

# ELECTRICAL REVIEW

FOUNDED  
1872

Vol. CXXXVI. No. 3527

JUNE 29, 1945

9d. WEEKLY

The advertisement is set within a dark, rounded rectangular frame. At the top, the word "Osram" is written in a large, white, stylized font, with a horizontal line passing through the middle of the 'O'. Below the logo, a hand is shown holding a white incandescent light bulb. The bulb has a red circular stamp on it that reads "BIBLIOTHECA POLYTECHNIKI LASKIEJ". At the bottom of the frame, the words "THE WONDERFUL LAMP" are written in a bold, white, sans-serif font, angled upwards from left to right.

# Aluminium

## IS AVAILABLE AGAIN FOR RISING MAINS

In multi-floor factories, office buildings and blocks of flats, bare aluminium busbars have numerous advantages.

Suspended in a vertical duct, they eliminate fire risk.

They withstand heavy overloads.

They are easily accessible for extensions as the load increases with business.

They are economical in installation and maintenance costs.

May we furnish you with the experience of users of aluminium busbars since 1915?



**THE BRITISH ALUMINIUM CO. LTD.**  
**SALISBURY HOUSE, LONDON WALL, LONDON, E.C.2**

Telephone : CLErkenwell 3494

Telegrams : Cryolite, Ave, London

## THE VALUE OF CONTRAST



To a modern generation, serviced with frequent Hot baths by Heatrae, the fact that Philip of Spain never had a bath in his life may sound incredible.

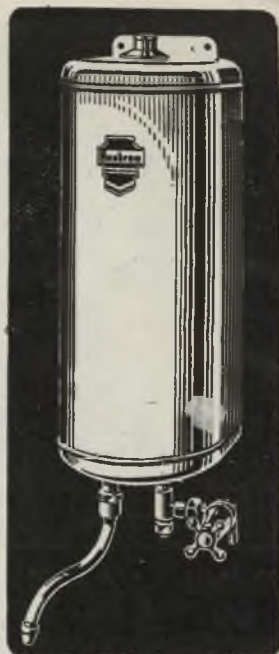
We suggest one possible reason—that neither Heatraes nor Electric Power were then obtainable.

Heatrae has only "made history" in the last 25 years.

# HEATRAE

**LEADERS IN  
ELECTRIC WATER  
HEATERS**

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:  
Willesden 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 2"  
HOLE**

**ROSS COURTNEY & Co. Ltd.**  
ASHBROOK ROAD, LONDON, N.19

## BEARINGS



to the specific  
requirements of  
our customers

Makers of all ty-  
pes of repetition  
products from  
the bar in all  
metals



**M.C.L. and REPETITION LTD.**  
Pool Lane, Langley, Birmingham.





McKechnie Non-Ferrous Ingots are uniform in composition and therefore easier to melt and handle. Produced by a perfect plant under constant supervision to the correct analysis, the McKechnie range of Non-Ferrous Ingots covers the entire need of the Brass Foundry. McKechnie Chill Cast Bars are closer in structure than Sand Cast Bars and possess greater homogeneity and resistance with an absence of segregation. They are clean, concentric and sound.

Apart from the saving on tool costs and labour which naturally follows the use of Chill Cast as against Sand Cast Bars the saving in scrap and turnings is very considerable.

## MADE BY **McKECHNIE BROS., LTD.**

Brass, Aluminium Bronzes & High Strength Brass Rods, Stampings & Non-Ferrous Ingot Metal Manufacturers

**ROTTON PARK STREET, BIRMINGHAM 16**

Telephone : Edgbaston 3581 (7 lines)  
Telegrams : "McKechnie, Birmingham"

### *A Thoroughly Sound Job for Outdoor Service*

- All-Steel Weatherproof Cubicle with reinforced under-carriage combines exceptional strength with lightness.
- Transportable—easily installed.
- Sloping roof prevents accumulation of water.
- Light-proof.
- Efficient Ventilation.

150 K.w. Outdoor Weatherproof  
Glass Bulb Rectifier.

**PEEBLES**

# RECTIFIERS

Manufactured by the Pioneers  
in Electrical Conversion.



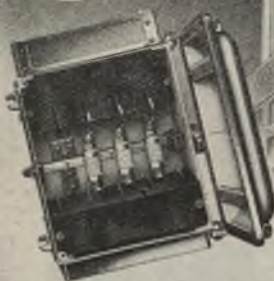
**BRUCE PEEBLES & CO. LTD., ENGINEERS. EDINBURGH.**

# MAIN CONTROL SWITCHES

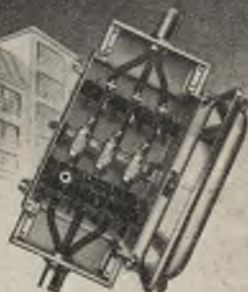
*for all factories*



*Bill "HRC" Fuse Switches  
fitted with  
"English Electric"  
"H.R.C." Cartridges.*



Made for 30, 60, 100, 160, 200, 300  
& 500 Amps., 600 Volts; Double,  
triple and four pole and with  
neutral links.  
Fitted for Conduit, busbar chamber  
flange or cable glands.



*Easy Wiring. Minimum Maintenance*

LONDON: A. W. ZELLEY  
73, GREAT PETER ST.,  
WESTMINSTER, SW1

**BILL SWITCHGEAR LTD**  
**BIRMINGHAM 20**

MANCHESTER GLASGOW,  
BELFAST BURTON-ON-TRENT  
EXETER SOUTHAMPTON

BIRCHFIELDS SOIL (4 LINES)

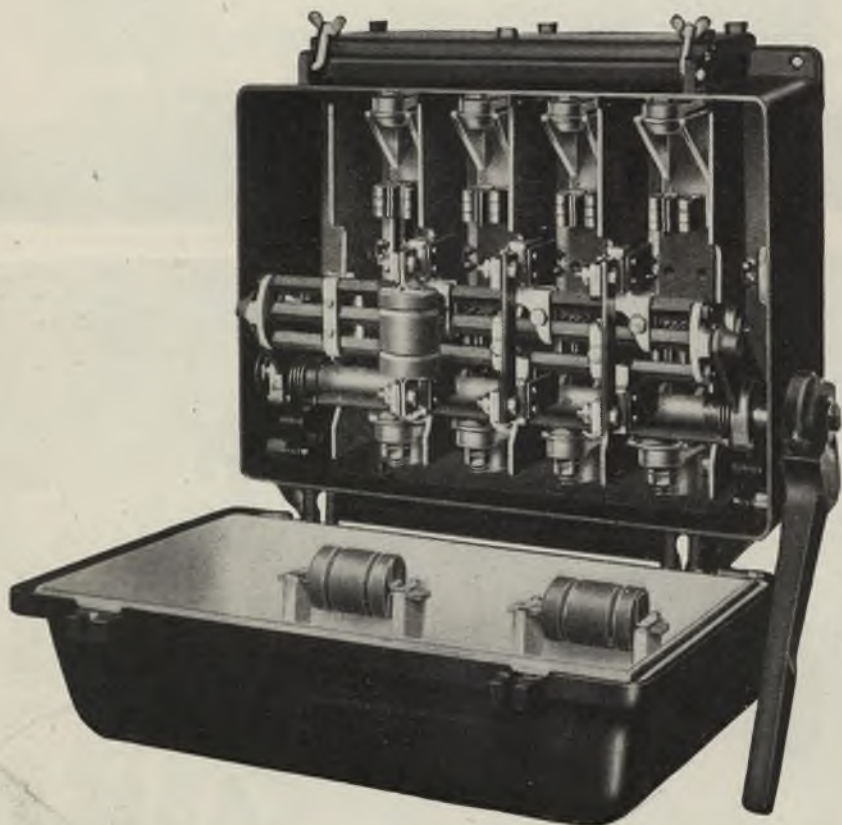
"AICHO" BIRMINGHAM



**THE CONCORDIA ELECTRIC WIRE & CABLE COMPANY LIMITED.**  
**LONG EATON NEAR NOTTINGHAM.**



# SIMPLEX





FOR SHIP WIRING...

**CROMPTON  
CABLES**

**TAKE A LOT OF BEATING**



**CROMPTON PARKINSON LIMITED, ELECTRA HOUSE, VICTORIA EMBANKMENT, LONDON, W.C.2**

Telephone : TEMple Bar 5911

Telegrams : Crompark, Estrand. London

# G.E.C. INDICATORS

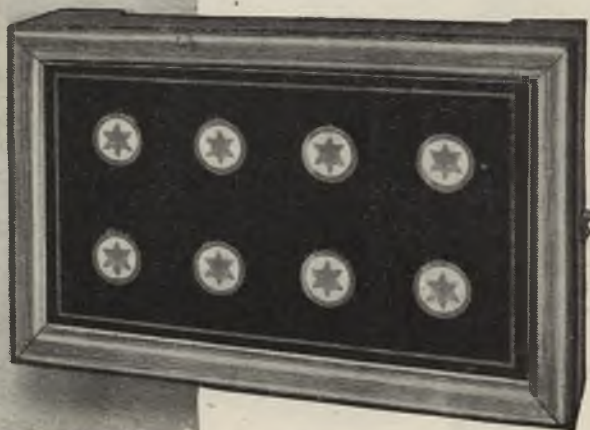
## BAKELITE BELLS-PUSHES AND TRANSFORMERS



Note the three fuses in the transformer, one to each pole on the secondary side, thus complying fully with I.E.E. Regulations No. 210.



**Get into touch  
with your nearest  
G.E.C. Branch for  
all requirements  
in Bell installation  
material.**



**G.E.C. quality is being rigorously maintained**



# EQUIPMENT for ALL INDUSTRIES



## Hicycle AERO DRILLS

Continuous production conditions call for sturdy machines that can be relied upon to get through a lot of hard work without fear of constant breakdown. Hicycle tools possess these essential characteristics for such conditions, i.e.:

- No armatures to burn out.
- Maximum possible power per lb. weight of tool.
- Constant speed giving increased production.

The machine illustrated is one of the many Hicycle Aero Drills, capacity  $\frac{1}{2}$ " in steel or  $\frac{1}{4}$ " in duralumin.



**CONSOLIDATED PNEUMATIC  
TOOL CO. LTD.**  
FRASERBURGH ABERDEENSHIRE

AIR COMPRESSORS • PNEUMATIC TOOLS • ELECTRIC TOOLS • DIESEL ENGINES • VACUUM PUMPS  
CONTRACTORS' EQUIPMENT • ROCK DRILLS • DIAMOND DRILLS • OIL WELL TOOLS



**SCALE and FUR**  
on  
**KETTLES**  
**WATER-HEATERS**  
ETC.

removed harmlessly  
in a short period

SIMPLY ADD

**"Fur-offit"**

to the hot water in the utensil  
and the mixture does the rest

QUANTITIES OF APPLIANCES  
CAN BE TREATED IN A BATH  
OF THE LIQUID

**SAVE FUEL**

by

using scalefree utensils

Send P.O. for 1 6 for sample bottle  
including postage and packing

**DRAKE & GORHAM**  
**WHOLESALE LTD.**

77 LONG ACRE, LONDON, W.C.2

Telephone : TEMple Bar 3993

MANCHESTER—29 Piccadilly.  
BRIGHTON—24 Marlborough Place.  
GLASGOW—182 St. Vincent Street.  
BRISTOL—2 & 4 Church Street, Temple.  
DUBLIN—2 Church Lane, College Green.

Midland Representative :  
W. T. BOWER, 184 Jockey Road, Sutton Coldfield



**KILMARNOCK**  
**POWER**  
**STATION**

**I**NTERNATIONAL COMBUSTION LIMITED  
were responsible for recent extensions at this station, including five 150,000 lb. per hour stoker fired boilers for a steam pressure of 420 lbs./sq. inch and temperature of 800 F. together with ash handling plant and comprehensive coal handling plants of a total capacity of 180 tons per hour.

**INTERNATIONAL**  
**COMBUSTION LTD.**

NINETEEN WOBURN PLACE  
LONDON · W.C.1



# CRYPTON

## BATTERY CHARGERS AND RECTIFIERS



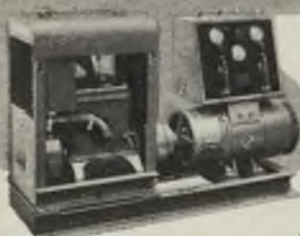
3-Circuit  
Battery Charger



Selenium Battery Charger  
for Electric Vehicles



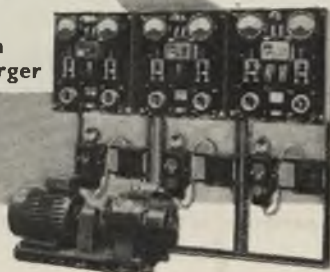
Portable  
D.C. Power Supply



Engine Driven  
C.P. Battery Charger



Portable High Rate  
Battery Booster



Motor Generator  
Battery Charger

**CRYPTON EQUIPMENT LTD. • REGD OFFICE • GEORGE STREET • BRIDGWATER • SOM.**

Associated Companies : Lancashire Dynamo & Crypto Ltd., Foster Transformers & Switchgear Ltd.

