordinary people.

Lord Brabazon spoke of the development of aircraft and Sir Robert Watson-Watt, F.R.S., discussed telecommunications. Sir Robert said that the older branches—line telegraphy and telephony, cable telegraphy, and long and short wave wireless, supplemented by the newer branches of radio-telephony, broadcasting, radio aids to navigation, facsimile transmission, television and radar, suggested that a scientifically founded industry could, with advantage, exchange new securities for old.

Dr. L. E. C. Hughes said that there was definite opposition to technical and scientific research and progress in Britain and it came mainly, he thought, from the trade unions.

Prof. J. D. Bernal, summing up the morning's discussions, said that what was needed was a picked body of people looking into the question of industry and science with the object of getting the best working partnership. The scientific personnel in this country was at least ten times less than what it should be. Our schools, technical institutes, universities and research laboratories must be organised so that in the immediate post-war period we would turn out as many trained and scientific technical workers as possible for they would be needed.

## Forthcoming Events

**Saturday, January 20th.—Manchester.**—Engineers' Club, 3 p.m. Association of Supervising Electrical Engineers (Manchester Branch). "Electrical Rules and Regulations," by T. Storrs.

**Swansea.**—Guildhall, 3 p.m. I.E.E. West Wales (Swansea) Sub-Centre. "Maintenance of Distribution Plant Installations on AC Networks," by F. N. Beaumont, B.Sc.(Eng.), and F. A. Geary.

**Monday, January 22nd.—London.**—Institution of Electrical Engineers, 5.30 p.m. Informal meeting. Discussion on "Applications of Electricity to Water Supply," to be opened by J. F. Shipley.

**London.**—Northampton Polytechnic Institute, St. John Street, E.C.1. "Electrodepositors' Technical Society. "Chromate Passivation of Zinc," by Dr. S. G. Clarke and J. F. Andrews.

**Birmingham.**—Grand Hotel, 6 p.m. Birmingham Electric Club. "Industrial Electronics," by Dr. W. Wilson.

**Manchester.**—Engineers' Club, 6.30 p.m. I.E.E. North-Western Students' Section. "Development of the Stroboscope," by D. T. Broadbent.

**Newcastle-on-Tyne.**—Neville Hall, 6.15 p.m. I.E.E. North-Eastern Centre. "The Electrical Aspect of Farm Mechanisation," by C. A. Cameron Brown, B.Sc.

**Bradford.**—Technical College, 6.45 p.m. Bradford Engineering Society. "The High-rupturing-capacity Fuse and Equipment for Medium-Voltage Systems," by J. Collins.

**Tuesday, January 23rd.—Luton.**—Town Hall, 7.30 p.m. Luton Electrical Society. "Fluorescent Lighting," by C. R. Bicknell, B.Sc.

**Walthamstow.**—South-West Essex Technical College, Forest Road, 7 p.m. London Supervisors' Discussion Groups (N.E. Centre). "Some Aspects of Safety in Industry," by R. K. Christy, B.Sc.

**Wednesday, January 24th.—London.**—Institution of Electrical Engineers, 5.30 p.m. Joint meeting of Radio Section and Television Society. "American Television Broadcasting Practice," by D. G. Fink. The paper will be read by Dr. D. B. Langmuir.

**Edinburgh.**—Heriot-Watt College, 6 p.m. I.E.E. Scottish Centre. "Planning the Future Electricity Meter," by G. E. Moore.

**Loughborough.**—At Loughborough College, 2.30 p.m. I.E.E. East Midland Sub-Centre. "Analysis of the Load on a Modern Electricity Supply System," by P. Schiller.

**Birmingham.**—James Watt Institute, 7 p.m. I.E.E. South Midland Students' Section. "Apprenticeship," by J. P. Quayle, B.Sc.

**Friday, January 26th.—London.**—Room 19, Livingstone House, Broadway, S.W.1, 6.30 p.m. E.P.E.A. Southern Divisional Meter Engineers' Group. "Points to be considered in the Selection of Meters," by F. A. Miles.

**Birmingham.**—Imperial Hotel, 6 p.m. Illuminating Engineering Society (Birmingham Centre). "Brains Trust." Question master, J. G. Holmes, B.Sc.

**Manchester.**—Engineers' Club, 6 p.m. I.E.E. North-Western Centre Radio Group. Informal discussion on "High-frequency Heating," to

be introduced by H. Wood, B.A., and J. F. Capper.

**Manchester.**—Engineers' Club, 6.30 p.m. Manchester Association of Engineers. "Standardisation, Testing and Research," by Dr. H. Wright Baker.

**Saturday, January 27th.—London.**—Caxton Hall, Westminster, S.W.1, 2.30 p.m. Association for Scientific Photography. "Electric-Discharge Lamps for Photography," by H. K. Bourne, M.Sc., M.I.E.E.

**Bristol.**—Merchant Venturers' Technical College, 3 p.m. I.E.E. Bristol Students' Section. "Electronic Stroboscope and its Applications," by Prof. G. H. Rawcliffe.

**Mansfield.**—County Technical College, 3 p.m. Association of Mining Electrical and Mechanical Engineers (Midland Branch). "Colliery Cables: Design, Installation and Performance," by R. F. D. Milner and J. R. Cox.

**Monday, January 29th.—Birmingham.**—James Watt Institute, 6 p.m. I.E.E. South Midland Centre Radio Group. Discussion on television to be opened by Dr. D. C. Espley.

## American Rural Plans

**A** PRELIMINARY report by a Rural Electrification Administration (United States) post-war committee outlines plans for a five-year programme that would create an outlet for \$5,546,283,000 worth of goods and services and provide electric service to 3,655,000 rural homes. Of the 6,344,000 occupied rural dwellings in the United States without central station electric service, 3,655,000 can be reached within five years by extensions from existing rural power systems or from a few new ones created by local interests. Construction of the lines is expected to cost \$1,020,000,000 and to provide 510,000 man-years of labour.

It is estimated that each newly connected farm will spend on the average \$145 for wiring and \$400 for appliances and equipment, and in addition 35 per cent. will install pressure water systems and plumbing at a cost of \$225. Other rural establishments, making up 25 per cent. of the total, are expected to spend \$90 each for wiring and \$2,000 for appliances, with 25 per cent. installing plumbing at an average cost of \$225. The expenditure for these purposes is expected to reach a total of \$2,026,241,000 and require 1,013,120 man-years of labour. Additions to existing installations are expected to cost \$2,500,042,000 and provide 1,250,000 man-years of labour.

At the end of last year there were 2,557,000 farms provided with an electric service. A table in the report gives the following estimate of the electrical apparatus in use in the farm homes and on the farms themselves:—Domestic apparatus: Radio sets, 2,208,700; irons, 2,086,000; washing machines, 1,349,800; refrigerators, 981,600; toasters, 736,200; vacuum cleaners, 490,800; hot-plates, 368,100; coffee makers, 220,900; ranges, 98,200; and roasters, 49,100. On the farm: Brooders, 613,500; water pumps and installations, 613,500; motors, 490,800; cream separators, 368,100; milking machines, 245,400; milk coolers, 171,800; poultry water warmers, 49,100; dairy water warmers, 24,500; and feed grinders, 24,500.

# House Service Unit

## Uniform Sections with Special Switches

**A** PATENTED service termination, the "Metric," is being manufactured by J. G. Statter & Co., Ltd., 82, Victoria Street, Westminster, S.W.1. It is suitable for normal domestic premises of five or six rooms and can be recessed in a wall or surface mounted. Provision is made for a twin 0.0275 or 0.06 sq. in. intake cable and the arrangement is suited to the accommodation of additional apparatus.

The termination is constructed of a plastic material; four rabbeted pillars, one attached at each corner of the base, receive the top, bottom and side panels and a metal centre stem is used for attaching the pillars to the base and also for securing the cover. Extra pillars can be provided in the centre of one or more of the sides for the fitting of cable boxes where necessary. The cover has sealable fastenings.

The essential feature is that by means of extension pieces inserted into the rabbeted corner pieces, further boxes can be attached vertically and horizontally, depending upon the shape of the space available. The extension inserts are designed for easy wiring from box to box and, as with the side panels, are easily withdrawn to permit full accessibility.

Multi-unit arrangements can be built up but, assuming that three would be the normal requirement, then the supply authority's portion would contain a fuse, metered live and neutral splitter blocks, cable sealing box and space for a second fuse and cable sealing box if required for looping out to another consumer.

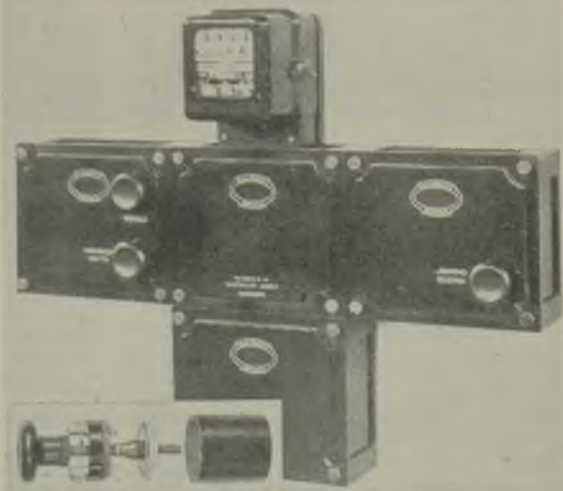
The high loading apparatus section would contain two fuses and switches of a push-pull design controlling cooker and immersion heater circuits, or similar apparatus. The consumer's distribution unit portion would contain two fuses for heating and power circuits and two for lighting circuits, a neutral splitter and a push-pull control switch. This unit is arranged for a ring main, but can easily be extended for premises wired on the radial system.

An earth connector splitter is provided on one of the extension inserts, all auxiliary earth wires being brought to this splitter and the main earth wire taken through a hole in the back of the cable box to the plumb of the service cable. All fuses are of the h.r.c. single-pole type, mounted on bases designed to allow vertical wiring at the back; live terminals are protected by means of an insulated cover. There is space in the consumer's section for a bell transformer.

Variations in physical dimensions of meters render their inclusion in a unit of uniform dimensions impracticable. It is suggested that the meter be installed either on the top of the termination or at the side (depending upon the

position of the meter terminals) butting against the termination, thus eliminating outside wiring.

The patented push-pull switch referred to is of 60 A capacity and possesses quick make and quick break features, produced by the action of a coiled spring, inserted in a contact plate, moving over a central rod of a double cone formation, the plate making contact with terminals situated in the body of the switch.



Extensible combination house-service boxes with new push-pull switch

This switch is very robust, simple and compact, being approximately 2½ in. dia. and 4 in. high. It is fitted in such a way that the cover cannot be removed from either the high loading apparatus unit or the consumer's distribution unit without first opening the switches, thus making an effective interlock.

The cable from the incoming sealing box is connected to a main fuse, thence through the meter to the live pole splitter block in the supply authority's unit. The neutral cable core is directly connected to the neutral splitter block, a shunt lead being connected to the meter. From these metered live and neutral splitters, connections are made to the switches. In rising-main boxes for large blocks of flats there is provision for incoming and outgoing 0.1 sq. in. twin cables on two multi-way terminal blocks, one for the live pole and one for the neutral.

In the case of a two-flat layout per floor two fused ways would be provided together with a neutral splitter, connected to the appropriate main terminals. Should more be required the unit can be easily extended, each containing four fused ways and a neutral splitter with an earthing connector block on the extension insert.



# COMMERCE and INDUSTRY

## Power Station Coal. Stockton Salary Question.

### Inferior Coal

**A**FTER describing as an exaggeration a Press report that inferior coal had been dictatorially foisted on the electricity supply industry, Sir John Dalton, Fuel and Power Controller, London and South Eastern Region, stated last week that it was true that electricity stations were having to take inferior fuel in many cases. It had to be accepted chiefly because a greater demand for fuel had to be met out of a diminishing production. Electricity undertakings had co-operated loyally in the inconvenience of receiving fuel which was not suitable for their boilers and undoubtedly resulted in either a diminution of output, or in the acceptance of a greater quantity of fuel to obtain the same output.

Sir John contradicted a statement that "bureaucratic officialdom" had directed delivery of low-grade coal to some undertakings. Allocation of fuel to electricity, gas and water works had been the task for the last four years of a committee of men drawn from the three industries, none of whom were civil servants; he had been chairman of this committee since its inception.

### Electricians' Wages

The National Joint Industrial Council for the Electrical Contracting Industry has notified us that there will be no alteration in the cost of living (war) addition to wages for the period ending on the second pay day in April. The amounts of the addition are as follows:—Labour over 21 years of age 6d. per hour; between 18 and 21, 3d.; under 18, 1½d. These rates include the 1d. per hour added by the agreement of September 6th, 1944.

The current hourly rates for adult male journeymen including the war addition, are now:—Grade "A," 2s. 4½d.; Mersey District, 2s. 3½d.; Grade "B," 2s. 2½d.; and Grade "C," 2s. 1½d. In all cases these inclusive hourly rates rank for any overtime actually worked.

### Electrical Contractors' Apprentices

Consideration is being given by the National Joint Industrial Council for the Electrical Contracting Industry to the first report of the Building Apprenticeship and Training Council with a view to formulating a comprehensive apprenticeship scheme for the electrical contracting industry. To assist in this members of the Electrical Contractors' Association are being asked to furnish the Council with up-to-date particulars of the number and classes of boys which they employ.

### Post-war Building

Those concerned with the heating of buildings will find much useful information on thermal insulation and associated matters in Post-War Building Study No. 15, "Walls, Floors and Roofs," which has been prepared for the Ministry of Works by a committee convened by the Royal Institute of British Architects

(Stationery Office, 9d. net). No. 16 in the same series, also by a committee convened by the R.I.B.A., is entitled "Business Premises" and costs 1s. It deals with the location and planning of premises, structure and materials, and services and equipment, including electrical installation, lighting, heating, ventilation, lifts and conveyors, etc.

### Export Control

Under the existing Export of Goods (Control) Orders (a) all goods require licences on export to certain destinations, and (b) the goods specified in the schedule to the Orders require licences on export to all destinations. The Export of Goods (Control) (No. 1) Order, 1945 (S. R. & O. 1945 No. 12, Stationery Office, 1d.), which is operative from January 15th, removes certain countries referred to in (a) and reduces such destinations to the following:—Andorra, Burma, China, Liechtenstein, Portugal (including Madeira, the Azores and the Cape Verde Islands), Rio de Oro, Spain (including the Canary Islands and the Spanish Zone of Morocco), Sweden, Switzerland, Tangier Zone, Turkey (including the Hatay), and the Union of Soviet Socialist Republics and enemy territories. The new Order does not affect the requirement in (b) above and goods included in the schedule to the previous Orders will continue to be subject to the licensing requirement on exportation to any destination.

### Radio Components Exhibition

A private exhibition of British radio and communications components is shortly to be held in London for the benefit of designers of equipment for the Services. The exhibition, fixed for February 20th-22nd inclusive, will be under the auspices of the Radio Component Manufacturers' Federation. Admission will be restricted to those with official invitation cards.

### Stockton Engineer's Salary

The Stockton-on-Tees Electricity Committee last week discussed the question of the salary to be paid to the successor of Mr. S. G. Marston, general manager and engineer of the Electricity Department, who is to retire. The Associated Municipal Electrical Engineers had reminded the Committee that the salary for the post under the "Walker scale" was £1,116 per annum with a commencing figure of £948. The Committee and the Town Council, however, decided to fix a salary of £850, plus bonus (at present about £34), as will be seen from an advertisement in this issue.