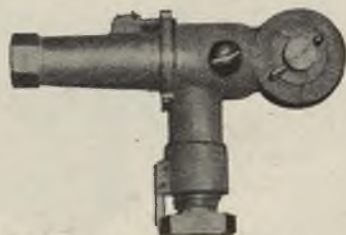


# OVERHEAD LINE FITTINGS



Cone Type Mid-span Tension Joint for Steel Cored Aluminium Conductors of  $\cdot 15$ - $\cdot 175$  sq. in. copper equivalent section.

Cone Type Tension Clamps for Steel Cored Copper Conductors of  $\cdot 025$ - $\cdot 075$  sq. in. copper equivalent section.



Aluminium Repair Sleeve for Steel Cored Aluminium Conductors up to  $\cdot 175$  sq. in. copper equivalent section.

Non Tension Joint for Steel Cored Aluminium Conductors from  $\cdot 1$  up to  $\cdot 175$  sq. in. copper equivalent section.



A small selection from the range of Overhead Line fittings of the well-known British Ropes design, which are now manufactured in our own shops. Quick deliveries of many types can be offered from components in stock. Prompt quotations for standard or special designs.

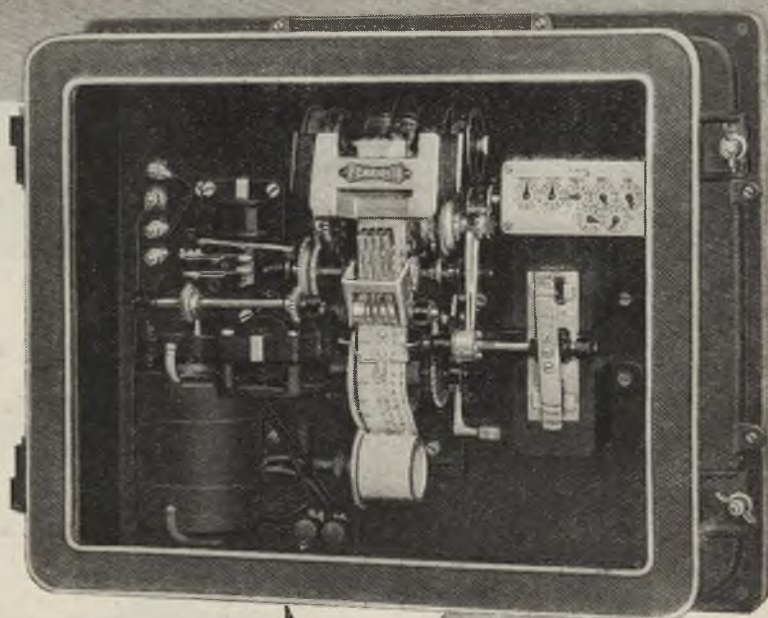
Our experience is at your disposal.

TELEPHONE  
SOUTHAMPTON  
2141 (5 LINES)

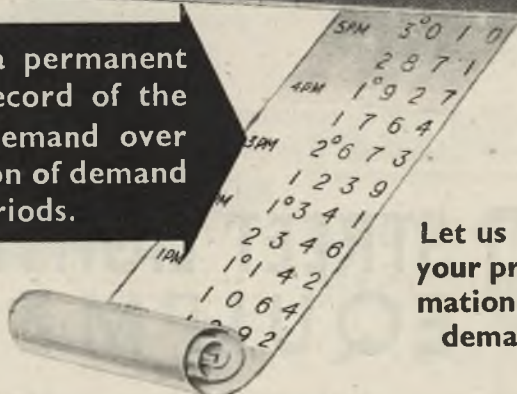
**PIRELLI-GENERAL**  
CABLE WORKS, Ltd., SOUTHAMPTON.

TELEGRAMS  
"PIGEKAYBEL"  
SOUTHAMPTON

# The FERRANTI *Printometer*



★ Gives a permanent printed record of the average demand over a succession of demand periods.



Let us help you with your problems of summation and maximum demand metering.

**FERRANTI LTD., HOLLINWOOD, LANCs.**

**LONDON OFFICE: KERN HOUSE, KINGSWAY, W.C.2.**



## INTO THE LIGHT . . .

**O**N and after July 15th, 1945, normal peacetime street lighting may again be used wherever installations are serviceable.

Authorities have been advised to restore their installations and to replace damaged equipment so that the streets may again be reasonably safe at night during the coming Autumn and Winter.

REVO Street Lighting Specialists will gladly assist in the preparation of schemes—large and small.

Catalogue of Fittings and equipment for use with Tungsten, Mercury or Sodium Discharge Lamps can be supplied on request.



## STREET LIGHTING EQUIPMENT

STANDARDS • BRACKETS • FITTINGS

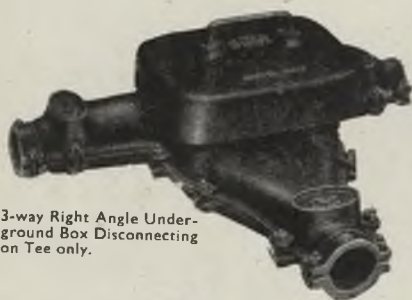
REVO ELECTRIC CO. LTD., TIPTON, STAFFS



# Useful Underground Disconnecting Boxes



2-way Underground Disconnecting Box fitted with wedge type links.



3-way Right Angle Underground Box Disconnecting on Tee only.



Parallel 'Narrow' Type Underground Disconnecting Box with Bolt on Wiping Glands. The fuses are provided with Porcelain Carriers which can be fitted instead of the Bakelite Lifting Bars supplied as standard.

Our special study of all problems relating to underground distribution has enabled us to build up a range of Underground Disconnecting Boxes to meet all the usual requirements of the Distribution Engineer and yet maintain a high degree of standardisation, thereby reducing stocks of components and increasing interchangeability.

The boxes illustrated are typical of the very wide range available. Please ask for catalogue WB and supplements.

## **HENLEY**

### **UNDERGROUND DISCONNECTING BOXES**

**W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.**  
MILTON COURT • WESTCOTT • DORKING • SURREY

**...for successful high –  
temperature operation**  
in electrical machinery

**Lewcos**  
REGD

*Lewcosglass*  
*Lewcosglass*  
REGD

**GLASS**  
*Insulated*  
**WIRE**

**PURE GLASS INSULATION,  
FLEXIBLE, RESISTANT TO  
ACIDS, OILS, ETC.**

Operates at temperatures which would quickly destroy other types of insulation.

Now available in all sizes of round wire between .010" and .144"



*Write for samples and technical details to:*

**THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED**  
**CHURCH ROAD • LEYTON • LONDON, E.10**

# PLANT MOTORISATION

USING 'ENGLISH ELECTRIC' MOTORS  
AND OVERHEAD BUS-BAR SYSTEM



*Before the Changeover*

View in a factory  
containing 105  
belt driven  
machine tools.



*One Week Later*

105 machine tools  
changed over to in-  
dividual motor drive,  
including all electrical  
connections and motor-  
isation of the machines.

**This changeover is fully described in our  
publication entitled 'PLANT MOTORISATION'**

WRITE FOR YOUR COPY to Fusegear Dept. STAFFORD.

**THE ENGLISH ELECTRIC COMPANY LIMITED**

London Office: QUEEN'S HOUSE, KINGSWAY, LONDON, W.C.2

WORKS: STAFFORD - BRADFORD - RUGBY - PRESTON



## Chapter Four ON FLOOD-LIGHTING

The comparison of flood-lighting in the past with flood-lighting in the future will be about the same as the comparison of the Battle of Agincourt with the Battle of El Alamein!

... and NOW is the time to get busy in this important branch of illumination, in which we in the "R.E.A.L." organisation can claim to be acknowledged leaders.

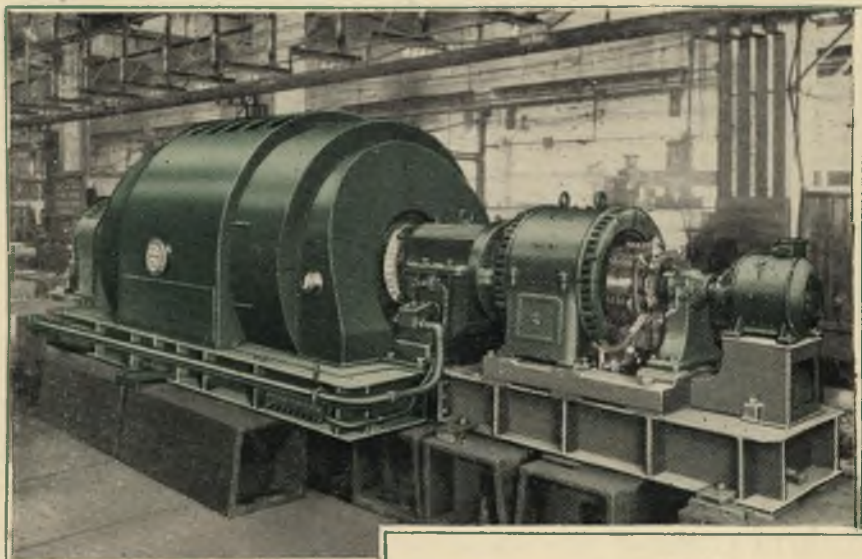
We are not officially in production yet, but prompt delivery of quite a number of patterns can be given.



R · E · A · L



# LARGE ELECTRICAL PLANT



**15,000 kVA.  
Synchronous Condenser  
on test prior to shipment to  
New Zealand.**

*BTH products include  
all kinds of electric  
plant and equipment;  
Mazda lamps and  
Mazdalux lighting  
equipment.*

**SPECIFY  
BTH**

# BTH

# RUGBY

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

A3533/2C



**IN THE DEPTHS OF THE JUNGLE . . .**



# Delaflex

plays a leading part  
in **KEEPING COMMUNICATIONS OPEN**

**DELAFLX** Rolled Silk Sleeveings are ideal for the internal wiring of electrical and radio apparatus intended for use in tropical climates. Samples and prices will gladly be sent on request.



1. Rolled Silk Inner Sleeveing.
  2. Braided and Varnished Outer Sleeveing.
- Made to Specifications DCD.WT. 820, 703 and 1273

Other DELAFLEX Sleeveings are: Varnished Cotton, Metal Screened, Varnished Rayon and Woven Fibre Glass. They are made to Specification in various sizes according to type from 0.5 mm. to 35 mm.

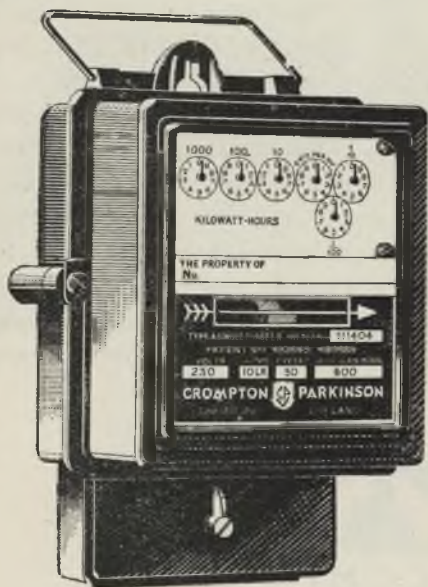
**DE LA RUE INSULATION LTD.**

IMPERIAL HOUSE · 84 REGENT STREET · W.1 · TELEPHONE: REGENT 2901





**For accuracy that never varies**



**Specify**

**CROMPTON**

**METERS**

  
**CROMPTON PARKINSON**  
LIMITED

ELECTRA HOUSE, VICTORIA EMBANKMENT LONDON, W.C.22



### *The "Ha'p'orth of tar"...*

Cricket, by gad, Sir, is in the very bones of the British Tradition. "Is it cricket?" is a question upon which the gravest decisions of honour have rested. The battle of Waterloo, Sir . . . . We beg your pardon? The great Duke of Wellington did not refer to . . . . Oh, the bails, Sir. Well, improvisation has always been . . . . What is that, Sir? It's not cricket? An insult to a great and honourable

game? No cricketer would consent to spoiling a noble ship for . . . .? Yes, yes, Sir. Of course, we see your point. As an engineer you would naturally hold the view that it is the little things that count. You would, for example, specify precision holding components by Newton. You would know that security, speedy assembly—and often safety—depend upon Newton accuracy and dependability. Precisely, Sir, the Ha'p'orth of tar . . . .

## **NEWTON**

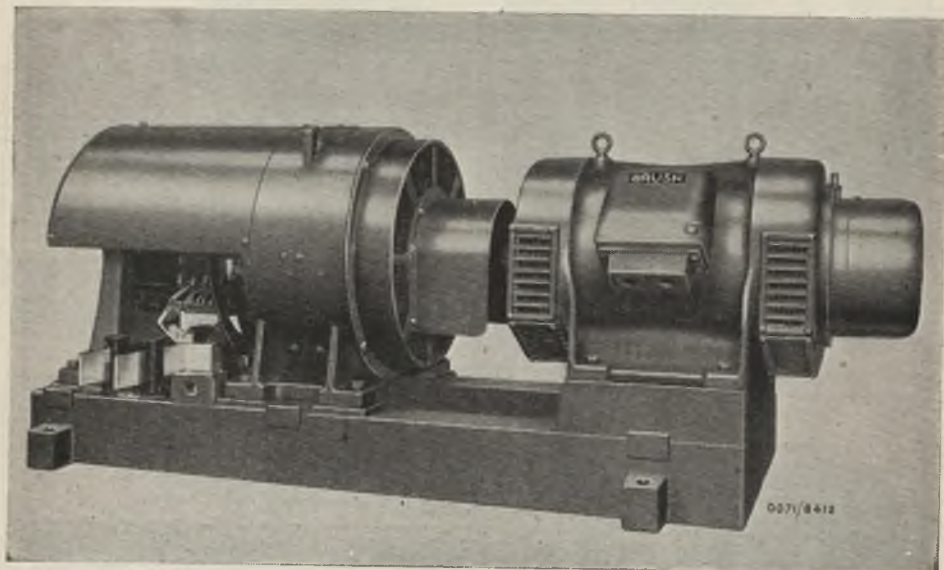
### **HOLDING COMPONENTS**

*Bolts, Nuts, Screws, Rivets, Precision Components*  
**L. H. NEWTON & CO. LTD., NECHELLS, BIRMINGHAM, 7**

*Telephone: EAST 1551 (16 lines)*

*London, Coventry, Manchester, Bristol, Dublin, South Africa, New Zealand, India*

## *Precision Speeds Production*

**BRUSH****ELECTROLYTIC  
GENERATORS**

**B**RUSH Electrolytic Generators have been standardised for current ratings of 1,000, 1,500, 2,000, 3,000 and 5,000 amperes, and are suitable for coupling to any type of driving motor.

Brush generators embody the highest standard of modern design, manufacture, and the unique experience gained in the production of heavy current generators extending from the early days of the electrical power industry.

*Send your enquiries to*

8-46

**THE  
BRUSH  
ELECTRICAL ENGINEERING  
LOUGHBOROUGH  
ENGLAND**

BRANCHES : LONDON, BIRMINGHAM, CARDIFF, MANCHESTER, LEEDS, NEWCASTLE, GLASGOW, BELFAST, DUBLIN



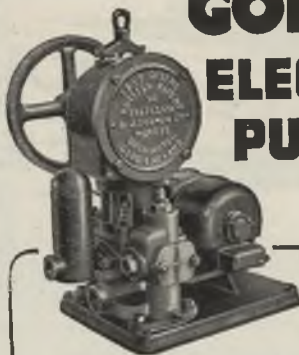
# DRAWING ATTENTION

COPPER & BRASS  
WIRE & STRIP  
PLAIN & TINNED

**R. H. SYMONDS LTD**  
39, VICTORIA STREET  
WESTMINSTER, S.W.1

E.R.I. 

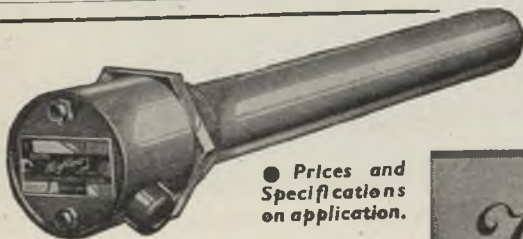
# Specify GODWIN ELECTRIC PUMPS



**TYPE A.I.E.  
PATENTED  
ELECTRIC PUMP**

is one of a range particularly useful where light and efficient duty is required. It has a capacity of 250 G.P.H. to a head of 80 feet and is fitted with Totally enclosed Self-oiling Mechanism with BALL BEARINGS throughout. Other special features include non-corrodible GUN METAL PUMP BODY, STAINLESS STEEL PISTON ROD and also AUTOMATIC GLAND ADJUSTMENT which reduces friction to a minimum. Write for fully illustrated lists, prices and generous discounts of the comprehensive range of Godwin Electric Pumps and Water Systems.

**H. J. GODWIN LTD.**  
QUENINGTON GLOS.

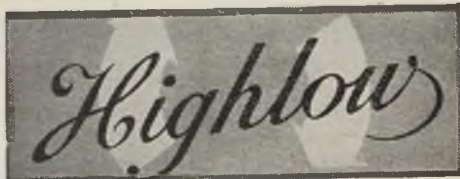


● Prices and  
Specifications  
on application.

**ARCHD. LOW ELECS. LTD.**  
Newarthill, Motherwell, Scotland

# OIL HEATING

We have developed a new range of Electric Oil Heaters for use with Creosote "B" and Creosote/pitch "C.P." mixture.



Generous  
Discounts  
on  
Application

# TUNGSTALITE

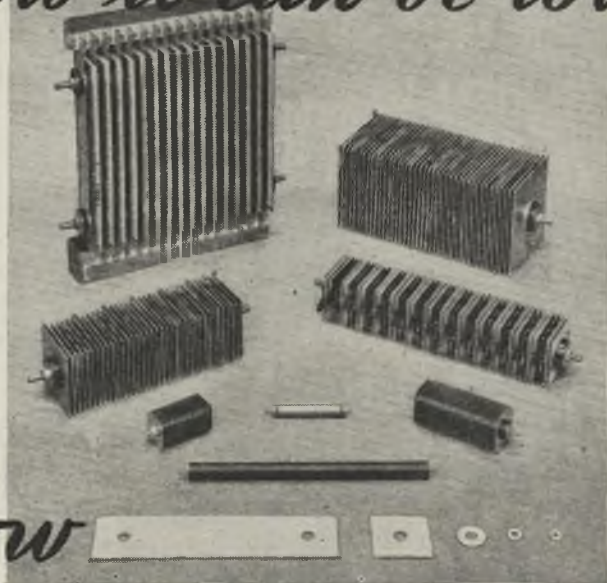
BRITISH GASFILLED.

THE LAMP OF PROVED EXCELLENCE.

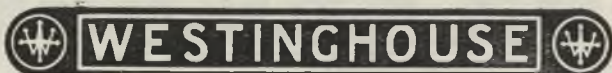
*"The Light that saves!"*

Manufactured by  
**TUNGSTALITE LTD.**, 47, FARRINGTON ROAD, LONDON, E.C.1.  
Telephone: Holborn 2321 & 2322 (2 lines).

*Now it can be told*



*How*



# METAL RECTIFIERS

*served the needs of war to further  
the aims of peace*

Because of the many and varied purposes for which they have been, and are still being, used on War Service, Westinghouse Metal Rectifiers have found their place—on land, sea and in the air—in every theatre of war as well as in every branch of war industry itself.

The number of rectifier elements produced from the outbreak of war up to the beginning of 1945 reached 115,000,000 and completed sets 76,500; together with over 120,000 transformers and chokes, in the manufacture of which 1,625 tons of electrical steel sheet were used for laminations, with over 500 tons of copper wire.

**WESTINGHOUSE BRAKE & SIGNAL CO. LTD., Pew Hill House, Chippenham, Wilts.**



**OUR WAR EFFORT**

**363,280,000**

**YARDS OF ASHTON CABLE**

have been supplied by Aerialite Ltd. to  
the Fighting Services to date.

CABLES FOR LIGHTING, HEATING, TELEVISION,  
RADIO, TELECOMMUNICATION, ETC.

**AERIALITE LTD**

*Castle Works*

STALYBRIDGE • CHESHIRE



**Dennis**  
**SWITCHGEAR**



PERFECTION IN DESIGN  
RELIABILITY IN SERVICE

**G.P. DENNIS**  
LIMITED  
ST. MICHAEL'S STREET  
CHESTER  
PHONE: 3743/4

SPECIALISTS IN SWITCHBOARDS  
CONTROL ROOMS • DISTRIBUTION  
BOARDS • FUSES & SWITCHGEAR

LONDON OFFICE: ABFORD HOUSE, WILTON RD., S.W.1  
Telephone: VICTORIA 5780

**FULL FACILITIES  
FOR INSPECTION**



Every portion of every tube and all joints can be inspected in Green's Premier Diamond Economiser. There are no dead pockets or concealed spaces where slow corrosion can proceed undetected. In this respect alone, this design is the most important advance in recent years in economiser practice.

**GREEN'S**  
**economisers**

E. GREEN & SON  
LIMITED

**WAKEFIELD**

**RM**

**COILS, CHOKES  
TRANSFORMERS**

R. M. ELECTRIC LTD.  
TEAM VALLEY,  
GATESHEAD, II.



We manufactured an enormous quantity of the H.A.I.S. cable used so successfully for maintaining a continual supply of petrol between England and the Continent.

In the above photograph are seen three 30 nautical mile lengths of H.A.I.S. cable being coiled down at our Works.

**CALLENDER'S CABLE & CONSTRUCTION CO. LTD., HAMILTON HOUSE, VICTORIA EMBANKMENT, LONDON, E.C.4**

*All over the World*

*Are you buying Lamps  
in the best market?*



Whatever your annual expenditure for electric lamps may be, you will show an immediate saving by buying Atlas Lamps.

Subjected to the most exhaustive tests at every stage of manufacture they are guaranteed to conform to the highest possible standard of efficiency. Instal Atlas Lamps and you will see the difference in quality and the extra discounts you receive will lighten your annual bill. Write for terms to-day.



**LIGHTING ADVISORY  
SERVICE**

In the drive for efficiency, good lighting for factory and office is vital. Our Lighting Engineers will be pleased to survey your installation and submit their recommendations for attaining maximum lighting efficiency.

**ATLAS  
LAMPS**

*Nothing better has come to light*

THORN ELECTRICAL INDUSTRIES LTD., 105-109, JUDD ST., LONDON, W.C.1. 'Phone: Euston 1183

Northern Branch: 55 Blossom Street, Manchester.

'Phone: Central 7461

N.E. Depot: 46 Sandhill, Newcastle-on-Tyne, 1.

'Phone: Newcastle 24068





Siemens Lamps  
are made  
throughout  
in England

## SIEMENS lamps

— used for lighting  
**BIG BEN** — and just  
as reliable!

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



M.S.M. are specialist manufacturers of tilting type mercury switches suitable for instrument work, domestic and industrial apparatus and power control gear.

THE MERCURY SWITCH MANUFACTURING  
CO. LTD.  
WEST DRAYTON, MIDDLESEX

*For Reliable Products*



Specialists in:-

**SWITCHGEAR and  
CONTROL EQUIPMENT**

**AUTO & CAPSTAN PARTS**

**PRESS & WELDED WORK**

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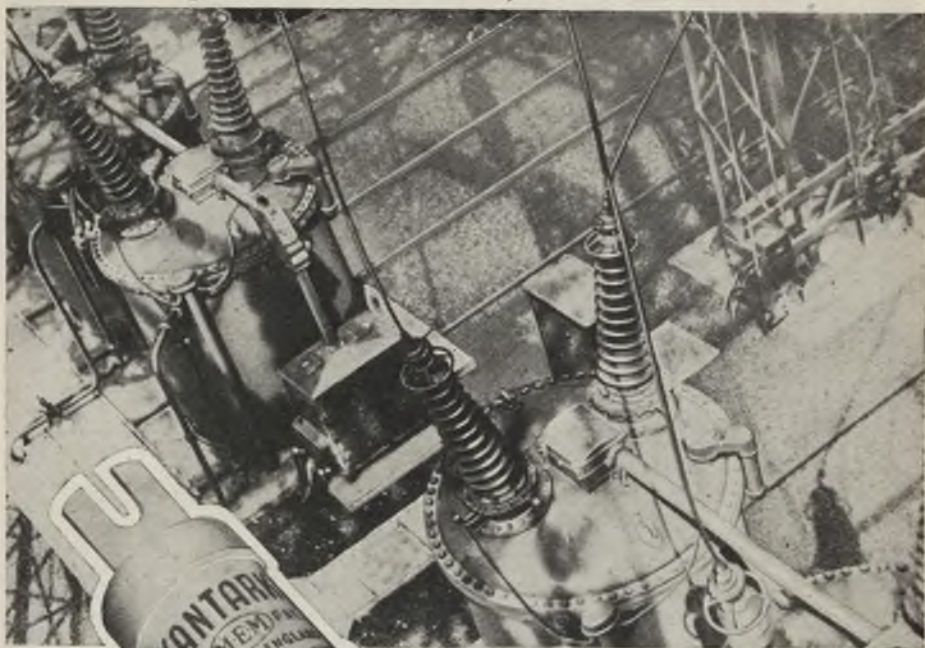