### Chemical Engineering Course

Proposals for extension of existing facilities for chemical engineering education of a university standard are contained in a booklet produced by the Institution of Chemical Engineers, 56, Victoria Street, S.W.1. The proposed course, leading to a bachelor's degree in the subject, extends over four years (4,000 hours). The first year would be devoted to the fundamental subjects—mathematics, mechanics,

chemistry, physics and engineering drawing. In the second and third years more advanced and detailed instruction would be given in these subjects, electrical technology being included. The more practical aspects, including power generation and distribution would occupy the fourth year. Outlines of the various parts of the courses are given and periods in drawing offices, laboratories and works during vacations are strongly advocated. It is considered that undue specialisation should be avoided although certain teaching institutions may desire to devote special attention to some subject in which they may be particularly interested, e.g., fuel technology, oil technology, etc.

### New Industries in the Urals

Russia has recently made two additions to the industrial capacity of the Urals region. These are an aluminium plant at Bogoslovsk and an open-cut lignite mine at Volchansk. Electrical energy at the Bogoslovsk plant is being supplied by a 50,000-kW set and another set of 25,000 kW is expected to be in operation within the next three months. This plant will work the Krasnaya Shapochka bauxite deposits, which are claimed to be among the best in the world. The lignite at Volchansk lies under a topsoil of 15 to 40 ft. The plan provides for an annual output of two million tons. It is also reported that work will start shortly on another deposit nearby with an estimated annual output of  $1\frac{1}{2}$  million tons. At this deposit seams of high-quality coal have been found under the top layer of lignite.—*Reuter's Trade Service.*

### Salt-Bath Explosion

An inquest was held recently on Derek Chinnock Bailey (18), an apprentice engineer at the Rugby works of the English Electric Co., Ltd., who received fatal burns following an explosion. Mr. L. J. Foxley, foreman in the steam-turbine laboratory, stated that if damp salt were added to the salt bath which Bailey was looking after the water would turn into steam immediately it was heated by the molten salt and cause an explosion. He had given no instructions for any salt to be added. After evidence that deceased had been seen pounding salt and apparently pouring it into the machine, Mr. F. Buckley, chief chemist and foundry supervisor, said that if damp salt had been added when the machine was cold there could have been no accident. In view of what had happened he thought the instructions might be a little more stringent. A copy of those issued as a result of the accident was submitted. The jury, returning a verdict of "Accidental death," added that in their opinion the rules were not explicit enough and that persons handling the machine should carefully study its working and sign the instructions to show that they had read them.

### Clothing Factory Lighting

An example of how electricity, materials and labour can be saved by the employment of fluorescent tube lighting is provided by an installation at a clothing factory. In one department, where white collars are ironed and finished, it is essential that all "near white" specimens be rejected. With the original lighting system, rejects were difficult to discover, but the

fluorescent lighting has made detection considerably easier and more certain. In addition, it has also speeded the inspection process, thereby saving much time and relieving eyestrain. Eleven "Osram" tubes are used in this collar finishing department representing a total loading of 880 W, as compared with the previous 2,500 W. There are, of course, other departments in which the conditions have similarly been improved, particularly in the ability of the workers to discriminate between close shades of colour. Altogether, 122 fittings were employed in the earlier system, with a total loading of 9.4 kW, whereas the "Osram" fluorescent tube installation employs 61 fittings with a total loading of 4.2 kW. The new installation was carried out by A. W. Fisher, electrical contractor, Dalston.

### Screw Gauges

For the past two years manufacturers have had to purchase their screw gauge requirements as directed by the Screw Gauge Allocation Centre. This Centre, set up in October, 1942, by mutual agreement of the Machine Tool Control and the screw gauge makers to meet the conditions then prevailing, is to be closed at the end of this month. From February 1st all intending purchasers of screw gauges should address inquiries to their usual suppliers and not to the Centre.

### New Zealand Import Quotas

The *Board of Trade Journal* for January '43th gives full details of the import licensing arrangements made by the New Zealand Government for 1944, indicating the proportion of the 1940 imports for which licences will be granted, for which classes licences will only be considered individually in relation to actual requirements, and classes for which allocations have not been made. Most of the electrical goods specified fall within the last two classes.

### Telephone Equipment for Portugal

A representative of the Anglo-Portuguese Telephone Co. is shortly leaving for London in the hope of getting enough equipment to set up two new exchanges in Lisbon. The Telephone Company, which operates a telephone concession for Lisbon and Oporto, now has 5,000 applications for new telephones on its waiting list. The difficulty has been wartime lack of material.—*Reuter (Lisbon).*

### Brisbane Extensions

Details of extensions which are being carried out at the Bulimba power station of the City Electric Light Co., Ltd., Brisbane, are given in a paper which Mr. C. T. McCORKELL recently submitted to the Queensland Section of the Institution of Electrical Engineers and the Brisbane Section of the Institution of Engineers, Australia.

The station was commenced in 1924 and the present extensions will add 50,000 kW to the 42,500 kW installed capacity. The existing boiler steam conditions are 300 lb. per sq. in. and 750 deg. F., whereas for the extensions the pressure will be 625 lb. per sq. in. and the temperature 850 deg. F. The addition of plant at higher steaming conditions was decided upon after considering other methods of extension, such as superposing.

Two 25,000-kW turbo-alternators are being supplied by C. A. Parsons & Co., Ltd., while the two-pass condensing plant, with aluminium brass tubes, is being made by Thompsons Engineering & Pipe Co., Ltd. A longitudinal arrangement of the turbo-alternators was chosen because this enabled the machines to be accommodated in the width of the existing turbine house. The turbine incorporates a twin effect evaporator operated from bled steam as well as three-stage feed heating. The alternator foundation blocks are supported by a continuous raft of cellular construction.

Three Babcock & Wilcox cross drum marine type boilers of 150,000 lb. per hr. m.c.r. have been ordered and a fourth will be needed to complete the extensions.

### Middle East Imports

After consultation with supply and shipping authorities in London and Washington, the British and American authorities in the Middle East Supply Centre have communicated to the Governments of Middle Eastern countries important modifications in the present system of control. Over a wide range of items M.E.S.C. recommendations of territorial import licences will no longer be required, but the import licensing regulations at present in force in all territories will continue.

Recommendations from the M.E.S.C. will still be required in the case of a number of classes, including insulated cable and wire, electrically- or turbine-driven laboratory centrifuges valued at more than £15, dry cell batteries, accumulators and radio receiving and transmitting equipment and parts.

### Reinstatement of Service Men

A useful summary of the Reinstatement in Civil Employment Act and the Disabled Persons (Employment) Act, 1944, has been issued by the N.J.I.C. for the Electricity Supply Industry, 1, Dickinson Street West, Manchester, 2.

### Proposed Y.E.P. Offices

The Yorkshire Electric Power Co. has submitted to Wetherby Rural District Council plans for administration offices, residential buildings, canteen and sports ground on land at Scarcroft. The Council is holding a special meeting to consider the proposal.

### An Electronic Converter

An electronic converter rated at 10,000 kW has been installed by the Carnegie-Illinois Steel Co. to permit the exchange of power, reversibly, between two systems of 25 cycles at 44 kV and 60 cycles at 69 kV.

The installation is in two portions (AC-DC-AC with the central link operating at 30,000 V) of twelve tubes each. When changing from rectifier to inverter operation for reverse power flow a phase-shifting network is utilised to move the grid voltage 150 degrees. The power output is maintained constant relative to the system frequencies and voltages, so the converter does not contribute current to system faults. Power flow to internal faults is suppressed and switching resorted to only in the case of persistent faults. Reactive over-excited current is furnished by the synchronous machines connected to both systems, excess losses being chargeable to the converter. The latter is

subject to arc-backs, which apparently cannot be avoided, but their system effects can be suppressed in a manner that has incidentally resulted in the DC transmission section becoming remarkably free from disturbance during lightning storms.

The pentode tubes are of the ignition type with thyatron characteristics, permanently evacuated and sealed. They are cylindrical, 10 in. in diameter and 45 in. long, each weighing 100 lb. The envelope is formed of two concentric stainless steel cylinders between which cooling water flows, the tube losses thus carried away being a fraction of one per cent. at the normal operating voltage. These tubes have a main and auxiliary anodes, a mercury pool cathode with igniters and three grids.

Possible applications of a 20,000-kW electronic converter installed by the General Electric Co. of America were discussed at the A.I.E.E. summer meeting in St. Louis.

### Trade Announcements

Owing to the retirement of Mr. C. A. Clarke, who has represented the Power Plant Co., Ltd., in the Manchester area for many years, Mr. J. F. Bradshaw of 24, Hawthorn Avenue, Eccles, has been appointed manager of the company's Manchester office. The counties covered will be Lancashire, Cheshire, Westmorland, Cumberland, Flintshire and Denbighshire. Mr. Bradshaw will be working from his home address for the time being, but it is hoped shortly to open an office in Manchester. Inquiries should be sent direct to the company at West Drayton, to save time.

The Union Cable Co., Ltd., has moved its offices to High Holborn House, 52-54, High Holborn, London, W.C.1 (telephone: Chancery 7744).

### Change of Name

Stephenson Clarke and Associated Companies, Ltd., have changed their name to Stephenson Clarke, Ltd.

### "Metadynes"

Our attention has been drawn to a printer's error in the article on this subject in the *Electrical Review* of December 29th (p. 919). In the twenty-fourth line of the second paragraph the words "If the lead is replaced . . ." should have read "If the load is replaced . . ."

## INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

Makers of Hewlett insulators.  
Manufacturers of Edison screw lampholders, with shade carrier ring.  
"Turbator" vacuum cleaner.



# Australian Production

## Wartime Growth of Electrical Industry

**T**HE war-time progress of Australia's electrical manufacturing industry is acclaimed in the annual issue (for 1944) of the *Australasian Manufacturer*. Summarising the situation it may be said that as a result of increasing production for some time on the part of manufacturers of generating and transmission equipment and electric transport material, a large proportion of local needs are being met by local enterprise.

Mobile power plants have been constructed for the Army and Air Force and for use in naval and merchant vessels. Motors are being supplied for both single- and three-phase operation and DC motors have been furnished to the Defence Departments of Australia and the Allies. Much of this equipment involved many special processes which had not previously been employed in the Commonwealth, and the finished products were required to measure up to the rigid British Admiralty standards. Certain works have specialised in the design of motors for operation in humid conditions and high temperatures, and for refrigeration equipment.

Transformer manufacture probably represents the most extensive range of Australian electrical production, varying from miniature audio transformers up to distribution transformers of 22,500 kVA, 66-kV, weighing 44 tons.

According to Mr. Leslie E. Cole, President of the Electrical Manufacturers' Association of Victoria, much of the world's pioneering work in electric welding was carried out in Victoria where the manufacture of such equipment, together with arc welding electrodes, was started about 24 years ago. He says that Australia has led the world in two applications of electric arc welding, namely, the construction of large gasholders and the repairing of steel

bridge structures. Electric resistance welding was well developed there with spot, butt and seam welders at the time of the outbreak of war and has been utilised in a large number of defence projects during the last four years. He also claims that Australia has been responsible for many advances in the production of switch-gear, transmitting apparatus, meters, signalling equipment, and in fluorescent, neon, mercury and sodium vapour lighting.

The production of radio and testing equipment, indicating instruments, and batteries has been greatly developed. Switches, lampholders, plugs and sockets are also made, while manufacturers of this type of equipment are actively engaged in plans for the post-war home.

The manufacture of v.i.r. cables was pioneered by a Victorian company early in 1940. Towards the end of that year, after all standard tests had been complied with, the cables were marketed throughout the Commonwealth. The variety of types in production is being constantly augmented, and there have been very large sales of cables from this factory and others that subsequently began operations. Australia is also making enamelled and covered copper winding wires in a great variety of types and gauges to exacting standards. The heavier copper wires have been made for some years past.

Among raw materials essential to electrical engineering which are produced in the Commonwealth are silicon motor and transformer steel; copper and brass rod, tubing and sheets; plastic moulding materials; insulating materials in all forms; varnishes; and mica products. It is suggested that paper makers might well consider the future production in Australia of electric insulating papers.

## Outlook in Egypt

### Need for Improved Supply System

**I**MPORT trade prospects after the war are the subject of a report by the British Chamber of Commerce of Egypt. In it there is much to interest United Kingdom electrical exporters against the time when goods are available for shipment. The Chamber considers that there is a wide field for development and that British manufacturers should be encouraged to enter it, chiefly by supplying plant, equipment, appliances and materials and by regular participation in tenders. At the same time electricity supply in Egypt is described as unsatisfactory, for many reasons—the unbalanced distribution of existing stations, the absence of any planned linking, the lack of supply facilities outside urban areas, the diversity of supply systems, which are sometimes obsolete, and the high charges. In these circumstances it is not surprising to learn that the development of domestic and industrial consumption has been slow.

As the vast majority of the population are agriculturists, poor and ignorant of electricity, prospects must for some time be restricted to town areas, but even so the Chamber does not

expect to see real progress without a sharp cut in tariffs. Somewhat similarly on the industrial side, the main consumers are reported to have felt that they could not rely on the public supply and have mostly turned to self-supply, so that any return to the former, with improved conditions, can only be a slow process.

Therefore the immediate problem is to create a demand, based on existing conditions, so that new sources of power may be provided when required. To do so, the report points out, the existing supply requires improvement by effective interlinking and standardisation of voltage and frequency. Thus present installations could be put to more economic use, industrial consumption could be encouraged and the load factor—which is very poor—improved.

The Aswan Dam hydro-electric scheme should move with, or even follow, the provision of an assured and growing demand. Given electrification, this form of power may supersede others for the operation of irrigation and water supply systems, but the Chamber regards it as unlikely that internal combustion engines

operating irrigation pumps will be ousted in isolated areas.

On the basis of the foregoing considerations the Chamber recommends United Kingdom manufacturers to take advantage of post-war re-equipment and building in Egypt to make up the leeway gained by their Continental competitors (presumably Swiss and Swedish). With this aim the Chamber sees the necessity for educating dealers and users to the higher British standards of fittings and supplies in which Continental manufacturers have predominated, although care should be taken to ensure interchangeability where both types are installed side by side.

In spite of the present high prices charged for electricity, the Chamber states that there will undoubtedly be a growing demand for

domestic electrical appliances, such as refrigerators, fans and ventilation equipment, and air-conditioning will increase in popularity. Good prospects are foreseen for the radio industry, but the diversity of electricity supply calls for special attention.

On the subject of the purchasing power of the country generally, the Chamber points out that Egypt's wealth has considerably increased during the war, her finances are sound and she is within the sterling area. At the same time it records tendencies which no British business man can regard with equanimity. These include legislation detrimental to foreign traders and excessive protection of local industries. Among goods which have recently shown signs of expansion are accumulators, batteries, lamps, plastic and porcelain fittings and electrical accessories.

## Activities in Southern Rhodesia

### Construction Schemes Delayed

**M**INING operations provide the bulk of the load of the Electricity Supply Commission of Southern Rhodesia. In the year ended March 31st last the total mining consumption was 88.8 million kWh, a decrease of 2.7 per cent. on the previous year. Increased supplies to other industries, municipalities and rural consumers, however, maintained the Commission's aggregate sales (112.2 million kWh) at the level of the preceding year.

Anxiety regarding the position of the gold mining industry, referred to in the previous three reports, has not lessened and every effort is being made to extend the Commission's supply systems to areas and individual mines jeopardised by the state of their own power units. Wherever possible the Commission has left in place distribution lines serving abandoned mines owing to the frequency with which they are reopened. While this practice adds to the cost of production of electricity to some extent, there is no doubt that it facilitates the operations of the mining industry. On the other hand, shortages of material may force a reconsideration of this policy and the basis on which supply is subsequently given to mines seeking re-connection after being abandoned and the service dismantled.

The volume of construction work in hand during the year under review was considerable. Delays in delivery of materials resulted in much generating, transmission and distributing plant and equipment remaining in various stages of completion instead of being placed in service during the year as had been anticipated. The bulk of these deliveries are now completed, and much of the equipment was brought into service after the close of the year under review.