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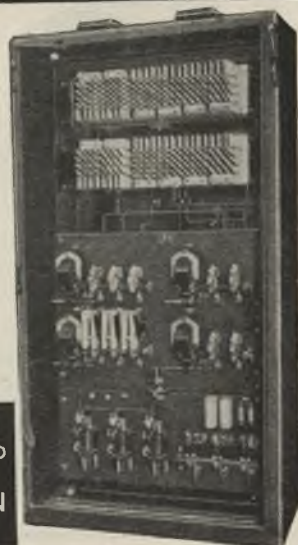
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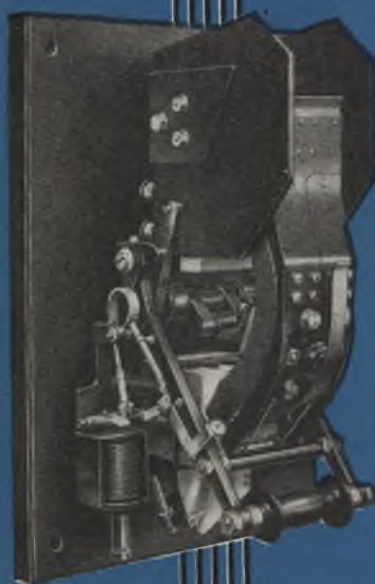






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# ELECTRICAL REVIEW

June 29, 1945

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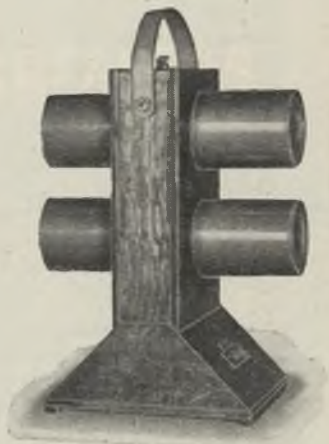


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# ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872



Vol. CXXXVI. No. 3527.

JUNE 29, 1945

9d. WEEKLY

## Men and Materials

### Trends in the Institution's Activities

**L**OOKING back over the session's institutional activities, one notes particularly the great amount of thought that has been devoted to training and research. No doubt favourable war developments were instrumental in heightening appreciation of the vital part to be played by these twin subjects in restoring and enhancing the industrial position of Great Britain. The key-note was struck in the presidential address of Sir Harry Railing to the Institution of Electrical Engineers, in which the fundamental need in all quarters for cultivating a scientific approach to the problems of life was urged. As apt corollaries, several chairmen's addresses to Sections, Centres and Sub-Centres had training and research as their main themes and many other pronouncements by leading electrical engineers included references to them.

#### Background and Future Requirements

In the issue of the *I.E.E. Journal* (February) in which appeared the Second Report on the Education and Training of Engineers, an appropriate background was given to it by the critical historical summary of technical education presented by Mr. J. Cormack (Mersey and North Wales) and by the setting out by Mr. W. Kidd (North-Western) of the framework of professional organisation necessary to make it fully effective.

Training and research naturally go together. The late Professor Stephen Dixon is quoted by Professor R. O. Kapp as defining an engineer as one who can deal adequately with men and materials.

Men come first, for modern engineering is inherently a co-operative enterprise in which close association is called for not only with those working in the vast electrical field but also with those whose outlook is often foreign to the engineer's. This essential quality of the inter-relation is stressed by Mr. R. A. H. Sutcliffe (Sheffield), who states that the electrical engineer enters more intimately into the texture of our civilisation than do those who follow any other occupation.

#### Non-Professional Subjects

Certainly the extent of the penetration will increase as time goes on. Professor Kapp points out, however, that criticisms of existing educational methods are not generally directed against its technical aspects, as such, but rather against a comparative neglect of outside subjects that should form part of the intellectual make-up of engineers.

Electrical men are, of course, of diverse types, but as Mr. F. W. Lawton (South Midland) says, they should have two things in common—a knowledge of fundamentals and an ability to think. Although ingenuity should always be a characteristic of the engineer, it needs more than ever to be reinforced by ability to deduce results logically from scientific data. For example, electro-technical applications are restricted by available materials, especially insulation. Professor E. B. Moullin, discussing molecular concepts of the structure of dielectrics, suggests that research in this direction may indicate how to “engineer” materials—but only

through ordered and systematic mental effort that places no reliance on unlikely accidental discoveries. The true worth of synthetic materials lies not in mere replacement of natural products but, as Mr. A. Brookes (East Midland) submits, in giving improved performances for various specific purposes. In subscribing to the view that one of the most obvious needs in the electrical industry is for new materials, Dr. W. G. Radley (Measurements) adds that the future prosperity of this country will be determined by the extent to which its research activities give birth to new manufacturing developments.

As a relaxation of the austerities of the past few years, the first evening function to be held since the outbreak of war under I.E.E. auspices—the Transmission Section dinner last week—was obviously very welcome to the members. Informal by name and nature, it allowed more time for reunion than did the lunches with which the Sections have filled the gap, as from these one had to hurry away to an afternoon's work. Full advantage was taken by members of other Sections to show that they take little account socially of the thin barriers dividing the membership that are merely a practical and convenient way of dealing with technical business.

THE numbers enrolled in the specialised sections of the Institution of Electrical Engineers grow steadily, but not nearly all those eligible have taken the preliminary step of filling in the form applying for inclusion, as recommended by Mr. H. W. Grimmitt, chairman of the Transmission Section. The main condition is that applicants shall be actively engaged in work coming within the scope of any particular Section. Not all I.E.E. members are catered for in this way, but clearly, before a new group of this kind can be formed, evidence of practical support for it must be furnished by promises of enough papers of the requisite quality for a reasonable time ahead.

REFERENCE is made on **Availability of** another page of this issue **Equipment** to an interesting survey by the Ministry of Works of the situation with regard to supplies of building materials and equipment. It

appears from this that both gas and electric cookers are not available in sufficient numbers to meet the demand—mainly we presume for the temporary houses which are to be erected and to some extent for the replacement of appliances destroyed in air raids. While gas water heaters are also in this category electric water heaters and immersers are more freely available and the same position is reported in the case of gas and electric fires. There may be more than one explanation of this but it is probable that it is because electric water heating and electric fires, in spite of their undoubted merits, have not made the headway against gas opposition which is their due.

**Tariff Bases** In an article in this issue Capt. J. M. Donaldson refers to a difficult point which arises in connection with the use of rateable value as a basis for the fixed charge of two-part tariffs. It crops up when there is a re-valuation of property in a district for rating purposes. Consumers understandably object to having to pay more for their electricity on top of higher rates and, as Capt. Donaldson says, the supply authorities usually ignore the increase in assessment. But then the problem of the new consumer has to be faced. Is it fair that for similar premises he should have to pay a higher standing charge because his assessment is greater? It certainly seems as though a firmer basis is desirable, particularly as an all-round re-valuation is a post-war possibility.

**The Domestic Chimney** As a footnote to a debate in the Commons earlier in the year, which covered the need for smoke abatement, comes a report of an investigation undertaken by the borough council of Bilston (Staffs) with the co-operation of the Department of Scientific and Industrial Research. According to *Smokeless Air*, it was found that 70 to 90 per cent. of the smoke over the town emanated from domestic chimneys, much the greatest concentrations being brought by winds from local areas devoid of industries, while conditions on an average were worse on Sundays. Even the bulk of SO<sub>2</sub> pollution—60 to 80 per cent.—was traceable to the residential districts. Since Bilston is part of the Black Country, the example is all the more striking.

# Remodelled Power Station

## Wartime Extensions at Kilmarnock

**T**HE Kilmarnock generating station of the Ayrshire Electricity Board, which we recently visited, by the courtesy of Mr. W. C. Bexon, M.I.E.E., general manager and engineer to the Board, has twice been extended during the war and now has a plant capacity of 85,000 kW. There are two 30,000-kW turbo-alternator sets which were put into commission in 1940 and 1943, respectively, and two 12,500-kW sets which were part of the station's 34,500 kW of generating plant before the initial extension was started. In four small sets, 9,500 kW of this original power plant was removed from a separate turbine room which was later remodelled and equipped as the main station control room. Five 150,000-lb. per hour boilers were included in the two extensions, two with the first turbo-alternator set and three with the second set, and six older boilers of up to 50,000 lb. per hour capacity each complete the boiler installation as it is to-day.

The station is situated on the north bank of the River Irvine and the extensions are all at the north end of the station site and buildings. The 1940 boiler-house and turbine-room extensions are, in effect, con-

tinuations of the older buildings. The two buildings thus completed by the 1940 extension, *i.e.*, turbine room to the east and boiler house to the west, are adjacent, the lower portion of the east wall of the boiler house forming the dividing wall between both buildings. One of the three boilers of the 1943 extension is in line with the two 1940 boilers and the double row of older boilers, and the two 1943 boilers are in a westerly extension of the 1940 boiler house, so that the five new boilers are now in a new boiler house measuring 140 ft. long, 96 ft. wide and 100 ft. high, in two facing rows, with an unusually wide firing aisle between with clean red tiles.

The latest turbine is housed in a new turbine room extending eastwards from the older turbine room 110 ft. long, 58 ft. wide and 54 ft. 6 in. high. In order to secure structural uniformity from the civil engi-

neering aspect the turbine-room basement is 15 ft. below ground level, while the boiler house basement is at ground level. The double-compartment boiler coal bunkers immediately above the firing floor have a total capacity of 1,250 tons.

Because the two turbo-alternator sets and



From the hopper under the second tower coal is taken by underground conveyor to a bucket elevator serving the boiler-house bunkers



Coal arrives at sidings on each side of the River Irvine



all five boilers are practically identical in design and lay-out we propose to describe the new plant as a whole as if it were one

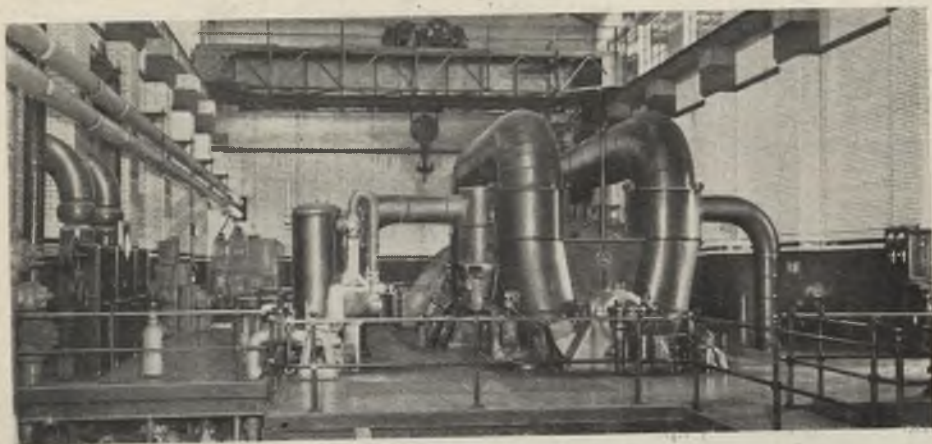
bustion tri-drum units, are each designed for the following conditions: normal evaporation 120,000 lb. per hr., m.c.r. evaporation 150,000 lb. per hr., peak evaporation 165,000 lb. per hr., steam pressure 420 lb. per sq. in., steam temperature 800 deg. F., and feed temperature 300 deg. F. The drums are of solid forged construction. The boiler feed water enters the rear



The five new boilers are now in a new building in two facing rows, with an unusually wide firing aisle

major extension or, indeed, a complete power station, for the older plant now forms only a minor portion. Further, we propose to describe the plant as far as possible in the production-flow sequence of the station. The boilers, all International Com-

drum through a distributing trough in order to ensure a uniform flow along the length of the drum. The boilers are completely steel cased with heat-insulated panels, and the effective heating surface area of each boiler is 16,410 sq. ft. Hopkinsons boiler mountings are installed with such special fittings as Copes feed-water regulators, "Igemal" remote water-level indicators and Dewrance external-type high- and low-water whistle alarms. The



The turbine room extension is a continuation of the old building; both 30,000-kW turbo-alternators are practically identical

heat-reclaiming surfaces are maintained free from deposit by "Ivor" soot blowers.

The combustion chambers are designed to burn a low grade fuel ("Scotch Gum") with maximum efficiency, and the chamber of each boiler has a volume of 9,030 cu. ft. The four chamber walls consist essentially of

elevator which serves the conveyor feeder system over the boiler-house bunkers. There is another conveyor scheme which serves the older station plant and is also used for reclaiming the coal. A drag-scraper is used for this purpose and for distributing the coal about the storage ground. From the

boiler bunkers the coal falls via the boiler hoppers to the "L" type grate stokers. Each boiler has twin stokers with a total grate area of 585 sq. ft. The grates are independently driven and the build-up of the cast-iron louvres is such that



Secondary air fans are housed at basement level; ash and riddlings from the grates are fed into troughs under the basement floor

the air supply to any particular part of the grate can be varied according to the combustion conditions.

tubing which is integral with the boiler heating system. All the coal consumed at the station is rail borne. There are two sources

Circulating-water pumps each with a capacity of 924,000 g.p.h.

of supply on the site, from sidings on each side of the Irvine. Coal from wagons on the south side of the river is emptied by a rotary tippler into a concrete hopper serving an inclined belt conveyor which elevates the coal to the first tower of the conveyor system. In this tower the coal is passed, either to a storage ground on the same side of the river, which will accommodate about 20,000 tons, or to a second inclined conveyor which elevates it to a second tower on the other side of the river.

From the second tower the coal passes to a second below-ground hopper which is also served by the rotary tippler for the other sidings, and from this hopper it is taken by an underground conveyor to a bucket



Ash and riddlings from the grates are chute fed into troughs under the basement floor, through which they are sluiced to a swirl pit from which the mixture of ash and water is pumped into elevated storage bunkers in which the water flows over weirs and returns to the system, while the ash is discharged into railway or road vehicles for disposal.

A single-compartment bunker which is on the point of completion has an ash capacity of 5,200 cu. ft., while the older two-compartment bunker will hold 8,000 cu. ft. all told. The ash-handling system



as a whole will deal with eight tons of ash per hour.

There are forced and induced draught and secondary-air Howden fans in the combustion



Two natural-draught hyperbolic cooling towers each deal with 1,850,000 gal. per hour

circuit, the f.d. and i.d. fans being installed at a level of 76 ft. above the boiler-house basement, and the secondary-air fans at basement level. There is one of each of these fans per boiler. The f.d. fan passes air through one side of an "Usco" plate-type air heater and is preheated to 310 deg. F. This air is then passed on to the stoker and secondary-air fans, the latter introducing additional air to the furnace through nozzles over the front arch. The air heater has a heating surface area

Complete new 22-kV switch-gear has been provided for the generation and main distribution. (Group feeder circuit-breakers.)

of 17,000 sq. ft. The gases from the combustion chamber take their tortuous path through the water-tube and superheater-tube passages on, in turn, to the economiser and the other side of the air heater for the regenerative air heating, to be pulled through to the stack by the i.d. fan.

The "Senior" economiser has a heating surface of 7,452 sq. ft. and the "Melesco" superheater has a heating surface area of 6,000 sq. ft. There is a separate stack for each boiler, superimposed on the boiler roof structure and measuring 66 ft. high and 8 ft. in diameter. There is a similar stack for each of two of the older boilers and one for each pair of the remaining four boilers, so that the complete station has nine stacks in all. The stoker f.d. and i.d. fan motors are all automatically controlled by the Bailey system of automatic combustion control which, governed by the steam pressure, regulates the grate and fan speeds so as to maintain the combustion conditions at maximum efficiency at any load. The instruments, switches, relays and contactors embraced in this system are all housed in or on a main central desk-type cubicle control board for each boiler, together with a full complement of pressure indicators, draught gauges, feed-water and CO<sub>2</sub> meters, temperature indicators, etc.

The most economical loading point of each of the B.T.H. 30,000-kW, 3,000-RPM turbo-alternator sets is 24,000 kW, and at this output the steam consumption is 9.239 lb. per kW, with a feed-water temperature of 300 deg. F., and a condenser vacuum of 28.5 in. Similarly, at the m.c.r. load, the consumption is 9.529 lb. per kW with



a feed-water temperature of 313 deg. F., and a vacuum of 28.3 in. Each turbine is a two-cylinder impulse-reaction machine



designed for operating with steam at 400 lb. per sq. in. and 800 deg. F. The h.p. cylinder has 20 stages of pure impulse operation, while the exhaust casings consist of streamline flow castings so arranged that the steam passes through various stages in opposite

water system. The condensing and feed-heating equipments are all Worthington-Simpson products.

The circulating-water pumps, each of which has a capacity of 924,000 gal. per hour, draw their water from an inlet tank



Switchgear is remotely solenoid operated from a spacious new control room

directions, finally passing through the exhaust openings to the condenser.

Throughout this circuit, steam is bled from four points to serve the feed-water heaters and evaporating plant incorporated in the enclosed feed-heating system. All the make-up entering the system is de-aerated in the condenser and all excess water is stored in suitable tanks. The evaporator will deal with 15,000 lb. of raw water per hour. Each boiler is served by one motor-driven and one steam-turbine driven stand-by feed pumps, each with an output of 36,780 gal. per hour, and the feed-water pumping point in the heating system is at an intermediate stage between the various feed-water heaters.

The condenser of each set is a twin-shell unit having a cooling surface of 28,000 sq. ft. The condensate from each condenser is dealt with by two 100 per cent. duty two-stage vertical-spindle extraction pumps, while a vacuum of 28.5 in., with a barometer reading of 30 in., is maintained by two 100 per cent. duty steam-jet air ejectors. The cooling water is supplied by two 50 per cent. duty circulating-water pumps for each set, incorporated with the cooling towers in the

located in the pump house which was formerly the boiler house for the original power station. The inlet tank is supplied from the cooling tower ponds and the dual system of pumping is necessary because the two cooling towers are situated on the opposite side of the river. The under-river piping necessitated by this scheme is one of the outstanding civil engineering features of the extensions, and the work was rendered more difficult by the considerable rise and fall of the river due to variations in rainfall. The piping includes 54-in. and 60-in. bore pipes laid side by side in concrete.

The two natural-draught hyperbolic reinforced-concrete cooling towers will each deal with 1,850,000 gal. of water per hour, cooling from 87.5 deg. F. to 75 deg. F., with a dry-bulb temperature of 53 deg. F. at 100 per cent. humidity. The make-up under the designed conditions is 0.81 per cent. of the water entering the tower per 12.5 deg. F. range of cooling. The dimensions of the cooling towers vary slightly, but the top, throat and base diameters of the more recently installed one are 87 ft., 77 ft. and 130 ft. respectively. The height of both towers above the sill is 190 ft. and the depth

of the pond below the sill is 10 ft. 6 in. Both of the new 30,000-kW sets operate entirely on the two cooling towers. The towers also serve to some extent for the older plant, *i.e.*, the two 12,500-kW sets, but the original scheme of riverside operation still applies to these older sets as far as conditions permit. The riverside operation scheme embraces a movable barrage across the river, and when the river water is inadequate in dry weather the Glenfield and Kennedy barrage is lowered so as to dam the river and create a reservoir for recirculating purposes.

The alternators are rated at 37,500 kVA, 3-phase, 50 cycles, 0.8 p.f. and generate at 22,000 V. They are of the totally enclosed design, the air cooling being arranged as a closed-circuit system, with water-cooled air coolers served by the condenser circulating water system. A stabilised exciter is carried on an extension of the alternator shaft.

#### New Switchgear

Before the installation of the first of the two new sets, generation was at 3,300 V, and step-up transformers served the primary transmission scheme at 22 kV. The switchgear for the larger sets could not be connected direct to the existing 22-kV switchgear, so that new switchgear has been provided for the generation and main distribution at the primary voltage. This new B.T.H. equipment is of the single-busbar sectionalised design, and the metal-clad draw-out type, with each phase completely isolated. The oil circuit-breakers have a single break, the arc being controlled by self-compensated explosion pots. Each circuit-breaker contains only 78 gallons of oil for the three phases and the rupturing capacity of each unit is 750 MVA. Each separate phase of the air-cooled condenser busbars terminates in a compound-filled junction busbar requiring only 120 lb. of compound.

The group feeder switches are connected to the earlier 22-kV switchgear which has only a limited rupturing capacity, and as a safeguard reactors are connected in the group feeder cable circuits to limit the short-circuit fault value to that of the breaking capacity of the earlier switchgear. These single-phase, air-cooled, cast-in-concrete reactors are installed in brick cells. All the switchgear is remotely solenoid operated from an attractive and spacious new control room accommodating, in addition to the

equipment for the 22-kV and the 11-kV switchgear, the control board for the adjacent grid substation.

With the exception of the boiler feed pump and circulating-water pump 3,300-V motors, all the station auxiliaries are supplied at 415 V and served by a metalclad, air-insulated switchboard which incorporates high-rupturing-capacity air circuit-breakers. The 3,300-V motors are served by metal-clad vertical-plugging oil circuit-breakers.

Mr. Bexon served as the consulting engineer for the extensions described above and we are indebted to senior members of his staff for their help in the writing of this article.

### Leeds Report

**A**T Leeds there was a decline in power supplies in the second half of 1944-45, but large increases (over 30 per cent.) were registered in residential and heating consumption, mainly on account of the cold weather in the early part of this year. Private lighting supplies were also higher. Altogether 363.1 million kWh was sold, an increase of 18.8 million (5.4 per cent.). This total includes bulk supplies of 10.3 million kWh to other undertakings but not those to the C.E.B. (219.3 million). Under the residential tariff supplies last year amounted to 85.8 million kWh (against 65.0 million) and for heating 20.2 million (15.4 million).

Of the record total of 662.1 million kWh generated last year 636.6 million was produced at the Kirkstall power station where the coal consumption averaged 1.352 lb. per kWh. Including Whitehall Road, coal consumption was 1.403 lb. per kWh compared with 1.449 in the previous year. Working costs per kWh generated were 0.293d. at Kirkstall and 0.808d. at Whitehall Road.

Revenue from electricity sales amounted to £1,384,998 (against £1,203,865), equivalent to an average of 0.915d. (0.839d.). From November 30th, 1943, 5 per cent. was added to all tariffs; from March 1st, 1944, a coal clause was introduced in connection with power supplies; and from September 30th, 1944, a further 5 per cent. was added to tariffs not subject to a coal clause. These alterations produced about £6,000 in 1943-44 and £110,000 in 1944-45, and early this year discussions were begun with the Electricity Commissioners for further adjustments. To put the advances in their proper perspective, Mr. F. Nicholls, the city electrical engineer, recalls in his report that between 1916 and 1918 increases of 10, 20, 40, 60 and 80 per cent. were imposed.

Gross income on distribution account was £1,401,257 (£1,235,884) and expenditure £1,159,313 (£1,059,162), there being a balance on net revenue account of £169,379 (£93,343). After provision for the reduction of debt and contributions to items of a capital nature there is a deficit on the appropriation account of £28,598, compared with a deficiency of £100,161 in 1943-44.



# The Domestic Consumer

## What is the Best Method of Charging ?

**M**ANY domestic users of electricity are irritated by the variations in the methods of charging and to a lesser extent by the difference in rates between neighbouring districts and also in the country as distinct from urban areas. Much time and skill have been devoted by suppliers to getting out rates which are "promotional" and also fair as between buyer and seller; nevertheless almost as many varieties of rate as the products of Mr. Heinz are in common use. Simplification and standardisation are being much discussed and both should be obtainable without destroying the value

of the work that has been spent on developing rate-structure. Any standardised form of rate must make allowance for the improbability of any great fall in price of coal during the next few years.

Figures used in the following notes are intended to indicate not what the actual rates should be but only the form they might take.

Questions the consumer often asks are as follows:—"Why do you charge me 4d. a unit for lighting and only ½d. for other purposes? After all, a unit is a unit." "Why may I not use lighting from a power circuit and why do I have to have two wiring systems anyhow?" "What have the local rates or the size of my house got to do with my electricity bill?" "I can send a letter any distance for one penny (or 1½d. or 2½d. as the year may be!), so why can't electricity be sold at the same rate everywhere?"

While the first three questions admit of what appears to a technical man to be a simple explanation, the average consumer will not necessarily be convinced and it is better to avoid queries by a method of charging which does not emphasise these points. Unfortunately it costs much more to supply scattered country consumers than compact blocks of property in the town. Although some widespread organisations, taking the fat with the lean, charge more or less uniform prices in town and country, it is not likely to be universally practicable and those who say it is are doing a disservice to the industry and the consumer as well. The letter-post argument has no weight since a very high proportion of the cost of handling

a letter consists of terminal charges, *i.e.*, local collection, sorting and local delivery. If the letter has to go by train it makes only an infinitesimal difference in cost whether it travels 10 or 500 miles. Furthermore, the argument is vitiated by the fact that Post Office telephone charges (other than local calls) are based on distance—that is they take into account the capital involved in trunk lines, etc.