The year has been notable for the widespread interest in electricity supplies among communities not yet served. Many of these are remote and widely dispersed within their districts. Shortage of materials and man-power is temporarily limiting expansion of rural connections in areas already served, and while this condition lasts preference must be given to immediate productive uses of electricity. Investigation of areas not yet supplied has recently been carried out, and in some of them the construction of distribution systems will be started immediately

conditions permit. Among these may be mentioned the Mafungabusi and Lower Gwelo gold belts, Umgusa Valley rural area, and the extension of the Umtali system through Inyazura to Rusapi. The Bellingwe and Fort Victoria districts were being connected to the Shabani system at the close of the year.

No additions to the generating plant of Gwanda station were made during the year and its installed capacity remained at 5,000 kW. Owing to losses by enemy action, delays were experienced in the installation of the third generating unit of 2,500 kW and boiler unit of 30,000/35,000 lb. of steam per hour evaporative capacity.

The total revenue of the Commission last year was £374,451 (against £370,113) and there was a net surplus of £11,864 (£2,439), of which £6,000 is to be refunded to consumers in the Umtali and Gwelo undertakings. The average price received per kWh sold (including sundry revenue) increased from 0.792d. to 0.801d., while the cost fell from 0.786d. to 0.775d. In the Commission's own generating stations 75,003 short tons of coal was consumed, the cost (£76,546) being equal to 0.202d. per kWh sold.

### Peruvian Electrical Plans

**T**HE Peruvian Congress has approved a Bill for the annual appropriation of 13,000,000 soles (£500,000) to be spent on financing the work of the Corporacion del Santa, the Government agency in charge of the industrialisation programme in the Chimbote Bay-Santa River region. A million soles per annum has been earmarked for engineering studies and surveys necessary for one of the largest national electrification programmes in South America, now being drawn up by the company's engineers in Lima. Work would be carried out over a period of from ten to twenty years. It is planned to complete the Canon del Pato hydro-electric plant and to construct in the future, several great hydro-electric plants in other parts of the country in order to provide cheap power sources for industrial development.—*Reuter's Trade Service.*

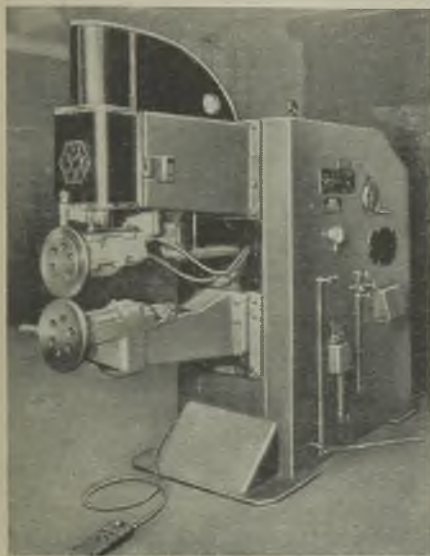
# RECENT INTRODUCTIONS

## Notes on New Electrical and Allied Products

### Roller Spot-Welder

**T**HE number of spot welds that can be made in a given time is not generally limited by the speed of the machine, but by the rate at which the operators can index the components through the machine, particularly the large component parts of some types of aircraft.

To increase the overall speed of welding and render it as completely automatic as possible by reducing the physical effort required of



Roller spot-welding machine

the operator, the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, has developed a roller machine for spot-welding aluminium alloys normally used in the construction of aircraft. The object to be welded is fed through two large-diameter electrode wheels, the pitch of the spots being determined automatically. The operator merely guides the work through the machine and, since adjacent spots are made with different parts of the electrode wheel circumference, electrode cleaning is reduced to the minimum.

The machine has been designed to spot-weld joints on flat and slightly curved sheets of aluminium alloys up to and including 16 gauge. The spot pitch can be varied from  $1\frac{1}{2}$  in. downwards in steps of  $\frac{1}{8}$  in. Speeds of 24 up to 144 spots per min. are obtainable, so that with a spot pitch of 1 in. the linear welding speed is 2 to 12 ft. per min., which is very much in excess of what can be obtained with the conventional machine on production work. The throat depth is 36 in. so that sheets up to 6 ft. in width can be welded.

Energy is supplied by a single-phase, 400-kVA, water-cooled transformer mounted in the fabricated steel frame. Tappings on the primary winding enable a wide range of values of current to be selected by means of switches mounted on the right-hand side of the frame. The time during which the welding current flows is controlled by an ignitron control panel making it possible to vary the welding time up to 24 cycles in 1 cycle steps.

The welding pressure is applied to the work by the top electrode wheel. Its bearing housing is connected by an accurately machined rectangular slide to the piston of a double-acting air cylinder mounted on the fabricated steel top bracket of the machine. The air control switch makes it possible to obtain either a single constant-pressure or double-pressure cycle. In the latter case the welding pressure is followed immediately by a forging (upset) pressure, its value being twice that of the initial welding pressure, which is adjustable by means of a reducing valve and indicated by a gauge on the top arm of the machine.

The electrode wheels are stationary while the welding current is actually flowing and they turn, so moving the work, only during the time between welds. The drive is to the bottom electrode only; the top wheel is free. By varying the throw of eccentric gearing any spot pitch can be obtained within the range specified. By means of the 3 to 1 variable speed drive and the two-speed motor a linear welding speed range of 6 to 1 is provided.

An additional feature of the drive allows for adjustment of the edge distance up to one complete spot pitch, meaning the distance between the point at which the electrode wheel first touches the work and the position of the first spot weld in a joint. The value is selected by means of a small control knob on the frame.

For cooling the transformer and both top and bottom electrode shafts and wheels, the flow of water in each circuit is controllable by individual valves with visual indication. When welding small assemblies foot control is generally used, while for long continuous joints hand operation is often preferable.

The large-diameter electrode wheels are provided with spring-loaded adjustable brushes which keep their welding surface clean and polished.

### Arc-Suppression Coils

Arc-suppression coils for the protection of overhead power lines against earth faults are now being made to an improved design which has been patented by the HACKBRIDGE ELECTRIC CONSTRUCTION CO., LTD., Hersham, Walton-on-Thames, Surrey.

In addition to the main untapped winding which is connected between earth and the neutral wire of the transmission line to be protected, there is on the same core a secondary winding tapped for loading by means of a reactor. Tuning of the coil to the line is done by means of an externally operated rotary switch, which varies the amount of the secondary winding connected to the loading reactor. A



separate potential winding and current transformer can be provided, if required, for operating relays and indicating devices, it being common practice to include, for example, a recording ammeter as associated equipment.

The working value of induction density in the core of an arc-suppression coil must be

of the regulating switch in loading the reactor across the correct proportion of the tapped secondary winding.

A number of these improved coils are in service in Great Britain, and engineers connected with their operation have expressed satisfaction with their superior characteristics.

### Lighting Bracket

An articulated bracket of the extensible arm type for industrial local lighting is one of the latest products of MERITUS (BARNET) LTD., Wood Street, Barnet, Herts. Its main feature is the knuckle joints, of the plate pattern incorporating three friction washers. The pressure on the joint is maintained by a self-locking nut and bolt which allow free movement of the arms and ensure that they are self-sustaining. The joints are claimed to be unaffected by moisture, oil, or machine suds. The wiring is completely enclosed. An independent switch may be built into the lampholder head, to which the shade is bolted solidly.



Local lighting bracket

The head and base can be rotated through 320 deg. The base, which may be attached to a bench or wall, is tapped for conduit connection; alternatively, when used for local lighting on machine-tools the base can be screwed directly on to the casing of a low-voltage transformer. The latter can be easily withdrawn from its case; it has an earthing screen between primary and secondary windings, double-pole fuses and a double-pole switch with a sunk dolly.

Dual-winding arc-suppression coil

near saturation value to avoid excessive voltages under certain operating conditions, but with ordinary coil tappings provided for tuning it is impossible to achieve this condition evenly over all tapping positions. This serious disadvantage is claimed to be overcome in the Hackbridge type which, while the main winding is rated to carry the full current, has a core so designed that saturation occurs at the minimum current, and this desired condition can be maintained for all current values by the operation

## Back to Civilian Life

### Crompton Parkinson's Plans for Service Men

**B**y the Reinstatement in Civil Employment Act employers are bound to take back into their service men and women who left them to join the Forces. But there may be a vast difference between taking back and welcoming back and we are therefore very pleased to have from Crompton Parkinson, Ltd., a little booklet which is being sent to all the company's men in the Services. Primarily this manifests the company's anxiety to reinstate employees in as good positions as possible quite apart from any idea of compulsion.

To enable this to be done the employee is given a brief survey of the probable post-war position, particularly in view of improved methods adopted during the war, and is shown that in order to "fit in" again comfortably he must contemplate a certain amount of re-training. Special attention is being given to this subject and appropriate courses will be arranged for various occupational groups. Coupled with this will be plans for enabling disabled men to find useful employment.

As regards remuneration, it is stated that the company's policy is to pay in addition to the usual nationally agreed rates a "compensatory

bonus" assessed according to the value of each man's extra individual effort. Returning employees will receive the national rate and until their bonuses can be arrived at they will be paid the average bonuses earned by men already doing similar jobs in the works. Any special skill or knowledge gained while in the Services may enable a man to be put into a more responsible post than his former one.

During the war Crompton Parkinson, Ltd., and its associates have expanded considerably and there will be hundreds of worthwhile interesting careers for enterprising people both at home and overseas. It is suggested that the company will do what it can with regard to possible housing problems.

At the end of the booklet is a confidential questionnaire for each recipient to complete. This asks for personal details, including qualifications and aspirations and the help of men's commanding officers is being sought in securing answers to the questions. If any former C.P. employee who reads these notes has not received a copy of the booklet he should ask for one from the Chief Personnel Officer, Crompton Parkinson, Ltd., Chelmsford.

# ELECTRICITY SUPPLY

## Cornish Extensions. Waste-Gas Station in Cumberland.

**Clitheroe.**—**FARM ELECTRIFICATION.**—The extension of electricity to Ribblesdale farms continues. Among schemes recently authorised is the provision of a supply to Loud Side farm, in the old-world village of Chipping.

**Consett (Co. Durham).**—**STANDARD TARIFF SOUGHT.**—The question of installing gas or electricity in council houses is being considered by the Urban District Council. It is stated that electricity charges in the Council area vary and it is intended to approach the supplying companies with a suggestion for bringing about a standard scale of charges.

**Cornwall.**—**ELECTRIC SUPPLY DEVELOPMENTS.**—The Cornwall Electric Power Co., in conjunction with Edmundsons Electricity Corporation, Ltd., has prepared an extensive construction programme for immediate and future extensions throughout the county. Part of the programme already in hand will involve the company in an expenditure of over half a million pounds. The new work includes new h.v. main transmission lines to the Camborne, Redruth, Newquay and Penzance area, together with the necessary transformer substations and additional h.v. switching facilities at Fraddon, the point where connection is made to the grid line of the Central Electricity Board. These new lines are intended to augment existing supplies to the towns they serve, and to provide a sufficient margin to deal with post-war demands, which are expected to be much bigger than at present.

In order to meet the increased demand that will be made upon the company's generation plant, the C.E.B. has given a direction for the installation of an additional 15,000 kW of new plant at Hayle. The design and construction of this new plant is being carried out by Edmundsons in collaboration with the Cornwall Electric Power Co.'s engineers. In designing the new plant the engineers have worked for the reduction of production costs by the economic use of fuel, coupled with greater continuity of plant service.

Plans for extension of the distribution system are under consideration as part of post-war schemes. They are designed to link up remote rural areas and bring into supply schemes as many farms and residents as practicable.

**Cumberland.**—**PROPOSED POWER STATION USING WASTE GASES.**—Ambitious post-war plans in which the electrical industry will play a major part are being prepared for West Cumberland, at one time a distressed area but now a priority area for industrial development.

At a Press conference at Whitehaven on January 9th, Alderman J. J. Adams, O.B.E., who has recently appointed Deputy Regional Controller of Cumberland, Westmorland and North Lancashire under the Board of Trade, said that the West Cumberland Industrial Development Co. and the Cumberland Development Co. have been in consultation with the Central Electricity Board and the United Steel Companies, who have a branch at Workington on the Cumberland coast, with the object of planning a large new power station in West

Cumberland. This would be fed with waste gases from the steelworks at Workington and save a large amount of raw fuel. The building of such a power station would have the effect of considerably cheapening electricity supplies in Cumberland and it would be able to meet the demands of industry.

**Dalkeith.**—**COST OF ELECTRIC COOKING.**—When the Town Council discussed the respective merits of gas and electricity for cooking appliances in new housing schemes a representative from the Lothians Electric Power Co. stated that consumers in Council houses used on the average 1,700 kWh per annum for cooking, costing about 4½d. a day.

**Eastbourne.**—**UNDERTAKING'S FINANCES.**—Reporting to the last meeting of the Town Council, Councillor G. P. Morgan Jones, deputy chairman of the Electricity Committee, surveyed the finances of the Electricity Department during five years of war. In each year since 1940 there had been a net loss and the reserves, which stood at £104,953 at the beginning of the war, had now been reduced to £51,903. Charges had been increased on two occasions, to the extent of 31·3 per cent. in all, but the Committee had done its best to avoid making those who had "stayed put" bear the extra costs arising from evacuation. The borough electrical engineer (Mr. N. Boydell) had made every effort to keep down controllable overhead expenses, but for which the losses would have been considerably greater. It was estimated that the balance for the current year would be on the right side. At the moment the undertaking was busy with the work of rehabilitation, and services all over the town were being reconnected.

**East Ham.**—**FURTHER CONCESSION.**—The 1943-44 accounts of the electricity undertaking submitted to the Council last week showed a credit balance of £14,438. Having considered a report by the electrical engineer and manager (Mr. G. W. Ablitt) the Electricity Committee recommended that prepayment charges should be reduced. Councillor Dixon (chairman) said that notwithstanding the appeal to use less fuel, consumption had risen by 1,700,000 kWh to 32,136,000 kWh. He recalled that last year the 20 per cent. surcharge was reduced to 10 per cent., and this concession had been in operation for six months.

**Lanarkshire.**—**OPERATION OF AGREEMENT WITH COMPANY.**—When the financial arrangements between Clyde Valley Electrical Power Co. and Lanark County Council were discussed by the Council on January 10th the convener explained that while the Council was a statutory authority for the supply of electricity, the company operated the Council's Orders. Under the agreement the Council was entitled to an equal share of the profits and a rent of 3 per cent. on the cost of cables after the original capital expenditure had been reimbursed by the company. It had been hoped that funds would thus be made available for the development of electricity in rural areas and, in particular, for supplies to farms. Unfortunately, there was

little hope of the Council's accumulating funds, for on the most favourable basis the accounts showed, on the profit-sharing arrangements, a loss for the year ended December 31st, 1942, of over £72,000. As the company was entitled to have the accumulations of the rent arrangements applied in the first instance to any losses under the profit-sharing agreement, there was very little hope of any extraneous fund being available for development for a long time to come. In the discussion which followed the appointment of a consulting engineer was suggested, and it was stated that this matter was being considered by the sub-committee.

**Lichfield.**—**SUPPLY TO WORKS.**—The Electricity Committee is to provide a supply to Concrete, Ltd., at proposed works in Dovehouse Fields at a cost of £3,500, the scheme taking into account future developments in the area.

**INCREASE WAIVED.**—Following its practice for some time past, the Electricity Committee recommends that the 10 per cent. wartime increase in charges shall not be applied for the December quarter.

**Northern Ireland.**—**FARMERS URGE RURAL ELECTRIFICATION.**—The opinion that the development of electricity in rural areas is one of the most urgent problems that require to be tackled immediately the war ends is expressed by the Ulster Farmers' Union in a memorandum submitted to the Government of Northern Ireland. Electricity, states the memorandum, is urgently required on the farm

in order to facilitate the mechanisation of farm work that will be essential if the agricultural industry, which is the basis of the whole economy of the country, is to maintain its position in the post-war world. It is equally essential in the houses of farmers, farm workers and other rural farm dwellers if the drift from the land to the towns is to be arrested.

The Union expresses the belief that by complete amalgamation of all undertakings in Northern Ireland a supply could be given to the farms and the countryside on an economic basis. It calls upon the Government to accept the principle that electricity should be provided to farms at the same charge as to urban consumers, and that the only capital cost to the farm user should be the wiring of his own premises and the provision or hire of his own equipment.

**Stockport.**—**MAINS EXTENSIONS.**—The Electricity Committee proposes to extend the electricity supply to two works, and is seeking sanction to borrow £10,290 for mains and services on the Bridge Hall Farm housing estate.

**COAL HANDLING PLANT.**—A new coal handling scheme for the electricity works is proposed.

**West Bromwich.**—**SERVICES FOR POST-WAR HOUSES.**—The Town Council has authorised application to the Electricity Commissioners in respect of the sum of £21,673 covering mains and substation equipment for three post-war housing estates.

## FINANCIAL SECTION

Company News. Stock Exchange Activities.

### Reports and Dividends

**E. K. Cole, Ltd.,** report an increase of £159,723 in trading profits to £423,124 for the year 1943-44. After providing for directors' fees, depreciation, taxation, the net balance is £138,165, an increase of £56,072. As already reported, the ordinary dividend has been raised from 15 to 20 per cent. General reserve again receives £50,000. The purchase of the capital of Ensign Lamps, Ltd., was completed during the year. In order to give full cover for the various businesses which the company has been carrying on and to provide for any future activities it is proposed to alter the company's objects.

**Radio Rentals, Ltd.,** announce that the trading profit for 1943-44 was £111,178 (against £112,658) and the net profit £23,232 (against £23,116). The ordinary dividend is maintained at 20 per cent. by a final payment of 15 per cent.

**British Industrial Plastics, Ltd.**—The report for the year to September 30th last shows a gross profit of £240,107 (against £327,852). The net profit, after providing for expenses, depreciation, research expenditure and taxation, was £21,705 (against £21,658). The dividend is maintained at 8 per cent.

**Wattford Electric & Manufacturing Co., Ltd.**—It is announced that the ordinary shareholders have taken up 94,100 of the new issue of 100,000 2s. ordinary shares and preference shareholders 18,135 of the 20,000 new 6 per cent. preference.

### New Companies

**Preformations, Ltd.**—Private company. Registered January 4th. Capital, £100,000. Objects: To carry on the business of manufacturers of, and dealers in, moulded goods, mouldings, moulded board, filling compounds, fire and acid proof materials, electrical and insulating goods, plastics, motor and radio accessories, etc. Directors: H. P. Bridge, Thetford Lodge, Thetford Road, New Malden, Surrey (director of De La Rue Plastics, Ltd.) and A. G. Clark, Boyles Court, Mascall Lane, Brentwood, director of Plessey Co., Ltd. Solicitors: Bristows, Cocke and Carpmal, E.C.

**Court & Cooke, Ltd.**—Private company. Registered January 8th. Capital, £2,000. Objects: To acquire the business of electrical contractors, refrigeration engineers and radio dealers carried on by Court Bros. (Electrical Contractors), Ltd., at 15, Butchery Lane, Canterbury. Directors: W. J. Court, 10, Cherry Garden Road, and R. A. B. Cooke, 2A, Westgate Grove, both Canterbury. Registered office: 15, Butchery Lane, Canterbury.

**Clapton Radio & Electrical Services, Ltd.**—Private company. Registered January 6th. Capital, £100. Objects: To carry on the business of wholesale and retail dealers in, and agents for, radio, television and electrical apparatus, etc. Subscribers: T. P. Way, 36, St. George's Square, S.W.1; and G. J. Balding, 42, Stamford Hill, N.16. Secretary: G. J. Balding. Registered office: 13, Northwold Road, N.16.



# SWITCH *and*

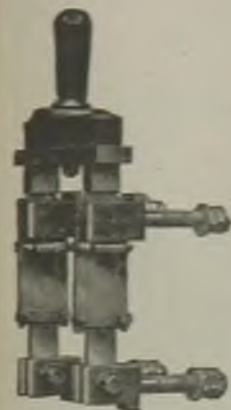
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**Southcombe & Willcocks, Ltd.**—Private company. Registered January 6th. Capital, £2,000. Objects: To acquire the business of electrical contractors carried on by C. P. Southcombe and M. S. Willcocks, at 3, Saltash Street, Plymouth, as Southcombe & Willcocks. The first directors are C. P. Southcombe, 20, Woodford Crescent, and M. S. Willcocks, 17, Lynwood Avenue, both Marsh Mill, Plymouth. Registered office: 3, Saltash Street, Plymouth.

**A. C. Ford, Ltd.**—Private company. Registered January 3rd. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, dynamos, motors, armatures, magnetos, batteries, cookers, glass, pottery, insulating materials, etc. Subscribers: F. Cox, Berrington Chambers, 93, Tottenhall Road, Wolverhampton; and Florence M. Jarvis, 22, Vincent Street, Wolverhampton. Registered office: Berrington Chambers, 93, Tottenhall Road, Wolverhampton.

**F. Bailey (Radio), Ltd.**—Private company. Registered January 6th. Capital, £1,000. Objects: To acquire the business of a radio and electrical engineer carried on by F. Bailey, at Radio House, High Street, Llangefni, Anglesey. Subscribers: June Jones, Pwll, and Gwelyn O. Jones, both of Four Mile Bridge, Holyhead. June Jones is the first director. Registered office: 17, Clwyd Street, Rhyl.

**Francis L. Bampton, Ltd.**—Private company. Registered January 4th. Capital, £4,000. Objects: To acquire the business carried on by F. L. Bampton at 7, Minshull Street, Manchester, and to carry on the business of electrical, wireless and general engineers, etc. Directors: F. L. Bampton, 5, Gladstone Grove, Heaton Moor, Stockport; and J. R. Cailey, 175, Kings Road, Old Trafford, Stretford. Registered office: 7, Minshull Street, Manchester, 1.

**Youngstown Products, Ltd.**—Private company. Registered December 28th. Capital, £100. Objects: To carry on the business of manufacturers of, and dealers in, kitchen equipment and refrigeration, electrical engineers, etc. Subscribers: C. R. Anderson, Little Yaldon, Northam, North Devon, and S. C. Coker, 73, Gorse Way, Romford, Essex. Registered office: 10, Bury Street, St. James's, London, S.W.1.

**H. Coursh & Sons (Koldaie), Ltd.**—Private company. Registered January 8th. Capital, £2,000. Objects: To carry on the business of refrigerating, air-conditioning and electric washing engineers, manufacturing research chemists, etc. Directors: H. Coursh, H. R. Coursh and H. L. Coursh, all of Bowholme Lane, Atwick. Registered office: Church Lane, Atwick, Driffield.

**A. C. Morrison (Engineers), Ltd.**—Private company. Registered January 6th. Capital, £15,000. Objects: To carry on the business of manufacturers of, and dealers in, electrically propelled vehicles, etc. Directors: A. C. Morrison, The Four Gables, Quorn, Leics; and J. Lilliman, Blenheim Mount, St. Ann's Hill, Nottingham. Registered office: 10, New Street, Leicester.

**Vocalax Co., Ltd.**—Private company. Registered January 4th. Capital, £1,000. Objects: To carry on the business of radio, television and electrical engineers and service men,

instructors, specialists in wireless and electrical correspondence courses, manufacturers of, and dealers in, instruments, etc. Directors: V. J. Harling, 56, Oakwood Crescent, Greenford; and J. Pegg, 5, Warrington Crescent, W.9. Registered office: 5, Warrington Crescent, W.9.

## Companies' Returns Statements of Capital

**British Electric Traction Co., Ltd.**—Capital, £2,998,397 15s. in £712,744 5s. cumulative participating preference stock, £1,326,263 10s. non-cumulative preferred ordinary stock, £790,752 deferred ordinary stock and 168,638 ordinary shares. Return dated July 7th, 1944. £2,829,759 15s. stock taken up. £2,046,007 15s. paid. £783,752 considered as paid. Mortgages and charges: £1,640,225 17s. 1d.

**B.E.T. Electricity Supply Co., Ltd.**—Capital, £750,000 in £1 shares. Return dated July 5th, 1944. 749,000 shares taken up. £440,388 paid. £308,612 considered as paid. Mortgages and charges: £352,493 3s. 2d.

**New System Private Telephones, Ltd.**—Capital, £20,000 in £1 shares (all ordinary). Return dated August 7th (filed November 25th). All shares taken up. £33,000 paid (including £15,000 premium). £2,000 considered as paid. Mortgages and charges: Nil.

**Brown & Co. (Electrical Engineers), Ltd.**—Capital, £5,000 in £1 shares. Return dated October 12th. 4,529 shares taken up. £12 paid. £4,517 considered as paid. Mortgages and charges: Nil.

**North Cheshire Electric Co., Ltd.**—Capital, £500 in £1 shares. Return dated October 17th (filed December 2nd). All shares taken up. £300 paid. £200 considered as paid. Mortgages and charges: Nil.

## Mortgages and Charges

**Dowsing Co. (Electrical Manufacturers), Ltd.**—Assignment of proceeds of contracts, dated December 16th, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

## Bankruptcies

**H. Savory**, electrical engineer, 7A, Hill Street, Shaw, Lancs.—Order made December 7th for debtor's discharge subject to his consenting to judgment being entered against him by the Official Receiver for £50 and £1 10s. costs, payable by instalments of £2 a month.

**E. C. Mould**, electrical retailer, trading as the Empire Electrical Co., 24, Westrow Gardens, Seven Kings, and lately at 28, Clements Road, Ilford, and The Facade, High Road, Goodmayes.—Proofs for dividends by January 23rd to the trustee, Mr. A. H. Ward, 42, Tavistock Square, London, W.C.1.

**G. S. Whiston**, 112, West Street, Crewe, electrical engineer.—Last day for proofs for dividend January 29th. Trustee, Mr. P. M. Milward, 12, Lonsdale Street, Stoke-on-Trent.

**W. Everingham**, 35, Quay Road, Bridlington, plumber and electrician.—Last day for proofs for dividend January 27th. Trustee, Mr. J. S. Snowball, Official Receiver, Bank Chambers, Scarborough.



## STOCKS AND SHARES

TUESDAY EVENING.

**W**HILE it cannot be said that Stock Exchange markets display any measure of general animation, it is noteworthy that prices continue to move mainly in favour of previous holders of shares. Notwithstanding the demands of the surtax gatherer, money in substantial volume is coming into the markets, more particularly those of the gilt-edged variety. Investment absorption of British Government securities lends to gilt-edged stocks a useful prop making for firmness, and this disposition is reflected in the high prices of front rank ordinary shares.

### Home Electricity Supply

The forthcoming rise in price of coal has so far affected not at all the shares in electricity supply companies. In bygone days such a considerable advance in the price of coal as is going to take place would have had an immediately depressing effect upon the prices of electricity supply shares, but examination of the list will show that prices are maintained at levels which afford a meagre return on the money. To mention a few shares on offer in this market, Yorkshire Electric at 43s. return £3 14s. 3d. and Lancashire Electric Light & Power at 37s. 3d. give  $4\frac{1}{2}$  per cent. In the London group, "Cities" at 30s. 6d. pay £3 12s. per cent. and Metropolitan at 43s. 6d. give £3 13s. 5d. County of London ordinary are up 1s. Midland Counties, Northampton and West Devons are all 6d. harder on the week.

### Manufacturing and Equipment

General Electrics have at length achieved £5 per share, at which the return is  $3\frac{1}{2}$  per cent. on the basis of the  $17\frac{1}{2}$  per cent. dividend paid for each of the past three years: Crompton Parkinson 5s. "A" ordinary shares are in steady request and at 34s. the yield is £3 6s. 3d. per cent. assuming maintenance of the dividend of  $22\frac{1}{2}$  per cent. paid for the year ended September 30th last. Aron Electricity Meter advanced its dividend to 15 per cent. for the year ended March 31st last and at 62s. 6d., at which 1,000 shares are obtainable in the market, the return comes to £4 16s. per cent. About 5,000 Newman Industries florin shares can be obtained at 7s.  $4\frac{1}{2}$ d., the yield in this case being £5 8s. 3d. on the 20 per cent. dividend paid by the company on its ordinary shares in each of the past four years.

### Miscellaneous Matters

International Combustion shares, which rose 5s. last week, have gained an equal amount, and now stand at £7. Dividend expectations are hopeful. Chloride Electrical Storage and De la Rue are good features.

Henley's are better at 28s. Callender's keep their advance at  $5\frac{1}{8}$ s, while British Insulated are  $\frac{1}{8}$ s easier at  $5\frac{1}{4}$ s. A number of rises include  $\frac{1}{8}$ s in Ericsson Telephones at 56s. 3d. and 1s. in Enfield Cables at 65s. Smaller gains have made Crabtrees 44s. 6d., Falk Stadelmann 35s., English Electric 57s., Laurence, Scott 14s. 3d. and Siemens 36s. 6d. Westinghouse Brakes, Murex, Hopkinsons, and Telegraph Construction & Maintenance are amongst others to make advances. On the other hand, Associated British Engineering have gone back to 53s. 9d. and Ever Ready to 43s. Shares in the heavy industries show a firm tendency: Babcock & Wilcox at 54s. 6d. are 6d. better. The cable section keeps firm. International Tel. & Tel. at 25 and Great Northern Telegraphs have again improved.

### Mather & Platt

Amongst the various industrial shares that come under the investor's review, Mather & Platt ordinary are naturally included and the price has recently advanced to 56s. 3d., at which the return on the money, on the basis of the last-paid dividend of 10 per cent., is a modest £3 11s. 2d. The present price is within a shilling or so of the highest touched since 1937, when it rose to over £3 a share. For that year and for 1938 the company paid  $13\frac{1}{2}$  per cent. From 1939 to 1944 inclusive, the annual dividend has been 10 per cent., with a special 1 per cent. in respect of 1942. The financial year ends with December. The company goes back over fifty years and some years ago entered into an agreement with the Food Machinery Corporation of California for the manufacture and sale of canning equipment.

### Brush Electrical

Shares in the electrical manufacturing and equipment companies are increasingly in demand and there is a corresponding diminution in the amount of stock available to the would-be purchaser. However, a line of 25,000 Brush Electrical Engineering ordinary shares came on offer at 11s.  $1\frac{1}{2}$ d. At this price (which compares with 8s. 6d. a year ago) the return is £4 0s. 9d. per cent., assuming last year's dividend of 9 per cent. to be repeated. The company paid an interim dividend of 4 per cent. against nil in the previous year. The dividend has been stepped up from 6 per cent. in 1941, the following year producing 8 per cent. and, as just mentioned, 9 per cent. in 1943. Hopefulness looks for a possible 10 per cent. in respect of the current year.