However, the ordinary consumer is concerned with the *money* he has to pay for a given service and if this seems right or reasonable he does not generally care how it is calculated. For this reason some local authorities, which assess property in their areas at high levels

so that the rate in the pound is small, do not in the long run deceive the ratepayers.

The supplier is interested in selling as much as he can from a given plant and cable investment and desires to encourage long-hour use. In other words he desires a "promotional rate," and contented consumers are his best advertisement. He also favours a one-meter system so that current for any purpose can be used from one circuit, as this undoubtedly tends considerably to simplify wiring and saves an extra meter. There is thus, to a large extent, a common point of view as between buyer and seller.

This then leads to the various forms of two-part tariff with one meter, with a fixed charge payable in four quarterly instalments, equal or otherwise, and a low rate for all energy used (lower perhaps in summer than in winter). The distinction between summer and winter quarters, desirable and reasonable as it is, may not, however, be practicable with continuous meter reading, which is generally adopted in the larger undertakings.

The three bases commonly used (with variations) for the fixed charge are (1) a percentage of the rateable value, (2) a figure per sq. ft. of floor area or per habitable room, and (3) the total watts of the installed lamps multiplied by a constant.

Of these methods the second was recommended by the committee appointed by the Electricity Commissioners some years ago and the reason is not far to seek. While No. 1 is very convenient and easy to ascertain, it has the disadvantage that the situation of

**By Capt. J. M. Donaldson,**  
M.C., M.Inst.C.E., M.I.E.E.



the property may, and generally does, affect the rateable value although the consumption is not affected. It seems unreasonable that a householder should get his electricity cheaper if he lives, say, opposite a sewage works! Also the rateable value is increased by the addition, say, of a bathroom, a garage or bay windows, none of which things necessarily increases the demand for electricity. Again when rateable values as a whole are increased, though the supplier usually (for the sake of a quiet life) does not increase the fixed charges, it means that old consumers are on one basis and new ones on another, which leads to difficulties, as near neighbours are apt to compare their accounts and a difference of even 3d. per annum has been known to cause heart burning.

#### Advantages of House-Area Basis

The second method of floor area bears a direct relation to the probable demand for lighting and for heating also, though a distinction has to be made (and can readily be made) between flats and bungalows with living rooms and bedrooms on one floor, and two- or three-storey houses, where the living rooms are generally on one floor only. The room method is simple (only certain rooms are counted) but is liable to cause queries and it makes no distinction between room sizes which is not logical. On the whole the house area, measured from outside and modified for the number of floors is easy to check and seems fairest. (Incidentally, the rateable value is often based on floor area).

The third method has the serious objection that the lamp installation has to be periodically checked and tends to cause the consumer (in the first place at any rate) to adopt too low a standard for lighting and the upward revision often necessary after a check may engender ill-feeling. On the other hand it links up the two-part tariff logically with other standard rates, *e.g.*, flat rate or *m.d.* rate. Thus by taking a percentage of the lamp wattage (probably about two-thirds) one arrives at the probable lighting demand and this can be linked up with the *m.d.* rate by assuming, say, two hours use per day of the maximum demand on an average. This gives a total number of kWh which can be assessed either at the flat rate or the maximum demand rate and having made a deduction of the number of kWh at the follow-on rate which is going to be used, the remainder represents the kW charge only, at normal rates.

This has two advantages, first the two-part

tariff can be readily adjusted if the flat rate is reduced and there is a further advantage which relates to large country mansions with, perhaps, seven or eight reception rooms and twenty to thirty bedrooms. A fixed charge based on the floor area or number of rooms would unfairly penalise the consumer, but such large houses have usually been supplied from a private plant dealing with lighting only, and the lighting demand, which can be used to determine the fixed charge, can generally be found from the records.

It is not suggested that the lamp-wattage basis should be used directly for the reasons given above, but the principle can still be employed by taking not the actual wattage installed but a reasonable figure based on the use and size of the room and in this way getting the best of both worlds. If some such method is not used the fixed charge tends to become a wholly arbitrary one based on experience, but the other method has the advantage of relating the charge to actual reasonable conditions.

#### The Heating Load

In practice there is a fairly close agreement between the fixed charges arrived at by way of the three methods, but with a fixed charge derived in any such way and with a follow-on rate which is quite commonly  $\frac{1}{4}$ d. per kWh, the assumption is that the "other uses" do not increase the maximum demand on the system. When this form of tariff was first produced this may have been roughly true, but radiant fires certainly vitiate the argument. On the other hand, no method of dealing with this heating load has been adumbrated, as it is not practicable at this stage (and probably not desirable) to separate the circuits used for this purpose and to charge a rate for it that is higher than the normal follow-on charge. Nor is a surcharge for fires installed desirable as it involves difficult inspections at frequent intervals with strong objections from consumers and possible legal complications. The only practicable method appears to be to increase the fixed charge to a reasonable extent and average out a period of years. This may also be done, and perhaps better done, by another method set out below.

This brings me to a system which has been adopted successfully by several large undertakings. Instead of a fixed charge per quarter, there are one or more blocks at varying rates. The first block is for a number of kWh at a rate that brings in the

fixed charge on any of the above tariffs plus the running charge for the number of kWh involved, all over this being at the follow-on rate. With a lighting flat rate of say 4d. and a normal follow-on rate of  $\frac{1}{2}$ d., there would be in each quarter a block of kWh to be paid for at 4d. and the remainder at  $\frac{1}{2}$ d. or the scheme can be extended by making three blocks instead of two, the second block taking care of cooking and the final block water heating and room heating. Where the flat rates are as given above a higher rate is sometimes charged for separately metered heating, say, 1d. per kWh. In this case the second block would be at 1d. and beyond this amount the charge would be  $\frac{1}{2}$ d.

The older methods have the advantage that a definite revenue is obtained even if the electricity is used hardly at all, but the consumer may suggest that he is paying something for nothing. There is no reason in equity why he should not pay for the service (as for his telephone), but nowadays, with wireless, the number of cases in which the minimum amount would not be reached is not great and anyway consumers must be treated as a group and the results averaged.

As stated earlier, it may be impracticable to differentiate between winter and summer quarters whether in the fixed or running charge because of continuous meter reading. This has led to difficulties inasmuch as a consumer might use in the summer considerably less than the first block of units. If the number of kWh per block as between winter and summer cannot be altered, this might cause a consumer to complain that he was paying the high rate for heating units in the summer months, but it is a difficulty which has to be faced.\*

#### Adjustment for Coal Costs

Where the rate is as low as  $\frac{1}{2}$ d., a large increase in the cost of coal will have to be covered. Supposing, for example, all rates had been increased by 20 per cent.; the extra amount obtained on  $\frac{1}{2}$ d. a kWh is only 0.1d., whereas on the usual basis applied to large power users, for an increase of coal from 20s. basic to, say, to 40s. the extra charge would be

more like 0.25d. With coal gradually increasing in price the domestic consumer, with a flat increase of 20 per cent. is doing far better than a large power user and this is bound to cause trouble, as the factory owner is quite frequently a domestic consumer in the same area and makes comparisons.

On the other hand, the formula commonly used for power consumers of say, 0.001d. per kWh per 1d. per ton increase in the cost of coal, is not suitable, nor are frequent changes desirable. A practical method of dealing with this is to take the average coal cost for the preceding year as a basis for the ensuing year and to vary the cost of the follow-on kWh by working on the basis of 1s. rather than of  $\frac{1}{2}$ d. That is to say, if the normal follow-on rate at the standard price of coal is  $\frac{1}{2}$ d. this could be expressed as 24 kWh for 1s. For an increase in cost of 10s. the rate might be 20 kWh for 1s. or 0.6 per kWh and for further increases, say, 16 kWh for 1s. which is 0.75d. per kWh. I do not think that this would be difficult to apply.

#### Maximum Prices

While I am in favour of the fixed charge being based on floor area, if the majority of suppliers preferred the block system I would support it in the interest of the industry, but only one system should be used. If this were decided on some action by the Electricity Commissioners would be desirable. Practically all suppliers, including municipalities, work on Provisional Orders or their equivalent, in which the maximum prices scheduled are almost always based on the flat rate, whereas it has been contended for many years past that the standard rate should be a two-part tariff. In any case, in such schedules the maxima are really out of date and are never applied. Since the object is to prevent too high a price being charged it would suffice if the standard form of tariff were set out, with perhaps a maximum limit for the fixed part of the charge as well as for the kWh charge.

I do not remember any case where the maximum rate did not cover working conditions except during the first European war, when owing to the heavy increase in costs, particularly of coal but partly of labour, a Special Order had to be obtained from the Commissioners to allow the maximum charge to be exceeded. If, however, the new form included some allowance for the price of coal, this would be automatically dealt with and it appears to be a practical solution.

\* It is not uncommon for the landlord of large blocks of flats to include the fixed part of the charge for electricity in the rent (possibly retaining a small percentage) and the tenant pays only for the units metered at the follow-on rate. This is a most convenient system and has a favourable psychological effect on the consumer. This system cannot be very readily applied where the block method is adopted.



# Views on the News

## Reflections on Current Topics

**W**HEN taxation is being discussed it is more often than not income tax which is thought to be the most iniquitous. This is probably true, but there is still some vestige of relationship between the amount of the tax and the ability to pay. It seems to me that in some directions purchase tax is certainly unfair and I am glad to see that the matter is being raised by some electricity supply authorities. Post-war prices of labour and materials will remain well above the 1939 levels and in themselves will prohibit the production of electrical equipment at prices which people seem to think will prevail. But when on top of this a 33½ purchase tax (on the wholesale price) is imposed appliances will be put out of reach of a good many people. It is certainly to be hoped that as supplies of these essential articles become available the purchase tax will come off.

\* \* \*

At present most of the available supplies of cookers are being booked by the Ministry of Works for temporary houses. The Ministry is one of the Government Departments able to buy goods free of purchase tax and occupants of its houses will therefore pay a reduced price for their cookers in their rents. Thus, unless the tax is removed when cookers (and other appliances) are purchasable by electricity supply undertakings and private individuals there will exist a strange discrimination. This is to say nothing of the feelings of the trade on the subject.

\* \* \*

In his presidential address to the Institution of Gas Engineers a few days ago Mr. S. E. Whitehead said he understood that the report of the Egerton Committee was likely to recommend the construction of a flue in every room as well as the provision of gas and electricity supplies in all new houses. If this turns out to be the case is not the Committee misinterpreting its terms of reference somewhat? The Committee was set up by the Department of Scientific and Industrial Research "to review existing scientific information in this country and abroad on the heating and ventilation of buildings; to make recommendations for practice in post-war building regard being had both to economy and efficiency for the individual user and the economical utilisation of the national fuel resources, etc."

Even if the availability of two or three different methods of heating and ventilating a house was economical and efficient (which takes some believing), there is nothing economical and efficient in providing

for the duplication or triplication of services. Houses are going to be quite dear enough for a good many years without providing a lot of superfluous gas pipes and flues for services which can be performed as well or better by electricity.

\* \* \*

The suggestion of an Aberdeen municipal councillor, to which I referred on June 8th, that the tramways there should be scrapped in favour of the mysterious "Baba" buses or indeed of any other buses—is, I gather from the *Modern Tramway* as well as from Mr. B. J. Prigmore's letter last week, only a very small minority view. The *Electrical Review* has on many occasions championed tramways, animadverting on misleading comparisons between old tramcars and new buses and pointing out the unfair financial handicaps imposed on the former—for example the obligation on the tramways, which cause no wear on the highways, to maintain the road surface between the rails and 18 in. on each side. Nevertheless, where tramways are to be replaced, whether on account of unfavourable local conditions or whether because the renewal of the tracks, as well as of the rolling stock, presents too difficult a financial problem, the trolley bus is, in my submission, their natural successor.

\* \* \*

If other electricity undertakings follow Finchley's example their tariffs may soon read something like this: "Lighting, 3½d. per unit; heating, cooking and power, 1d. a unit; *goldfish*, £1 each." When Mr. C. R. Westlake went to Finchley as borough electrical engineer and manager he decided to employ goldfish (costing £35) to get rid of mosquitoes from the cooling-water lake at the power station. Now the mosquitoes are under control and no less than £300 profit has been made from the sale of the surplus fish, appearing in the accounts as "by-products." The warm water is ideal for breeding and is surely an argument either for or against district heating—I'm not sure which. Although the fish have proved such a profitable investment, Mr. Westlake finds them somewhat of a mixed blessing. Someone rang him up at 2 a.m. the other morning to inquire about them, and to save him further loss of sleep I had better mention that business is strictly wholesale. The lake, by the way, is now surrounded by trees, shrubs and flowers and is one of the prettiest spots in the borough. Chickens and rabbits are among other livestock reared by the undertaking.—REFLECTOR.