### E. K. Cole

Radio issues retain their hold upon popular imagination and there is a lively business going on in the shares. Attention

(Continued on page 112)

# ELECTRICAL INVESTMENTS

## Prices, Dividends and Yields

Company	Dividend		Middle Price Jan. 16	Rise or Fall	Yield p.c.	Company	Dividend		Middle Price Jan. 16	Rise or Fall	Yield p.c.
	Pre-vious	Last					Pre-vious	Last			
Home Electricity Ordinary						Equipment and Manufacturing					
Bournemouth and Poole	12½	12½	62/6		£ s. d. 4 0 0	Aron Elec. Ord.	10	15	61/-		4 18 4
British Power and Light	7	7	33/-		4 4 10	Assoc. Brit. Eng.	6	7	53/9	+ ¼	2 12 0
City of London	7	5½	30/-		3 13 4	Assoc. Elec. :					
Clyde Valley	8	8	42/-		3 16 0	Ord. . . . .	10	10	58/-		3 9 0
County of London	8	8	44/-	+ 1/-	3 12 9	Pref. . . . .	8	8	40/-		4 0 0
Edmundsons	6	6	31/3	- 9d.	3 17 0	Automatic Tel. & El.	12½	12½	67/6		3 14 0
Elec. Dis. Yorkshire	9	9	45/6		3 19 6	Babcock & Wilcox	11	11	54/6	+ 6d.	4 0 9
Elec. Fin. and Securities	12½	13½	60/6		4 9 0	British Aluminium	10	10	46/-		4 7 0
Elec. Supply Corporation	10	10	50/6		3 18 6	British Insul. Ord.	20	20	5½	- ¼	3 9 9
Lancs. Light and Power	7½	7½	37/-		4 1 1	British Thermostat (5/-)	18½	18½	21/3		4 7 0
Llanely Elec.	6	6	26/6		4 10 7	British Vac. Cleaner (5/-)	30	30	32/6		4 12 3
London Assoc. Electric	3	4	26/-		3 1 6	Brush Ord. (5/-)	8	9	11/-		4 1 9
London Electric	6	6	30/6		3 18 8	Burco (5/-)	15	15	15/9		4 15 3
Metropolitan E.S.	8	8	43/6	+ 6d.	3 13 5	Callender's	15	20	5½		3 8 9
Midland Counties	8	8	41/6		3 17 0	Chloride Elec. Storage	15	15	87/6	+ ½	3 18 7
Mid. Elec. Power	9	9	44/6	+ 6d.	4 1 0	Christy Bros.	12½	17½	80/-		4 7 6
Newcastle Elec.	7	7	32/-		4 7 6	Cole, E. K. (5/-)	15	20	42/6	+ ¼	2 7 0
North Eastern Elec.	7	7	34/6		4 1 2	Consolidated Signal	24	27½	6½		4 1 6
Northampton	10	10	50/6	+ 6d.	3 19 4	Cossor, A. C. (5/-)	7½*	10*	32/6	- 6d.	1 10 4
Northmet Power	7	7	41/-		3 8 4	Crabtree (10/-)	17½	17½	44/6	+ 6d.	3 18 7
Richmond Elec.	6	6	26/-		4 12 4	Crompton Parkinson Ord. (5/-)	20	22½	34/-	+ 6d.	3 6 3
Scottish Power	8	8	40/6		3 19 0	De La Rue	35	40	9½	+ ½	4 1 8
Southern Areas	5	5	23/-		4 7 0	E.M.I. (10/-)	6	8	37/-		2 3 3
South London	7	7	30/-		4 13 4	Elec. Construction	10	12½	61/3		4 1 8
West Devon	5	5	24/6	+ 6d.	4 1 8	Enfield Cable Ord.	12½	12½	65/-	+ 1/-	3 17 0
West Glos.	4½	3½	25/-		2 16 0	English Electric	10	10	57/-	+ 6d.	3 10 2
Yorkshire Elec.	8	8	43/-		3 14 5	Ensign Lamps (5/-)	25	15	21/3		3 10 8
Public Boards						Ericsson Tel. (5/-)	22*	20*	56/3	+ ¼	1 15 6
Central Electricity 1955-75	5	5	115		4 7 0	Ever Ready (5/-)	40	40	43/-	- 9d.	4 13 4
1951-73	4½	4½	106		4 5 0	Falk Stadelmann	7½	7½	35/-	+ 6d.	4 5 9
1963-93	3½	3½	105	+ 1	3 6 8	Ferranti Pref.	7	7	31/9		4 8 2
1974-94	3½	3½	101	+ ½	3 4 4	G.E.C. :					
London Elec. Trans.	2½	2½	98		2 11 0	Pref. . . . .	6½	6½	34/-		3 16 4
London & Home Counties 1955-75	4½	4½	111	- 1	4 1 1	Ord. . . . .	17½	17½	100/-	+ 1/6	3 10 0
London Pass. Trans. Bd.						General Cable (5/-)	15	15	17/-		4 8 3
A	4½	4½	121½		3 14 1	Greenwood & Batley	15	15	48/9		6 3 0
B	5	5	122½		4 1 8	Hall Telephone (10/-)	12½	12½	31/6		3 19 4
G	3	3½	69		4 14 2	Henley's (5/-)	20	20	28/-	+ 3d.	3 11 5
West Midlands						4½% Pref.	4½	4½	24/-		3 15 0
J.E.A. 1948-68	5	5	106½		4 14 0	Hopkinsons	15	17½	75/9	+ 2/-	4 12 7
Overseas Electricity Companies						India Rubber Pref.	5½	5½	23/-		4 14 9
Atlas Elec.	Nil	Nil	6/9	- 3d.	—	Intl. Combustion	30	30	7	+ ½	4 5 9
Calcutta Elec.	6*	6*	48/-	+ 1/6	2 10 0	Johnson & Phillips	15	15	79/-		3 15 9
Cawnpore Elec.	10	7	41/3		3 7 9	Lancashire Dynamo	22½	22½	100/-		4 10 0
East African Power	7	7	35/6	+ 6d.	3 19 0	Laurence, Scott (5/-)	12½	12½	14/3	+ 3d.	4 8 6
Jerusalem Elec.	7	5	29/-		3 9 0	London Elec. Wire	7½	7½	38/-		2 19 0
Kalgoorlie (10/-)	5	5	10/6		4 15 3	Mather & Platt	10	10	56/3		3 11 2
Madras Elec.	Nil	4	30/6		2 12 4	Metal Industries (B)	8	8½	49/-		3 9 6
Montreal Power	1½	1½	25½		—	Met. Elec. Cable Pref.	5½	5½	21/3		5 8 6
Nigerian Elec.	8	10	37/6	+ 6d.	5 6 8	Mid. Elec. Mfg.	25	25	7½		3 9 10
Palestine Elec. "A"	5*	5*	38/-	- 6d.	2 12 8	Murex	20	20	5½	+ ¼	3 18 0
Perak Hydro-elec.	6	7	12/6		—	Newman Ind. (2/-)	20	20	7/3		5 10 0
Tokyo Elec. 6%	6	6	21½	- 2½	—	Philco (2/-)	—	—	16/-	+ 1/-	—
Victoria Falls Power	15	15	90/-		3 7 7	Power Securities	6	6	29/6		4 1 4
Whitehall Inv. Pref.	—	6	26/-		4 12 4	Pye Deferred (5/-)	25	25	33/9		3 14 0
						Ransome & Marles	20	20	87/6		4 11 4
						Revo (10/-)	17½	17½	44/6		3 18 7
						Reynolds	12½	12½	72/6		3 9 0

(Continued on next page)

(Continued on next page)

\* Dividends are paid free of Income Tax.

Company	Dividend		Middle Price Jan. 16	Rise or Fall	Yield p.c.	Company	Dividend		Middle Price Jan. 16	Rise or Fall	Yield p.c.
	Pre-vious	Last					Pre-vious	Last			
<b>Equipment and Manufacturing (Continued)</b>											
					£ s. d.						£ s. d.
Siemens Ord. . .	7½	7½	36/6	+6d.	4 2 2	Cape Elec. Trams	5	6	26/-	..	4 12 4
Strand Elec. (5/-)	10	12½	11/6	..	5 8 8	Lancs. Transport	10	10	47/6	..	4 4 3
Switchgear & Cow-ans (5/-)	20	20	20/9	..	4 16 7	Southern Rly. : 5% Prefd.	5	5	79	+1	6 6 7
T.C.C. (10/-) . .	5	7½	25/-	..	3 0 0	5% Pref.	5	5	119½	+½	4 3 8
T.C. & M. . . . .	10	10	57/-	+1/-	3 10 2	T. Tilling	10	10	62/-	..	3 4 6
Telephone Mfg. (5/-)	9	9	12/-	..	3 15 0	West Riding	10	10	47/6	..	4 4 2
Thorn Elec. (5/-)	20	20	28/9	..	3 9 6	<b>Telegraph and Telephone</b>					
Tube Investments	20	22½	5½	..	4 0 1	Anglo-Am. Tel. :					
Vactric (5/-) . .	Nil	22½	17/6	..	6 8 6	Pref. . . . .	6	6	125	+½	4 16 0
Veritys (5/-) . .	7½	7½	9/-	..	4 3 4	Def. . . . .	1½	1½	31	+1	4 16 9
Walsall Conduits (4/-)	55	55	52/6	..	4 3 10	Anglo-Portuguese	8	8	29/6	..	5 8 6
Ward & Goldstone (5/-) . . . . .	20	20	30/-	..	3 6 8	Cable & Wireless :					
Westinghouse Brake	12½	14	76/-	+1/-	3 13 8	5½% Pref. . . .	5½	5½	118	..	4 13 3
West, Allen (5/-)	7½	7½	8/9	..	4 5 9	Ord. . . . .	4	4	85	..	4 14 2
<b>Traction and Transport</b>						Canadian Marconi	1 Nil	4cts.	9/6	..	—
Anglo-Arg. Trans. :						Globe Tel. & Tel. :					
First Pref. (£5)	Nil	Nil	2/6	..	—	Ord. . . . .	8½*	5*	42/6xd	..	2 7 1
4% Inc. . . . .	Nil	Nil	6½	..	—	Pref. . . . .	6	6	31/-xd	..	3 17 5
Brit. Elec. Traction :						Great Northern Tel. (£10)	Nil	Nil	28½	+½	—
Def. Ord. . . . .	45	45	1200	..	3 15 0	Inter. Tel. & Tel. :	Nil	Nil	25	+1	—
Pref. Ord. . . . .	8	8	190	..	4 4 3	Marconi-Marine . .	7½	7½	35/6	..	4 4 6
Bristol Trams . .	10	10	57/-	..	3 10 2	Oriental Tel. Ord.	18	10	49/-	+1/-	—
Brazil Traction . .	1½	2	26½	..	7 9 6	Telephone Props.	Nil	6	20/-	..	6 0 0
Calcutta Trams	6½	7½	64/6	+2/-	2 6 6	Tele. Rentals (5/-)	10	10	12/3	..	4 1 8

\* Dividends are paid free of Income Tax.

**Stocks and Shares (Continued from page 110)**

has been quickened by the publication of the full E. K. Cole report. For the company's profit to expand by no less than £159,723, within twelve months, shows remarkable progress, and served to raise the price by 3s. 9d. to 42s. 6d. The energy with which the company is managed finds reflection in the proposal to widen the scope of its operations. The dividend recently declared made 20 per cent. against 15 per cent. in the previous year and although the yield on the money at the present price is less than 2½ per cent., optimism looks for a greatly increased distribution when the company is able to go ahead after the war. At 2½ the price is 16s. 3d. higher than it was a year ago. Cossor reacted 1s. to 32s. before rallying to 32s. 6d. Philco at 16s. are 1s. to the good.

**Calcutta Electric**

Excitement has evaporated from the market in Calcutta Electric Tramways shares. Pending some fresh development, the price recovered a florin to 64s. 6d. More activity is shown by the price of Calcutta Electric Supply ordinary shares, to which attention has been directed by reason of the statement that the Calcutta Corporation may exercise its right to acquire a large part of the company's undertaking in 1948. The company paid dividends of 7 per cent., tax free, for the two years prior to the threatened invasion of

India by Japan. As a result of the Japanese threat, the dividend was cut to 6 per cent. net, and the price of the shares went back to 22s. 6d. Of late, there has been a certain amount of support lent to the shares by Indian sources, and there is talk of a possible return to the 7 per cent. net dividend paid for 1940 and 1941. At 48s., the shares return, on the 6 per cent., tax free, dividend now being paid, a yield of 2½ per cent. net, equal, of course, to 5 per cent. with tax at 10s. in the £. The Government of Bengal has the right to take over the company's undertaking in the year 1958. It looks, however, as though the Calcutta Corporation intends to step in first.

**Overseas Securities**

In the New York Stock Exchange, a view that the war may possibly last longer than had been previously expected, led to a bout of buying of industrial shares, on the ground that further inflation is probable. The result has been a fairly general improvement in American and Canadian dollar securities of all kinds. Shares in the utility companies have participated in the improvement that occurred throughout the list as a whole. Montreal Light, Heat & Power shares hold their previous rise to 25½. Amongst other overseas issues, Tokyo Electric sixes have lost 2½, at 21½. East African Power & Nigerian Electrics are 6d. better in each case. Palestine Electrics at 38s. have lost 6d.



# NEW PATENTS

## Electrical Specifications Recently Published

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2*

**ADEL** Precision Products Corporation.—“Supporting clip for wires.” 8675/43. July 6th, 1942. (566393.)

Allmänna Svenska Elektriska Aktiebolaget.—“Resistance element for pyrometers.” 13255/43. August 21st, 1942. (566448.)

A. M. Armour and Metropolitan-Vickers Electrical Co., Ltd.—“Magnetic field indication means.” 12141. July 26th, 1943. (566430.)

C. J. Beaver, E. L. Davey, J. H. Pirie and W. T. Glover & Co., Ltd.—“Construction and arrangement of insulating sleeves and bushings for electric conductors.” 11301. July 12th, 1943. (566425.) “High voltage electric cable terminations and joints.” 11302. July 12th, 1943. (566426.)

British Thomson-Houston Co., Ltd.—“Washing machines.” 5842/42. April 30th, 1941. (566372.)

British Thomson-Houston Co., Ltd., and H. C. Hastings.—“Control systems for electrically-driven cranes, hoists or the like.” 11925. July 22nd, 1943. (566404.)

Callender's Cable & Construction Co., Ltd., G. D. S. MacLellan and A. Cameron.—“Drawing of wire and apparatus therefor.” 12728. August 6th, 1943. (566434.)

Creed & Co., Ltd., and A. E. Thompson.—“Telegraph apparatus.” 9708. June 16th, 1943. (Addition to 553680.) (566368.)

Dorman & Smith, Ltd., and T. Atherton.—“Electrical connector plugs.” 4683. March 23rd, 1943. (566384.)

Electroflo Meters Co., Ltd., and C. W. Couling.—“Construction of magnetic units.” 9088. June 7th, 1943. (566365.)

Electroflo Meters Co., Ltd., and W. R. Goff.—“Devices or instruments for measuring, or for compensating for variations in, fluid pressures.” 8212. May 24th, 1943. (566361.)

English Electric Co., Ltd., and P. W. Sewer.—“Automatic speed limiting device for hydraulic turbine rotors.” 13742. August 23rd, 1943. (566464.)

L. C. Farlow.—“Light projectors.” Cognate applications 7199/43 and 19559/43. May 6th, 1943. (566357.)

G. R. Fountain, Ltd., H. J. Houlgate and G. C. Wheeler.—“Loudspeakers and loudspeaker horns.” 9944. June 21st, 1943. (566398.)

A. J. Gunn and Dowsing Co. (Electrical Manufacturers), Ltd.—“Dish- and like washing machines.” 15715. September 24th, 1943. (566489.)

Marconi's Wireless Telegraph Co., Ltd.—“Televison transmitting systems.” 12134/43. July 27th, 1942. (566429.)

National Lead Co.—“Storage batteries of the lead-acid type and battery plates therefor.” 4125/43. March 19th, 1942. (566383.)

Radio Corporation of America.—“Sound

recording.” 7102/43. May 29th, 1942. (566356.)

B. V. Rollin.—“Electrical apparatus for the measurement of pressure in vacuum systems.” 14086. August 28th, 1943. (566470.)

Sangamo Weston, Ltd.—“Electrical measuring instruments for giving remote indication of quantities or measurements.” 13326/43. February 18th, 1942. (566449.)

Siemens Bros. & Co., Ltd., and D. A. Christian.—“Searching arrangements in telephone systems.” 13187. August 13th, 1943. (566445.)

Simonds Development Corporation, Ltd. (Liquidometer Corporation).—“Electrical indicating or telemetering system.” 13850. August 25th, 1943. (566466.)

Standard Telephones & Cables, Ltd.—“Power tube structure.” 8996/43. June 6th, 1942. (566364.) “Frequency multipliers.” 13800/43. October 27th, 1942. (566465.)

Sulzer Frères Soc. Anon.—“Rotors for turbo-machinery.” Cognate applications 10030/43 and 10031/43. July 10th, 1942. (566417.)

Telephone Manufacturing Co., Ltd., S. J. Smith and R. G. St. Terry.—“Apparatus for indicating the end of a predetermined time period.” 17020. November 30th, 1942. (566345.)

E. A. J. Tunnicliffe.—“Wireless signalling apparatus particularly intended for sending distress signals from lifeboats.” 9686. June 16th, 1943. (566396.)

Venner Time Switches, Ltd., W. F. Horgan and W. E. Brook.—“Induction electrical instruments.” 11924. July 22nd, 1943. (566428.)

E. J. W. Watkinson.—“Radiological and X-ray apparatus.” 8053. May 20th, 1943. (566391.)

W. Watson.—“Radiographic apparatus.” 14450. September 3rd, 1943. (566479.)

Westinghouse Brake & Signal Co., Ltd., and J. P. Coley.—“Code transmitters for railway signalling systems and the like.” 13650. August 21st, 1943. (566408.)

## TRADE MARK APPLICATION

**A**PPPLICATION has been made for the following trade mark. Objections may be entered within one month from January 10th:—

**PYE TELECOMMUNICATIONS, CAMBRIDGE, ENGLAND** (design). Class 9, No. 629175. Radio apparatus and parts thereof; gramophone pick-ups, microphones, amplifiers, and loud speakers, all for use in the electrical reproduction of sound; television apparatus and parts thereof; electric oscillation generators; electric batteries and accumulators; all the said goods being telecommunication instruments and apparatus or parts thereof not included in other classes.—Pye, Ltd., Radio Works, Cambridge. To be associated with No. 613,073 (3351) ix and others.

# CONTRACT INFORMATION

## Accepted Tenders and Prospective Electrical Work

### Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

**Bootle.**—January 27th. Town Council. Electric lamps (Form No. 14), for six or twelve months from April 1st, 1945. Forms of tender from the borough engineer, Town Hall.

**Eston.**—January 29th. Urban District Council. Kiosk substation, with 300-kVA transformer and switchgear; also cable. (See this issue.)

**Eire.**—**GALWAY.**—February 1st. County Council. Electrical installation at nurses' home extension, Central Hospital, Galway. Plans, etc., from J. P. Tierney & Co., 44, Kildare Street, Dublin.

**Gellygaer.**—February 3rd. Electricity Department. Indoor and outdoor transformers, kiosk complete with switchgear and accessories, e.h.v. and l.v. cable, overhead line equipment, wood poles. (January 12th.)

**Leeds.**—January 22nd. Housing Committee. Maintenance repairs in several trades, including that of electrician, over a period of six months ending September 30th. Particulars and forms of tender (5s. per trade) from R. A. H. Livett, housing director, Priestley House, Quarry Hill, Leeds, 9.

**Stirling.**—County Council. Tenders are invited in connection with the advance preparation of housing sites, electricity services, etc. Schedules from County Architect, Spittal Street, Stirling (£1 1s.).

**West Lothian.**—County Council. Completion of 42 houses at Winchburgh (electrical work). County Clerk, County Buildings, Liplithgow.

### Orders Placed

**Blackpool.**—Cleansing Committee. Accepted. Three batteries for cleansing vehicles.—D. P. Batteries.

**Bradford.**—Electricity Committee. Recommended. Coal-handling plant.—International Combustion.

**Manchester.**—Health Committee. Accepted. Two electrically heated and insulated hot-food conveyors.—Frank V. Magrini.

**Northumberland.**—Education Committee. Accepted. Installation of electrical services at canteens: Amble—I. & E. Morton, Alnwick; Haunley—Gray Bros., Ltd., Newcastle-on-Tyne.

**Scunthorpe.**—Electricity Committee. Recommended. 33-kV outdoor switchgear (£6,540).—Ferguson, Pailin.

**Sheffield.**—Health Committee. Accepted. Electric range for hospital (£78).—Simplex Electric Co.

**South Shields.**—Town Council. Accepted. Electrical accessories.—Gledson & Co., G.E.C., Adamson Co., British Electrical & Manufacturing Co., Siemens Electric Lamps & Supplies, and B.T.H. Co.

### Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

**Bradford.**—Works additions, Hollinwood Lane; Field, Son & Co., Ltd.  
Additions, Myers Lane.—Coldstart Petroleum Products, Ltd.

**Brighouse.**—Works additions; G. Turner & Co., Ltd., worsted spinners, Owlcr Ings Mills.

**Devizes.**—Pump house (£2,286); W. E. Chivers & Sons, Ltd., contractors, Devizes.

**Greenock.**—Reconstruction of X-ray department of Royal Infirmary; medical superintendent.

**Hebburn-on-Tyne.**—New extensions on football field site for the Pyrotex Co., Ltd.; R. W. Gregory & Partner, architects, Pilgrim House, Newcastle-on-Tyne.

**Hyde.**—Additions to factory; Slack Mills, Ltd., cotton spinners, Hyde, Cheshire.

**Lichfield.**—Instrument assembly room, Greenhoughs Road; John Harris (Coventry), Ltd.

**Maidenhead.**—Bus station, Bridge Road; Thames Valley Traction Co., Ltd., Thorn Street, Reading.

**Mansfield.**—Extensions at General Hospital (£50,000); A. W. Chadburn, chairman, General Hospital Finance Committee.

**Middlesex.**—Adaptations at private residence for institution for chronic cases, staff, etc. (£7,961); county architect.

**Northern Etchells.**—Works extensions, Bradnor Road; J. H. Sellers & Son, architects, 78, King Street, Manchester, 2.

**Nuneaton.**—Municipal maternity home; borough surveyor, Council House, Cotton Road.

**Rochester.**—Industrial premises adjoining Temple Manor; Lister Bros., laundry engineers, Nightingale Vale, Woolwich, S.E.18.

**Sheffield.**—Proposed sanatorium (£520,000); W. G. Davies, city architect, Town Hall.

**Stockport.**—Works extensions; G. Durrant & Sons, Ltd., Bury Street, Lancashire Hill.

**Stroud.**—Crematorium; surveyor, Rural Council Offices, John Street, Stroud, Glos.

**Surrey.**—Boarding and camp schools, Otter-shaw; county architect, Kingston-on-Thames.

**Sunderland.**—Furniture factory, Villiers Street, for Ditchburn, Ltd., and bakery, Mainsforth Terrace, for T. A. Scott; Matkin & Hawkins, architects, Fawcett Street, Sunderland.

New players' machine shops; W. Doxford & Sons, shipbuilders.

**Wallasey.**—Rebuilding home, Manor Road (£8,000), for Manor Lodge Committee; Rees & Holt, architects, Rodney Street, Liverpool.

**Wallsend.**—Additions to premises in Stephenson Street for Cookson's Lead & Antimony Co., Ltd.; company's own architect.

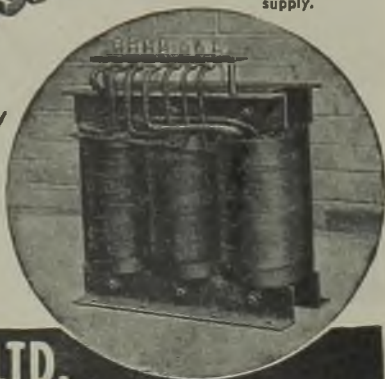


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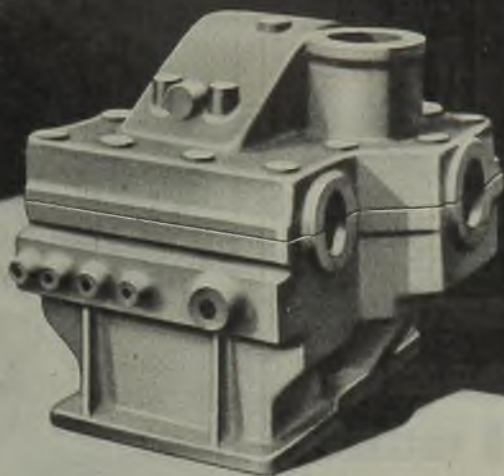
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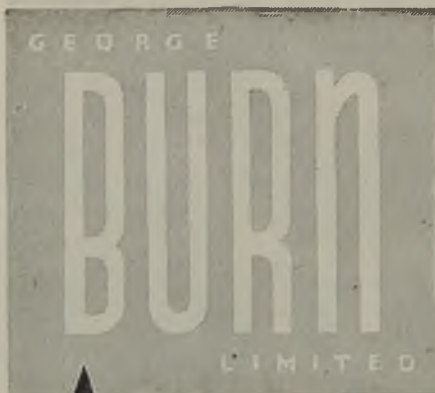
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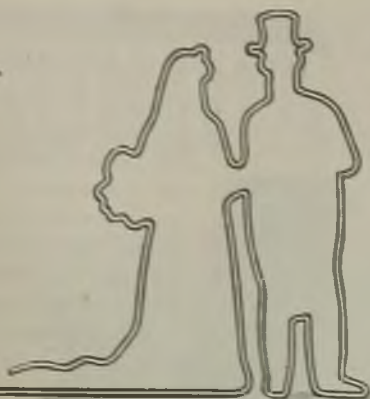
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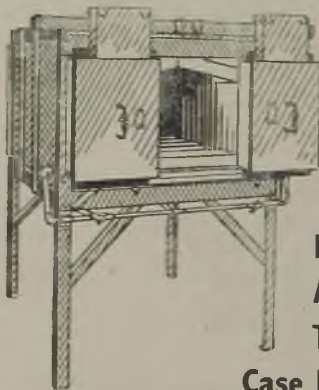


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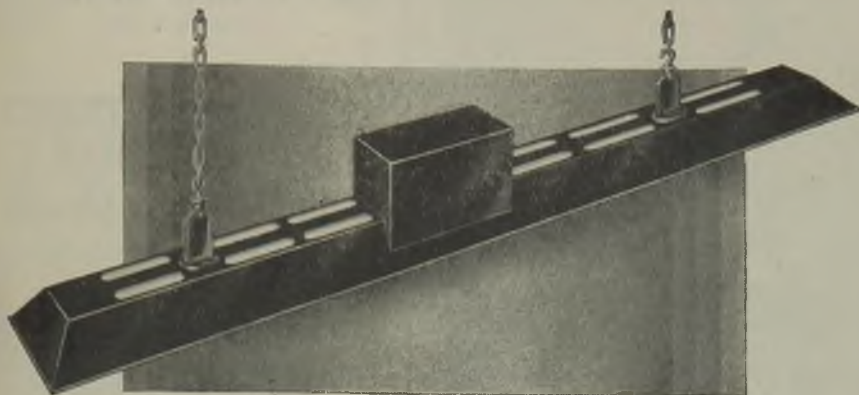
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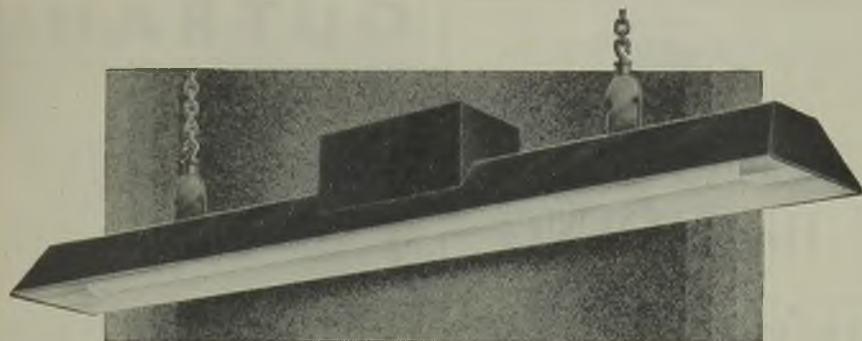
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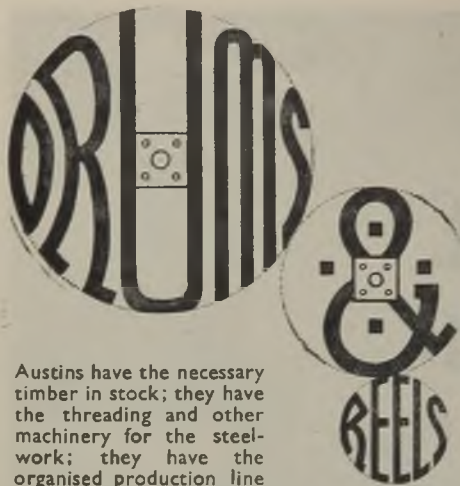


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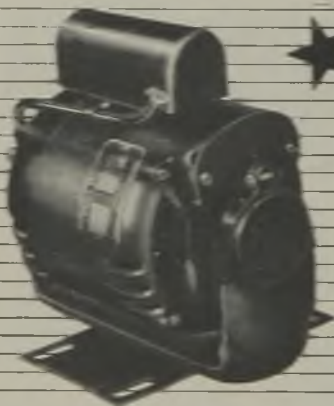


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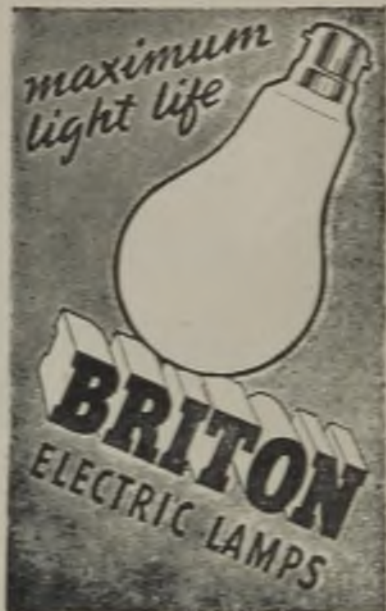
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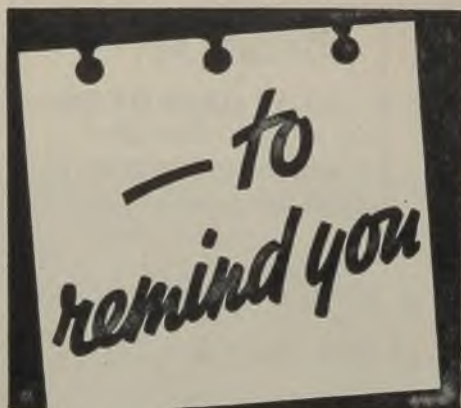


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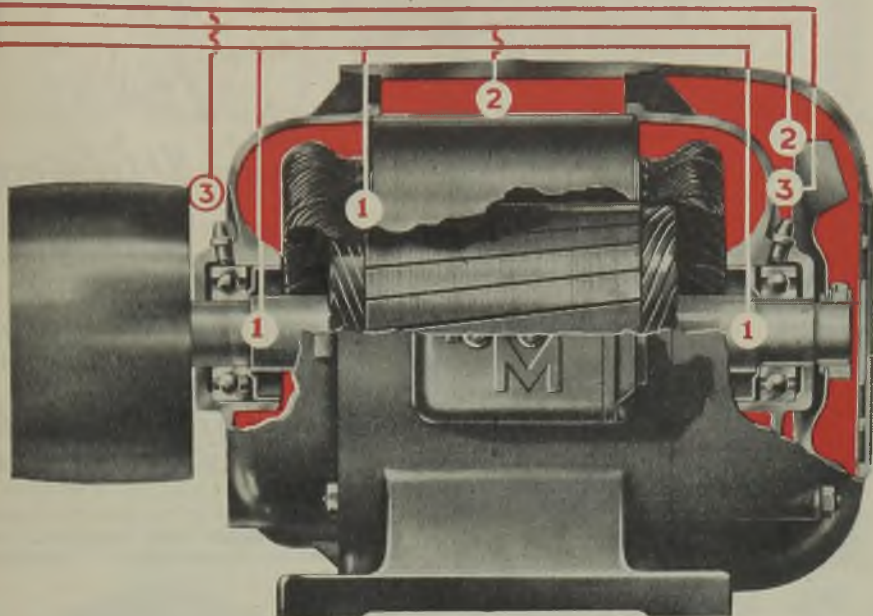
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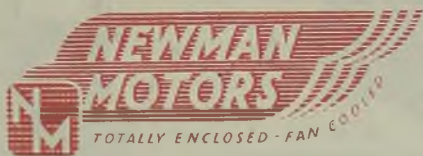
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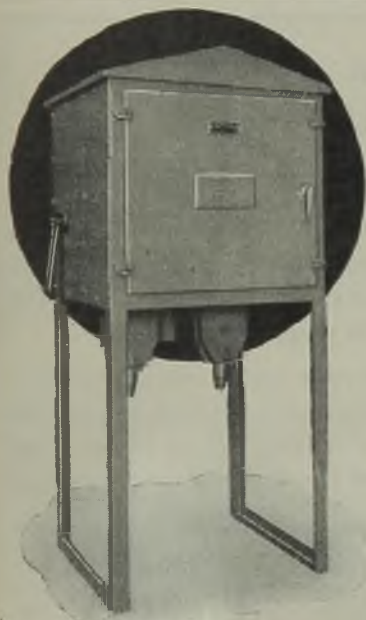
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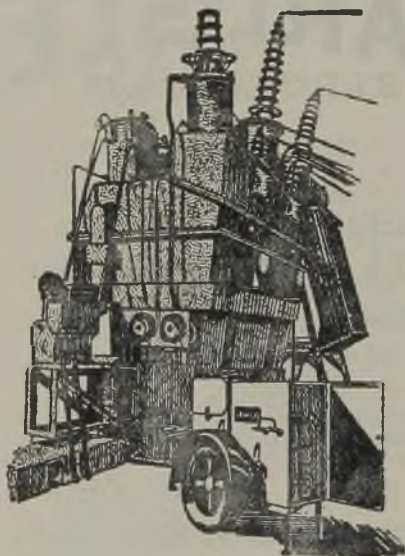
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- REMOTE CONTROL
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## The »BRECO« ON LOAD VOLTAGE REGULATOR WITH STEPLESS REGULATION

BRENTFORD TRANSFORMERS LTD BRENTFORD MIDDX



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The Importance of maintaining the full Insulating value of oil in circuit-breakers and transformers at all times can hardly be exaggerated.