## CORRESPONDENCE

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

### Earthing in Rural Areas

IN the first paragraph of the article by R. Mallet in the *Electrical Review* of April 6th, the assumption is made that rural water supply systems would provide a low resistance if connection thereto were permitted. The statement "water-piping systems provide good earths" has been repeated so often in literature without any reservation that many people otherwise very well informed appear to accept it without question. So far as the requirements of a single farm are concerned, there may be little or no water piping in contact with earth at all. The writer has records of many such cases where it is obviously absurd to mention the water-piping as an earthing medium. In one case six animals were killed in a stable due to voltage coming by way of underground water-pipe from a residence about 200 ft. away. The earth resistance of the pipe measured 10 ohms and 50 V was established between the water bowls and the floor of the stalls.

The comment (second paragraph) that "news spreads rapidly (usually in an exaggerated form) and it is noticeable that pedigree live-stock seem to be peculiarly liable to injury" seems to require some clarification. If an animal is electrocuted, its salvage value is limited to that of the hide and the carcass for fox-meat. If a farmer is sufficiently progressive to install complete electrical and other equipment in dairy barns, etc., it is improbable that he would waste time and fodder to any appreciable degree on scrub stock. Naturally it would be pedigree or good grade stock that would be exposed to the hazards.

In the fourth paragraph Mr. Mallet refers to a "vertical school" and a "horizontal school" of thought with respect to placing the earthing spike. Theoretically of course one may belong to the "vertical school" of thought but, because of shallow earth and hard rock below, be forced to plant the ground rod horizontally or try another location. The author calls attention to potential gradients on the surface. Sometimes grounding spikes and rods are driven in such locations (e.g. adjacent to doorways) that an animal has no chance of protecting itself, and we have records of fatalities from such causes.

I do not wish to detract from the value of Mr. Mallet's article, which is both interesting and useful. In my opinion much more study should be given the subject and the information distributed in such manner as to promote

a better general understanding of the important elements.

One item on which information seems to be lacking at present is the current-carrying capacity of driven earth electrodes. It is highly important that the value of an earth installed for safety protection should not be vitiated by passage of load current. Trends in good practice are to keep stables dry, and soil in sheltered locations gradually increases in resistance for lack of moisture until low values of earthing resistance may be difficult to obtain. Another factor involved in considering water piping in rural installations is that its electrical continuity is not guaranteed. Many of the convenient materials for making pipe-joints watertight have substantial insulating qualities and joints of quite high resistance, even broken couplings, have been discovered in service.

Toronto.

W. B. BUCHANAN,  
Chairman, A.I.E.E. Subcommittee  
Electrical Hazards to Farm Stock.

### Release from the Services

COMMENTING in your issue of June 15th on the Electricity Commissioners' letter to undertakings, you refer to the probability of Groups 1 to 20 being released from the Services, under Class "A," during the next six months and thus not requiring application for release under Class "B." So far as the R.A.F. is concerned, this may—with luck—apply to the ranks in the Technical Branch but engineer and electrical engineer officers have been advised by the Air Ministry that, for the present, Group 1 only can be released. The Commissioners, therefore, would be well advised to recommend undertakings to apply for Class "B" release for all their key men who hold commissions in the Technical Branch of the R.A.F.

This unexplained decision not to permit electrical engineer officers to leave the R.A.F. with their appropriate age and service group has come as a shock to the older officers. Many of us are volunteers, released for service with the Forces by patriotic employers who, now the immediate danger which threatened this country has been removed, are just as anxious as we are for our return to our civil employment. The feeling of unfair treatment is aggravated by our being informed by Air Ministry Order, and reminded in conversation with higher formations, that our acting ranks are in danger, i.e., that many of us who have held senior rank for years can expect to be reduced in status and pay, in addition to being prevented from

leaving the Service at what we consider is our due date.

The majority of electrical engineer officers in the R.A.F. are young men and it is almost certain that the release of Groups 1 to 20 would not affect as much as 20 per cent. of the present strength. If the manning of the Electrical Engineer Branch of the R.A.F. has been so mishandled that this small percentage cannot be spared on the cessation of hostilities in Europe, they could be replaced easily by suitable young men from the Central Register. Such replacement would have the double advantage of allowing the older men in the R.A.F. to resume their more remunerative employment and interrupted careers as well as reducing the number of young electrical engineers at present in the R.A.F. who will be called upon to accept reduced rank.

In the present circumstances, in common with other non-regular R.A.F. electrical engineer officers of over forty years of age, I cannot but feel disappointed and disillusioned at what appears to be grossly unfair discrimination against us.

R.A.F. V.R. OFFICER (M.I.E.E.)

### Portable Tools

**I**T is encouraging to find so many people giving thought to safety, but we must bear all factors in mind and retain the flexibility of electrical apparatus. The adoption of very low voltage is said to give complete safety. Arguing similarly, the way to avoid road accidents—a far greater risk—would be to avoid using the roads.

Most of this thought is directed to industrial applications by conscientious electrical engineers whose wives or other relatives may use 230-V irons, kettles and washing machines under conditions involving equal risk in their kitchens or to have their "coiffure" attended to with 230-V clippers and hair dryers.

Assuming the answer to be that one must begin somewhere or that the support of the Factory Department enables something to be done in industry, I put forward the following points:—

(1) The adoption of 25 V would not cover the danger of breakdown of transformer windings, terminals or leads, or of unnoticed fortuitous contact of the low-voltage circuits with the normal mains supply or other circuits; neither does it cover fire risk.

(2) The use of 25 V imposes definite limitations on the power and performance of portable (or other) appliances and voltages of this order are therefore being superseded in large aircraft factories after many years of use.

(3) A standard of 230 V has been fixed in this country and of this order in other countries.

(4) The advantages of 230 V and 115 V to earth can be retained by the use of systems described in the *Electrical Review*.

(5) I have yet to hear of a fatal accident at about 100 V and I am satisfied that the number is in any case small.

(6) A reduction even to 110 V (55 V to earth) could be made without sacrifice of performance, whilst retaining all the previously mentioned advantages. I suggest this as the limit because, even then, some sacrifice has been made of availability of service and of the possibility of using "any appliance anywhere"—both selling points in favour of electrical apparatus.

(7) I therefore suggest, as the low limit, 110 V (55 V to earth), but the advisability of a reduction even to this figure should be very carefully considered before it is brought to the committee stage.

(8) The social aspect has its analogy in the universal acceptance of the 30 MPH speed limit in built-up areas. One can be killed at that speed, but few people would recommend reducing this figure to 5 or 10 MPH.

(9) Much remains to be done in the education of school children, the general public, operatives and even electricians in the avoidance of electric shock. This is our responsibility.

*Slough.*

F. E. BUTCHER.

**W**ITH reference to Mr. B. Hinks' letter in your June 15th issue, a portable tool, whether operating at 25 or 230 V, single-phase, 50 cycles, has exactly the same weight. The main feature of a change from 230 to 25 V is in the number of conductors per slot and turns on the field, commutator and brushes. The output of a machine is a function of  $D^2L$ .

One of several faults with the 230-V tool is breakage of small-gauge wires at the back of the commutator. With a 25-V tool the wires are more robust and consequently less likely to break.

I have purchased 25-V portable tools and our existing 230-V tools are to be rewound for 25 V in the same carcass. Cable sizes need not be and are not made too large, nor are they unwieldy. Handle switches require some modification, but good compact and reliable switches are on the market.

Regarding 200-cycle tools at 100 V, I know of several cases where very severe shocks have occurred. I have now arranged for all "Hicycle" generators to be provided with four rings instead of three, and a complete earth leakage system to be installed on each of eight sets. I repeat my suggestion that only 25-V portable tools should be permitted in industry, and that this should be a legal requirement.

I am in full agreement with Mr. Hinks' statement regarding the need for an association of plant engineers.

*Sheffield.*

R. BENNETT,

Chief Electrical Engineer,  
Thos. Firth & John Brown, Ltd.



# PERSONAL and SOCIAL

## News of Men and Women of the Industry

It is announced that **Sir Leonard Pearce**, C.B.E., D.Sc., engineer-in-chief of the London Power Co., is resigning the post of part-time Electricity Commissioner, which he has held since 1940, on July 1st. He had previously been a full-time Commissioner in 1925-26. Before joining the London Power Co. he was for many years the chief engineer and manager of the Manchester Corporation Electricity Department.



**Sir Leonard Pearce**

The Minister of Fuel and Power has appointed **Mr. Henry Nimmo** as an Electricity Commissioner in the place of Sir Leonard Pearce. Mr. Nimmo has been chief engineering inspector to the Commission since 1929. He was previously electrical inspector to the Government of Burma. He is a member of the Institutions of Civil, Electrical and Mechanical Engineers.

**Mr. S. E. Goodall** has been appointed deputy chief engineer to W. T. Henley's Telegraph Works Co., Ltd. Mr. Goodall was appointed assistant chief engineer to the company last year, having previously been in the Research Department of the Metropolitan-Vickers Electrical Co., Ltd. He was educated at Queen Mary College and took an honours degree in engineering, University of London, proceeding to M.Sc. (Engineering). Mr. Goodall is a member of the Institution of Electrical Engineers and was a member of the Council from 1941 to 1944.

**Mr. R. H. Coates**, B.Sc. (Eng.), A. M.Inst.C.E., A.M.I.Mech.E., M.I.E.E., deputy general manager and engineer with the Sheffield Electricity Department, has been appointed engineer and manager of the Portsmouth electricity undertaking to succeed Mr. B. Handley. Mr. Coates received his schooling in London and Southsea, and his technical training at the Regent Street Polytechnic, passing out as a gold medallist, and at the Royal Technical College, Salford. He took an honours degree in engineering at the London University. He served an apprenticeship with Metropolitan-Vickers for three years, followed by a special apprenticeship for a further two years.



**Mr. R. H. Coates**

Before going to Sheffield in 1937, as technical assistant, he held an appointment for three and a half years on the operation staff of the Central

Electricity Board, first in the South-East England area office and then at the head office, dealing with extensions of generating stations. He had previously been on the staff of Kennedy & Donkin. He has been an active member of the I.E.E., being hon. secretary of the Sheffield Sub-Centre, and vice-chairman of the Leeds Centre. Mr. Coates takes up his new appointment on October 1st.

Subject to confirmation by the Corporation, **Mr. F. Barrell**, A.M.I.E.E., A.M.I.Mech.E., deputy borough electrical engineer of Blackburn, has been appointed to the newly-created position of deputy electrical engineer at Leeds, at a salary of £1,100 rising to £1,300. Mr. Barrell, who is forty, has held his appointment at Blackburn since 1941, and before that was chief engineering assistant in the Poplar electricity undertaking. Mr. Barrell is a native of Oldham and received his technical education at the Oldham Technical School, Manchester College of Technology, Birmingham Technical College and Woolwich Polytechnic. He received his early training with J. P. Halls, of Oldham, and the Metropolitan-Vickers Electrical Co., Ltd., Trafford Park. From 1924 to 1928 he was assistant to the late Mr. Angold in the Development Department of the General Electric Co., Ltd., at Witton, and subsequently became designing engineer with that company, specialising in automatic plant and schemes.



**Mr. F. Barrell**

**Professor D. T. A. Townend**, D.Sc., Ph.D., Livesey Professor of Coal, Gas and Fuel Industries at Leeds University, has been appointed director of the British Coal Utilisation Research Association.

**Mr. G. A. Meier**, Dipl.El.Tech., A.M.I.E.E., has joined Cooke & Ferguson, Ltd., as chief designer to the Electrical Division. Mr. Meier was for more than twelve years engaged in research, design and development of circuit-breakers with Brown Boveri and has recently been assistant to Dr. Haefely of Micanite & Insulators, Ltd.

A party of 40 of the technical assistants from the Rotax Laboratories spent an enjoyable social evening recently. A block of seats was taken for the Palladium show "Happy and Glorious," and this was followed by a dinner at the Ariston Grill.



**Mr. G. A. Meier**



We regret that we omitted from our list of King's Birthday Honours last week the name of **Mr. Claude D. Gibb** upon whom a knighthood has been bestowed. Mr. Gibb, who is joint managing director of C. A. Parsons & Co., Ltd., and a director of A. Reyrolle & Co., Ltd., has during the war been Director-General, Armoured Fighting Vehicles Production and chairman of the Tank Board, Ministry of Supply.

Our last week's list recorded the award of the O.B.E. to **Mr. T. G. Travis**, sales manager of the Wotton Engineering Works of the General Electric Co., Ltd., since 1924, and to **Mr. C. Riley**, telephone sales manager to the company. We are now able to reproduce the portraits of

by many speakers, including Messrs. F. W. Field, illuminations engineer; E. Donohue, works superintendent; W. J. Haslam, mains superintendent; and J. Parkinson, chief clerk. Councillor R. Darbyshire, a member of the Electrical Contractors' Association, said that cordial relationships had always existed between Mr. Shanahan and the trade.