This desirable result, ensuring freedom from electrical breakdown, can be achieved reliably and conveniently by means of a portable Stream-Line filter.

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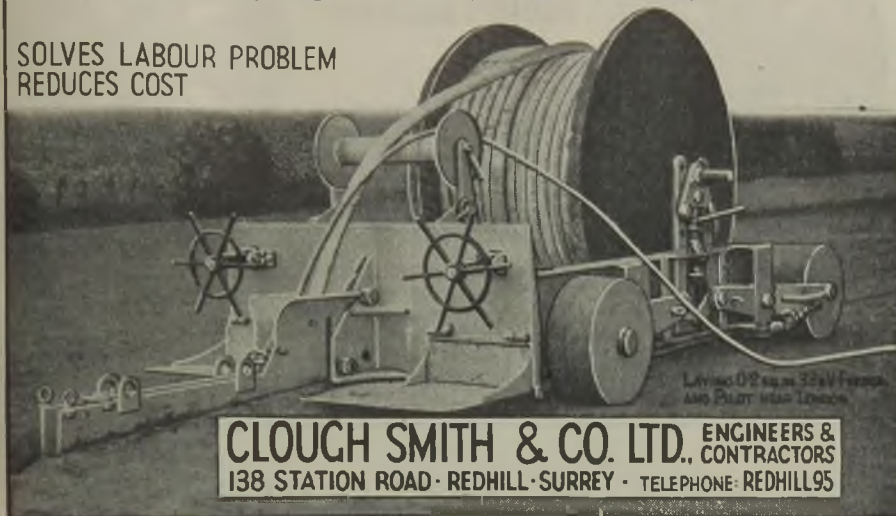
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# Lay Your Power Cables By the **PLOUCH METHOD**

SOLVES LABOUR PROBLEM  
REDUCES COST



**CLOUGH SMITH & CO. LTD.** ENGINEERS & CONTRACTORS  
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BITUMEN  
BUCKET  
WITH FALSE  
BOTTOM

COMPOUND KETTLE

BUCKET REST

TYERS JOINTERS

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## **JOINTER'S MELTING EQUIPMENT**

Portable Oil Furnace, Melting Pot, Bucket Rest, Bitumen Bucket, Compound Kettle and Metal Ladle.

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# AGRO BAKELITE BLOCKS

THE ALTERNATIVE TO WOOD BLOCKS



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**PROMPT DELIVERY**

No. 5050 Round type for one 2"  
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**T.M.C.-HARWELL (SALES) LTD.**

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DAY AND NIGHT  
**ELECTRIC SERVICE**



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THE  
**Sperryn**  
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**T. A. LAMPHOLDER**

Suitable for Gas-filled lamps.

Will operate at 10 amps continuously.

Stands up to the hottest lamps.

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**R·E·A·L SCREWED GLASS  
FITTING 60W, 100W—and  
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**EXTRA TOUGH QUALITY POR-  
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**HEAVY-QUALITY PRESSED WELL  
GLASS**—gives much higher threading  
accuracy, closer limits and a heavier,  
stronger glass.

**DIE CAST MAZAC TOP MEMBER**  
—engaging on rubberised asbestos  
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**HEAVY RUBBER GASKET**—giving  
a definitely watertight joint.

Can be supplied without Mazac  
Top for mounting direct to standard  
B.E.S.A. conduit box for positions  
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No steel authorisation required.

"I NEED LOTS OF HOT WATER"

**Charlton**

**ELECTRIC HOT WATER**



## TO REMIND YOU

that "Charlton" Electric Water Heaters are on active service. Soon, we hope, the kitchen will take the place of the cook-house, there won't be a parade for baths, and "Charlton" will return to its civilian job—on the mains of the Supply Authority. We will then make even better and maybe brighter water heaters.

**JOHNSON & PHILLIPS LTD.**

Telephone :  
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**CHARLTON, LONDON, S.E.7.**

Telegrams :  
"JUNO," Charlton, Kent

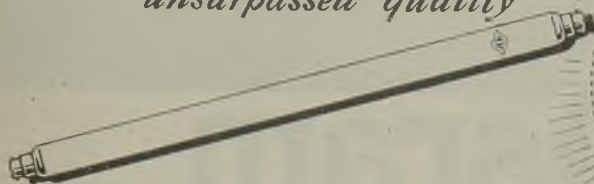


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# FLUORESCENT LAMPS

*have established a reputation for  
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reduced  
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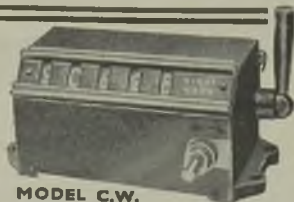
ILLUSTRATION SHOWS MODEL C.W. REVOLUTION COUNTER FOR  
COIL-WINDING MACHINES, MAXIMUM SPEED 6,000 REVS. PER MIN.

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# BROMLEY-LANGTON

*All British*

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INSULATING TUBING—INSULATED  
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TRADING ESTATE      SLOUGH      BUCKS.



5 ft. 80 watt

## FLUORESCENT LAMP

A new lamp is introduced for use in situations where a light is desired of good colour-rendering properties but warmer in tone than the existing Daylight colour lamp. All other characteristics remain the same.

**Low Brightness**

**High Lighting Efficiency**

**Large Area Source**

**No Glare — No hard shadows**

**Cool Burning**

**Low Current Consumption**

**Rapid Starting**

**Suitable for existing installations**

**PRICE 24/- each**

REMEMBER — There are now TWO types of "OSRAM" Fluorescent Lamps —

**DAYLIGHT & WARM WHITE**

# CLASSIFIED ADVERTISEMENTS

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

**THE CHARGE** for advertisements in this section is 2/- per line (approx. 8 words) per insertion, minimum 2 lines 4/-, or for display advertisements 3/- per inch, with a minimum of one inch. Where the advertisement includes a Box Number there is an additional charge of 6d. for postage of replies.

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

Original testimonials should not be sent with applications for employment.

## OFFICIAL NOTICES TENDERS, ETC.

### ESTON URBAN DISTRICT COUNCIL

#### Electricity Undertaking

THE Council invite tenders for:—

- (i) the supply, erection and setting to work of a steel Kiosk Substation, complete with one 300-kVA power transformer and high and low tension switchgear; and
- (ii) the supply and laying of about 600 yards .15 low-tension 4-core Cable.

Further particulars and copies of the specifications and form of tender may be obtained upon application to the Electrical Engineer at the Electricity Offices, Middlesbrough Road East, South Bank, Middlesbrough.

No tender will be received except in a plain sealed envelope, which may bear the endorsement "Tender for substation and/or cable," but must not bear any name or mark indicating the tender.

Tenders must be delivered to me not later than noon on Monday, the 29th January, 1945.

The Council do not bind themselves to accept the lowest or any tender and reserve to themselves the right to accept the whole or one or more items of any tender they may select.

STANLEY T. JOHNSON,

Council Offices, Deputy Clerk of the Council.  
Grainetown-on-Tees. 1264

## SITUATIONS VACANT

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

### COUNTY BOROUGH OF IPSWICH EDUCATION COMMITTEE

#### School of Technology

Principal: T. S. Harker, B.Sc., M.I.Mar.E., A.M.I.Mech.E.

**APPLICATIONS** are invited for the post of **LECTURER** in **ELECTRICAL ENGINEERING** subjects, duties to commence in September next. Candidates should have had good industrial experience and preference will be given to those who are corporate members of the Institution of Electrical Engineers. Previous teaching experience would be a recommendation.

Salary in accordance with the Burnham Scale for Technical Colleges with such appropriate additional allowances, depending upon the qualifications of the successful candidate, as may be allowed under the new salary scale.

Forms of application and further particulars may be obtained from the undersigned to whom applications should be returned so as to be received not later than 16th February, 1945.

J. T. HILL,

Chief Education Officer.  
Education Department,  
17, Tower Street.  
Ipswich. 1299

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

### BOROUGH OF STOCKTON-ON-TEES

Appointment of General Manager and Engineer of the Electricity Department

**APPLICATIONS** are invited for this appointment from qualified Electrical Engineers, preferably not exceeding 45 years of age, with considerable experience in the management and administration of an electricity undertaking.

The salary will be at the rate of £850 per annum, plus cost of living bonus (at present fixed at £33 16s. per annum).

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

Forms of application will not be issued, but applicants should give particulars of age, present position and duties, salary, past service, and all other essential information, including applicant's position with regard to liability for National Service.

Applications, accompanied by copies of three recent testimonials, must be addressed to the undersigned and delivered in sealed envelopes endorsed "Electricity General Manager and Engineer," not later than first post on Wednesday, 7th February, 1945.

Canvassing, either directly or indirectly, will disqualify.

ERIC BELLINGHAM,

Barclays Bank Chambers, Town Clerk.  
Stockton-on-Tees.  
10th January, 1945. 1272

### COUNTY BOROUGH OF EASTBOURNE

#### Electricity Department

#### Chief Clerk and Administrative Assistant

**APPLICATIONS** are invited for the position of Chief Clerk and Administrative Assistant with the above Undertaking.

Applicants must have had a sound commercial training and extensive experience in the administrative work of an Electricity Undertaking, including modern methods of costing, preparation of accounts, framing of tariffs, etc., and the control of clerical staff.

The salary will be £450 per annum, plus war bonus (at present £60 per annum).

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

Form of application may be obtained from the undersigned, and this should be completed in candidates' own handwriting and returned in a plain sealed envelope endorsed "Chief Clerk and Administrative Assistant," not later than Monday, 5th February next, to the under-mentioned address.

N. BOYDELL, M.I.E.E., A.M.I.Mech.E.,

Borough Electrical Engineer  
and Manager.

St. Winifred's,

Fairfield Road,

Eastbourne.

January, 1945

1244

**A** competent Stores Clerk with intimate knowledge of trade is required by leading electrical wholesaler in the West Country. The post is permanent and has very good post-war prospects for the right man.—Box 1277, c/o The Electrical Review.



## COUNTY BOROUGH OF SWANSEA

## Electricity Department

## Appointment of Mechanical Maintenance Engineer

**A**PPPLICATIONS are invited for the above position from qualified engineers not over 45 years of age. Applicants must have had a first-class practical training as mechanical engineers and experience in large, modern power stations employing pulverised fuel. It will be considered an advantage if applicants have electro-technical knowledge and experience, corporate membership of the Institution of Mechanical Engineers and/or Electrical Engineers.

The salary will be in accordance with Grade 5, Class J of the N.J.B. Schedule of Salaries (at present £583 rising to £612 per annum). Applicants must have had actual experience in the whole of the mechanical maintenance of a large power station, including boilers, coal pulverising equipment, turbines and all auxiliary plant wherever situated in the Station. The person appointed will be responsible to the Station Superintendent for preparing and maintaining a complete programme of repairs and maintenance.

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

Applications, which must be made on a prescribed form obtainable from the Borough Electrical Engineer and Manager, Guildhall, Swansea, together with copies of not more than three recent testimonials, must be delivered to the undersigned not later than Saturday, the 3rd February, 1945.

Canvassing, either directly or indirectly, is prohibited and will be a disqualification.

T. B. BOWEN,  
Town Clerk.

Guildhall,  
Swansea.

14th January, 1945.

1297

Associated Municipal Electrical Engineers  
(Great Britain and Ireland)  
and  
The Electrical Power Engineers' Association

NOTICE  
Stock-on-on-Tees Corporation  
Appointment of Engineer and Manager

**THE** Standing Joint Committee of the above Associations desire to point out that the above advertised post is not in accordance with Clause 10 of the Agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers (Electricity Supply Industry), under which clause the latest available data of output indicates a commencing salary of £948 per annum.

**ALL ENGINEERS, WHETHER ENGAGED IN THE ELECTRICITY SUPPLY INDUSTRY OR NOT, ARE URGENTLY REQUESTED NOT TO APPLY FOR THE POST NOW BEING ADVERTISED, AND IF AN APPLICATION HAS ALREADY BEEN MADE IT SHOULD BE WITHDRAWN.**

W. ARTHUR JONES, A.M.I.E.E.,  
Secretary,  
Standing Joint Committee,  
A.M.E.E., E.P.E.A.

1273

**A** company manufacturing electrical water heaters (including all forms of domestic and industrial immersion heaters) and rotary switchgear, requires a fully experienced export salesman to create a market and introduce their goods all over the world. Applicants should state full details of the positions previously held, and present employment, age and salary required.—Box 1290, c/o The Electrical Review.

**A**FTER restrictions on the engagement of labour are removed, a well-established firm of electrical power switchgear and domestic appliance manufacturers in the London area desire to engage men for the following permanent positions: (a) Draughtsman to take charge of small drawing office; (b) Draughtsman for development of new electrical equipment; (c) Works Engineer with knowledge of tool design and production, and able to supervise plant maintenance. Applicants should write as soon as possible, giving fullest details of previous experience, employers and salaries earned. This information will be dealt with in strictest confidence. Only men of initiative and with sound experience need apply to—Box 1215, c/o The Electrical Review.

**A**DVERTISING Assistant required to prepare technical pamphlets, descriptions of electrical equipment, catalogues, etc. Previous experience essential, which should preferably have been in the electrical engineering industry. The post offers excellent prospects for a first-class man with the requisite experience. Apply—Scottish Cables Ltd., Deanside, Renfrew. 1271

**A**N Electrical Machinery Traders' Association requires a Secretary. The post is not a full-time appointment, and is suitable for a private accountant or the secretary of some other trade association. Applications, giving full details of experience, age and extent of services available, should be made not later than January 26th, to—Box 1281, c/o The Electrical Review.

**A**PPPLICATIONS are invited for the position of Testing Superintendent by a well-known firm of manufacturers in the South-West London district. Applicants must have a first-class experience in A.C. watt-hour meter testing together with knowledge of small switchgear and instrument work. Write for appointment, stating age, experience and salary required, to—Box 1283, c/o The Electrical Review.

**B**OROUGH of Royal Tunbridge Wells. Appointment of Deputy Borough Electrical Engineer. Applications are invited from suitably qualified and experienced candidates. Preference will be given to those candidates who possess an engineering degree or its equivalent and/or are Corporate Members of the I.E.E. Extensive experience with a modern progressive undertaking with sales development and commercial experience is also essential. Salary in accordance with Class E, Grade 1 of the N.J.B. Schedule at present £700 p.a., rising by two increments of £25 p.a. to £750 (plus war bonus at present £39 16s. p.a.). The increments being payable for the third and fourth years of the service respectively. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination and reside within the borough. Applicants should write, quoting D.1042XA, to the Ministry of Labour and National Service, Appointments Dept., A3(B) Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms which should be returned completed on or before 31st January, 1945. 1298

**C**ORPORATION of Barking: Deputy Borough Electrical Engineer and Manager. Applicants must be Corporate Members of the I.E.E., or equivalent standard, and have had a sound technical education, also technical, administrative and commercial experience of an electricity undertaking. Salary in accordance with Class F, Grade 1, of the N.J.B. Schedule, at present £712 p.a., plus car allowance of approximately £80 p.a. The appointment will be subject to the Local Government and Other Officers' Superannuation Act, 1937, and a satisfactory medical report. Applicants should write, quoting D.1048XA, to the Ministry of Labour and National Service, Central (T. & S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 31st January, 1945. 1265

**E**LECTRICAL Engineer. Experienced Manager required to take charge of department for the design, development and testing of small type switches, solenoids and other electrical equipment. Must have sound theoretical and practical experience. Commencing salary £800-£1,000 per annum according to qualifications.—Box 1258, c/o The Electrical Review.

**E**NGINE Driver required for 300-h.p. Hick Hargreaves Diesel Engine. Fast End sawmill on essential work. Apply—Box 1251, c/o The Electrical Review.

**E**NGINEERING Tutor (part time) required immediately by University Correspondence College. Must be qualified to coach for university degrees and professional diplomas in electrical engineering. Applications, stating age, to—Principal, Burlington House, Cambridge. 1252

**E**XPORT Assistant required by firm of electric cable manufacturers. Must possess first-class estimating experience and be fully conversant with all procedure pertaining to export business. Permanent and progressive position for suitable applicant. Applications, which will be treated in strictest confidence, to be forwarded to—Scottish Cables Ltd., Deanside, Renfrew. 1282

**L**ECTURER in Radio, to assist in the training of Naval Radio Mechanics. The candidate must have had a good education in electricity or physics and have a satisfactory knowledge of radio theory and practice. Salary £350 p.a.—Electrical Department, Robert Gordon's Technical College, Aberdeen. 1187

**M**ANAGER to take charge of department making up telephone cords. Must be capable of controlling sixty women. Urgent Government work. Factory in North-West. Please reply giving full details and salary required—Box 1292, c/o The Electrical Review.

**OUTSIDE** Technical Representative required. Should have established personal contacts with radio element of radio manufacturers desirable. Salary about £600 p.a. Age 30-45 years.—Box 1226, c/o The Electrical Review.

**PERSONAL** Assistant to Managing Director. Small, but rapidly progressing manufacturers of high-grade electrical equipment, with large contracts and post-war world export, desire to train personal assistant to managing director. Applicant should have had sound education and will have to start at the bottom, and be unafraid of hard work or dirty hands. An excellent opportunity for a young married man, age 25-30.—Box 1291, c/o The Electrical Review.

**POWER** Plant Engineer required to come under chief engineer for operation and repair of 10,000-kW industrial plant in Scotland. Candidate must have thorough technical education and be familiar with A.C. and D.C. machines, boilers, pumps and auxiliaries. State full particulars scholastic attainments, practical experience, age, wages required, and when at liberty. Address—0913, Wm. Porteous & Co., Glasgow. 6647

**RELIEF** Charge Engineer required at generating station in Home Counties, N.J.B. conditions, Grade 8a. Class F. experienced with H.P. boilers, turbo-alternators, converting plant. State age, single or married, to—Box 1253, c/o The Electrical Review.

**RELIEF** Switchboard Attendant required by the Rawtenstall Corporation for shift duties. Present wages £1 12s. 9d. per week of 48 hours. Applications, stating age and details of technical experience, together with copies of testimonials, to be delivered to the Borough Electrical Engineer, Bacup Road, Rawtenstall, Rossendale, Lancs., not later than 26th January, 1945. 1294

**REPRESENTATIVES** required by wholesalers for London area. Only men with live connections and first-rate references considered. Salary, expenses and commission basis. Superannuation scheme in force.—Box 1227, c/o The Electrical Review.

**REQUIRED** for engineering works engaged on Government work, Cricklewood area, Shorthand-Typist or Ediphone Typist. Please reply, stating experience and salary required, to—A. T., c/o Streets, 110, Old Broad Street, E.C.2. 1249

**REQUIRED** for London as Technical Representative. Young Electrical Engineer with practical and theoretical knowledge of small motor and transformer design and manufacture. Commercial experience desirable but not essential. Send full details in confidence to—Box 1260, c/o The Electrical Review.

**SALES** Representative required for South London by Electrical Wholesaler. Knowledge of electrical trade an advantage. Permanent and progressive position, with exceptional post-war prospects. Write, stating age, experience, and salary required.—Box 1275, c/o The Electrical Review.

**STORES** Assistant (permanent) required at once. Write, stating age, salary required and electrical stores experience, to—Wholesale Electric Co., 37, Vauxhall Bridge Road, S.W.1. 1218

**STORES** Clerk required by electrical wholesalers. Good knowledge of electrical material essential. Apply—London Electrical Company, 92, Blackfriars Rd., S.E.1. 25

## APPOINTMENTS FILLED

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied-for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

## SITUATIONS WANTED

**A** Sales Representative seeks change, desires to represent manufacturer of elec. fittings, commercial and industrial. Connection with wholesalers, supply companies and Govt. dept. Area covered, London and South of England.—Box 6643, c/o The Electrical Review.

**A.M.I.E.E.**, A.M.I.Mech.E., seeks interesting spare time work, Central or West London area.—Box 6605, c/o The Electrical Review.

**A.M.I.E.E.** (39), construction, operation and maintenance power stations, O.H. and U.G. distribution systems, practical, technical and commercial exp. electricity undertakings. Situation desired overseas.—Box 6614, c/o The Electrical Review.

**CHIEF** Draughtsman or Designer. Engineer with varied mechanical and electrical experience (not radio), design, planning, tools and production, desires responsible post, S.W. London area preferred.—Box 6612, c/o The Electrical Review.

**DESIGNING** and draughting of light electrical and mechanical apparatus desired by Electrical Engineer and Designer-Draughtsman (part time). Enquiries—C. Bishop, 4, Bonechurch Rd., West Ealing, W.13. 6655

**ELECTRICAL** and Mechanical Engineer desires to contact small manufacturer with view to producing his designs (domestic apparatus), which should have large demand in post-war period.—Box 6602, c/o The Electrical Review.

**ELECTRICAL** Engineer, A.M.I.E.E., desires post as Works Engineer, 25 years' experience, maintenance, construction, electrical and mechanical, age 44, exempt.—Box 6603, c/o The Electrical Review.

**ELECTRICAL** Engineer, B.Sc., A.M.I.E.E., 17 years' varied experience in responsible positions with leading manufacturing companies, requires post of high responsibility giving scope for initiative. Consultative work considered.—Box 6623, c/o The Electrical Review.

**ELECTRICAL** Engineer, supervise installation, contracts or factory maintenance, 28 years' experience, good organiser, labour control, age 44 years, seeks responsible position. Now disengaged.—Box 6629, c/o The Electrical Review.

**ELECTRICAL** Engineer (39), first-class experience in rural supply and distribution, desires position of responsibility with supply authority; not afraid of hard work, 20 years' practical experience.—Box 6649, c/o The Electrical Review.

**ELECTRICAL** Mechanical Engineer, sound commercial background, experienced on rural and similar development, H.T. and L.T. distribution, electrical installation and factory maintenance, desires position with scope in post-war period. Preferably with rural supply authority where initiative and experience will be utilised and appreciated.—Box 6601, c/o The Electrical Review.

**ELECTRO** Mechanical Engineer (35), A.M.I.E.E., etc., seeks London appointment. Free in one month. Now holding executive position covering sales, drawing office, installation and service departments.—Box 6610, c/o The Electrical Review.

**INSTRUMENT** Engineer, 30 years' experience, instruments, relays, transformers, recorders, integrating meters to Government specifications, Meter Act, etc., quotations, design, development and manufacture, large or small quantities to customers' requirements, mixed labour, 15 years' leading manufacturer. Executive post with post-war prospects, salary commensurate with responsibility.—Box 6656, c/o The Electrical Review.

**MANAGER**, electricity service centre, 25 years' engineering experience, M. & E., B.O.T. Cert., E.D.A. Sales Engrs. Diploma, seeks similar post with electricity undertaking with good scope for future development. First-class development record, sales and consumers, expert on all types of domestic apparatus and appliances, motors, pumps and machinery generally, responsible for H.T. and L.T., town and rural supply maintenance, good organiser, keen worker. Present post (voluntary from outbreak of war), shift supt. engr. over 300 employees. Release possible in near future owing to moving of works. Please reply in confidence, giving first details, to—Box 6613, c/o The Electrical Review.

**QUALIFIED** Production Engineer (39), experienced in el. assembly work, incl. winding technique and lamp production, desires change of position offering post-war prospects, preferably development of production methods, tooling investigation, time and motion study, as assistant to works manager. Good references.—Box 6653, c/o The Electrical Review.

**SALES** Rep. Engineer (26), completed B.Sc. course, not liable nat. service, free.—Box 6641, c/o The Electrical Review.

**VACUUM** and Electronics research. Controlling position required. Salary £750.—Box 6626, c/o The Electrical Review.

**WORKS** Electrical Engineer, A.S.E.E., desires post, 25 yrs. technical and practical exper. planning installations and maintenance for large industrial plants.—Box 6642, c/o The Electrical Review.

**YOUTH**, 16 yrs., secondary school education, seeks situation in distribution department or drawing office.—Box 6627, c/o The Electrical Review.

## FOR SALE

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

**A** large stock of Winches of our self-sustaining types, also Searchlights (sale or hire), Mirrors, Lenses, A.I.D. Turnbuckles, etc., also surplus Carbon Rods, Ebonite and Fibre. Hundreds of thousands supplied during the last 40 years to Government departments, corporations and innumerable traders.—London Electric Firm, Croydon. 42

**GEORGE COHEN, SONS & CO. LTD.**

for

**GUARANTEED ELECTRICAL****PLANT,****MOTORS, GENERATORS.****SWITCHGEAR,**

etc.

**WOOD LANE, LONDON, W.12.**

Telephone: Shepherds Bush 2070

and

**STANNINGLEY, NEAR LEEDS.**

Telephone: Pudsey 2241.

Established 1834.

27

**REBUILT MOTORS AND GENERATORS**

**L**ONG deliveries can often be avoided by purchasing rebuilt secondhand plant. We can redesign or replace surplus plant of any size.

**SEND US YOUR ENQUIRIES.****OVER 1,000 RATINGS ACTUALLY IN STOCK HERE****DYNAMO & MOTOR REPAIRS LTD.,**

Wembley Park, Middlesex.

Telephone: Wembley 3121 (4 lines).

**Also at Phoenix Works, Belgrave Terrace, Soho Road,**

Handsworth, Birmingham.

Telephone: Northern 0898.

26

**WATER TUBE BOILERS IN STOCK**

Four	25,000 lbs.	evaporation,	175 lbs.	W.P.
Three	20,000 lbs.	..	175 lbs.	..
One	15,000 lbs.	..	175 lbs.	..
One	12,000 lbs.	..	175 lbs.	..
One	12,000 lbs.	..	200 lbs.	..
One	12,000 lbs.	..	160 lbs.	..
One	9/10,000 lbs.	..	200 lbs.	..

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

**BURFORD, TAYLOR & CO. LTD.,**

Boiler Specialists, Middlesbrough.

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**NOTICE** is hereby given that Johnson Laboratories Incorporated seek leave to amend the specification of Letters Patent No. 562512, entitled "Improvements in or relating to multi-range high frequency systems." Particulars of the proposed amendment were set forth in the Official Journal (Patents), No. 2921, dated January 17th, 1945. Any person may give Notice of Opposition to the amendment by leaving Patents Form No. 19 at the Patent Office, 25, Southampton Buildings, London, W.C.2, on or before the 17th February, 1945.—H. L. Saunders, Comptroller-General. 1295

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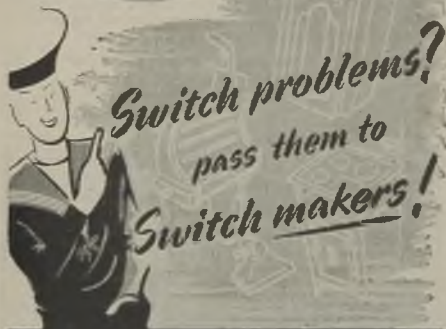
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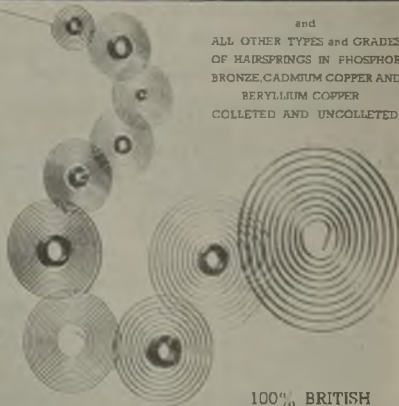
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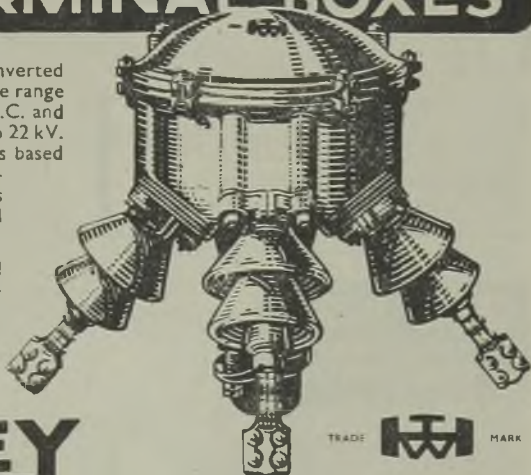
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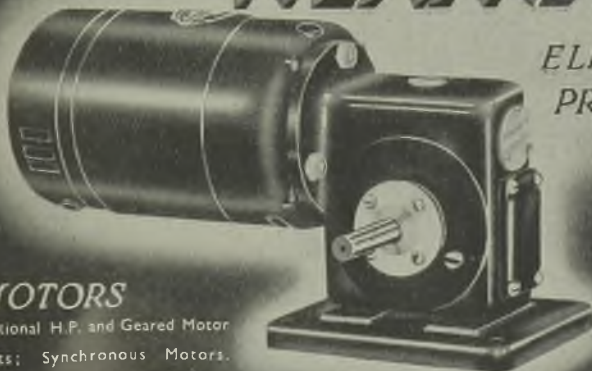
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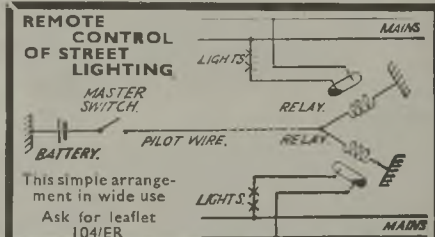
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