**Lt.-Col. C. H. Blackburn**, a director of C. H. Blackburn & Co., Ltd., and E. Dawson (Lamp Factors), Ltd., is standing as Liberal candidate for the Tiverton Division of Devon.

In October, 1941, the Fulham Borough Council agreed to adopt the National Joint Committee's agreement on the salaries of chief



**Mr. C. D. Gibb**



**Mr. T. G. Travis**



**Mr. C. Riley**



**Mr. F. Ashton**

these two gentlemen. The portrait has also been received (and is reproduced) of **Mr. Frank Ashton**, works manager for Bulpitt & Sons, Ltd., Birmingham, who was awarded the M.B.E.

**Mr. James R. Beard**, M.Sc., M.Inst.C.E., M.I.E.E., senior partner in the firm of Merz & McLellan, and past-president of the Institution of Electrical Engineers, has been elected chairman of the Association of Consulting Engineers for the year 1945-6.

**Mr. A. J. Shrosbery**, A.I.E.E., has been appointed managing director of T. Clarke & Co., Ltd. Before joining the company six years ago Mr. Shrosbery served successively with Johnson & Phillips, Ltd., British Insulated & Helsby Cables, Ltd., the Macintosh Cable Co., Ltd., and as mains engineer at Nuneaton, Norwich and Pooley Hall. He was made a director of the company in 1943 and has during the war been engaged particularly on Air Ministry distribution contracts. Mr. Shrosbery is joint patentee for devices for handling and feeding cables and ducts laid by plough.

A large party, totalling 260, of the members of the South Midland Centre of the Institution of Electrical Engineers, visited the Hams Hall "B" power station of the Birmingham Corporation on May 30th, and were afterwards entertained to tea.

**Mr. H. F. Shanahan**, borough electrical engineer of Blackpool, who has retired after forty-five years in the service of the Corporation, was recently presented with a silver salver by members of the Electricity Committee, the chairman (Alderman George Whittaker, J.P.) entertaining committee and officials of the electricity works. Mr. F. J. Cole, who is succeeding Mr. Shanahan, was a guest. High tributes to Mr. Shanahan's ability were paid

electrical engineers after the war. The Staff Committee now recommends that this shall operate as from June 1st, the initial increase in the salary of the borough electrical engineer, **Mr. W. C. Parker**, then to be payable in full.]

**Mr. N. Jones** has been appointed chief engineer and chief officer of the Electricity Department at Ashton-under-Lyne and **Mr. W. B. Bradley** commercial assistant.

Oldham Electricity Committee has recommended the appointment of **Mr. J. A. Ogden**, B.Sc., as deputy electrical engineer. He is the son of Mr. F. L. Ogden, a former borough electrical engineer of Oldham.

At the annual meeting of the Ayrshire Electricity Board held at Kilmarnock, **Provost Thomas Murray**, Ayr, was reappointed chairman and **Provost John H. Carnie**, Kilmarnock, vice-chairman.

**Mr. and Mrs. Frank Grindrod**, directors of Hardman & Co., Ltd., and Philco Distributors (Lancashire), Ltd., celebrated their silver wedding anniversary by entertaining their employees to dinner at the Masonic Rooms, Rochdale, on June 15th, there being 150 guests present.

**Mr. N. Clarke**, B.Sc., A.Inst.P., has been appointed assistant secretary of the Institute of Physics.

**Mr. Percy Moon**, for over twenty years commercial assistant to Fleetwood Electricity Department, is to retire.

**Mr. B. Moore** and **Mr. R. E. P. Briebach** have been appointed executive directors of Crompton Parkinson, Ltd. Mr. Moore joined F. & A. Parkinson, Ltd., now a subsidiary of the company, in 1922, and has in various capacities worked under the direction of Mr. Albert

Parkinson, vice-chairman, and is now works director for the company's works at Guiseley. Mr. Briebach is now general manager of the company's lamp works after fourteen years' service with the company, during which period he has been associated throughout with the development and expansion of the lamp manufacturing business.

Mr. L. A. Hooke, managing director of Amalgamated Wireless (A'sia), Ltd., and Mr. C. Crome, associate director of Australian General Electric Pty., Ltd., have been re-elected president and chairman respectively of the Electrical and Radio Development Association of Australia.

Mr. A. E. King (Liverpool) has been re-elected president of the National Union of Commercial Travellers.

Mr. F. P. Bishop, assistant manager of *The Times*, is severing his connection with the newspaper managerial field to become joint managing director of Broadcast Relay Service, Ltd.

Mr. R. J. Thomson, A.M.I.E.E., assistant section engineer, Wirral Section, Central Electricity Board, North West England area, for the past two years, has been appointed assistant mains engineer to the South African Electricity Supply Commission in the Capetown area. Before joining the C.E.B. he was with the Yorkshire Electric Power Co. in its North Lincolnshire area and Mains Construction Departments, Leeds. His future address will be c/o P.O. Box 4877 Johannesburg.



Mr. R. J. Thomson

Within the framework of the Metropolitan-Vickers Electrical Export Co., Ltd., in London, the following appointments have been made:—Mr. T. C. Hunt to be manager, South-American Division, Mr. R. V. D. Kirby to be manager, Eastern Division, Mr. J. W. Bell to be manager, Dominions Division, and Mr. G. Turkus to be manager, Continental Division.

Mr. F. Gurney has been appointed sales manager of the Plant Department of the Metropolitan-Vickers Electrical Co., Ltd., at Trafford Park, being succeeded in his position as sales manager of the Transformer Department by Mr. R. J. Cochran.

The basic salary of Mr. C. Booth, engineer and manager of the Spenborough U.D.C. Electricity Department, is to be increased by £50 to £750 per annum.

Major B. G. Drummond, jun., T.D., A.M.I.E.E., R.E.M.E., has recently been promoted lieutenant-colonel and appointed C.R.E.M.E. 30 Corps Troops, B.L.A.

**Appointments Vacant.**—The Hong Kong Electric Co., Ltd., is advertising in this issue for a deputy general manager at a salary of not less than £1,500 per annum. Great Yarmouth Corporation is seeking a deputy borough electrical engineer (£771) to succeed Mr. R. C. Golding, who has been appointed borough electrical

engineer of Wallasey. A consumers' engineer (£459) is required by the Stafford Electricity Department and an assistant area engineer (£540) by the Buckrose Light & Power Co.

## Obituary

**Mr. H. Scholey.**—The death occurred recently of Mr. H. Scholey at the age of seventy-eight. Mr. Scholey's activities extended to a number of varied spheres. He was at one time (towards the end of last century) on the editorial staff of the *Electrical Review*. During the last war he was awarded the C.B.E. for his assistance to the Admiralty in submarine detection.

**Wills.**—The late Mr. Killingworth Hedges, M.Inst.C.E., M.I.E.E., left estate valued at £483,082 (£467,920 net personality).

**Sir Basil Peto, Bt.** was at one time associated with the Morgan Crucible Co., Ltd., left £152,764.

## Grading of Meter Staffs

**THE** National Joint Board of Employers and Members of Staff (Electricity Supply Industry) has agreed upon positions in the Schedule for certain grades of electricity undertakings' meter staffs. The salary Schedules are being revised to include references to this decision and definitions of duties will also be embodied in the national agreement.

The new grades are set out in the June *Electrical Power Engineer* from which they are reproduced below:—

Title of Grade	Grade
Meter and test superintendent, Class A polyphase station	5
Meter and test superintendent, Class A non-polyphase station	6
Meter superintendent, Class A polyphase station	
Meter and test superintendent, Class B station	7
Meter superintendent, Class A non-polyphase station	
Meter and test engineer, Class A polyphase station	
Meter superintendent, Class B station	8
Meter and test engineer, Class A non-polyphase station	
Meter engineer, Class A polyphase station	8a
Meter and test engineer, Class B station	
Meter engineer, Class A non-polyphase station	8b
Meter engineer, Class B station	

Definitions are as follows:—

**Meter and Test Superintendent.**—To be responsible for the full administrative and technical organisation of the testing department including design and equipment as and when required; specifications, correspondence; negotiations; any electrical testing and calibration in addition to that of meters and electrical measuring instruments.

**Meter Superintendent.**—The duties to be the same as those of a meter and test superintendent, but confined to meters and instruments.

**Meter and Test Engineer.**—To be responsible for the organisation and control of the meter and testing department, but excluding correspondence and negotiations other than those of a routine character.

**Meter Engineer.**—The duties to be the same as those of a meter and test engineer, but confined to meters and instruments.



# Self-Coupling

## New Method of Automatic Parallel Operation

**M**AIN requirements for the operation of two or more ordinary transformers in parallel are similar connections and phase rotations of the windings, similar impedances and the same voltage ratios.

The growing use of voltage regulators and of transformers with remote or automatically controlled on-load tap-changing gear frequently involves similar parallel operation. The requirements just mentioned are still necessary with the addition of means to ensure that both units are kept on the same tapping or voltage ratio so that the load is equally shared and there is little or no circulating current. This means is usually required to be automatic in operation for protective reasons, even when the tap-changing gear or regulators themselves are remove controlled or hand-operated.

Mechanical coupling of the regulating machinery is the most obvious solution of this problem, but it is now rarely used, as it involves particular location of the units, the installation on site of the coupling mechanism and is not applicable to existing equipments.

The usual practice adopted in this country is known as the "leader-follower" system. One transformer is operated in the normal way from its automatic voltage relay or by remote control as desired. This results in a temporary inequality in the respective transformer currents and a difference in mechanical positions of operating gears. Either the inequality or the difference can be made the basis for initiating operation of the "follower" transformer to bring it into step with the "leader." The latter obviously involves mechanical connection with the operating mechanism of each transformer and additional moving parts. On the other hand, operation based on inequality in currents is

**By E. T. Norris,**  
M.I.Mech.E., M.I.E.E., Fellow  
A.I.E.E.

fundamentally correct and is obtained by inter-connection of current transformers in each transformer circuit on the same principle as in the "split conductor" protection of cables (Fig. 1).

With correct parallel operation the currents will be the same in the two main transformers and also in the current transformer secondary windings, giving no resultant current for the directional relay. When, however, the leader transformer has operated, the voltage ratios of the two transformers will be unequal and the resulting currents will differ in magnitude and phase. This difference takes the form of a circulating current which, at no-load, results in currents in opposite directions in the two transformers and on load adds vectorially to the normal currents. The difference in current-transformer secondary currents will form a current in the directional relay practically independent of the load and in such a direction as to cause it to close the appropriate contact for initiating operation of the follower transformer to equalise the voltage ratios. To this end the contacts close auxiliary relay circuits which energise the "raise" or "lower" starting contactor of the follower-transformer motor. The sequence of components is shown in Fig. 2.

Unequal sharing of load currents will occur if the impedances of the two transformers differ, hence the necessity for similar values in the parallel operation of ordinary transformers. Since the reactance of a transformer is always appreciably greater than the resistance, the resulting current in the directional relay is practically out of phase with the current due to unequal ratio and does not therefore affect the relay. As a typical example the effective current in the directional relay due to 10 per cent. difference in reactance (the maximum per-

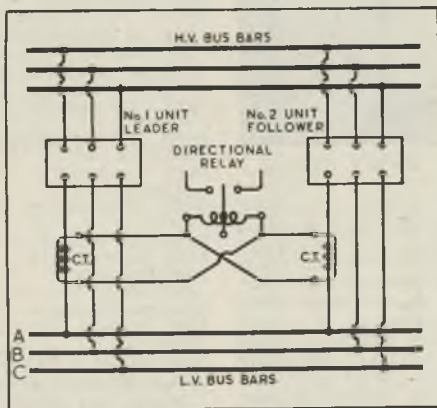


Fig. 1.—Schematic diagram of automatic control of parallel operation

load currents will occur if the impedances of the two transformers differ, hence the necessity for similar values in the parallel operation of ordinary transformers. Since the reactance of a transformer is always appreciably greater than the resistance, the resulting current in the directional relay is practically out of phase with the current due to unequal ratio and does not therefore affect the relay. As a typical example the effective current in the directional relay due to 10 per cent. difference in reactance (the maximum per-



mitted by B.S.S. 171) is only one-fifteenth of the current due to one step difference in voltage ratio.

The new method employs the same current

Q and hence no driving torque in the motor.

When the leader transformer voltage is changed, either by manual operation or through the action of its automatic voltage relay, the resulting difference in currents of the follower transformer passes through the motor phase winding Q in a direction depending upon whether the voltage is raised or lowered. The motor, thereupon, starts up and brings the follower transformer voltage into line with the leader. When this is

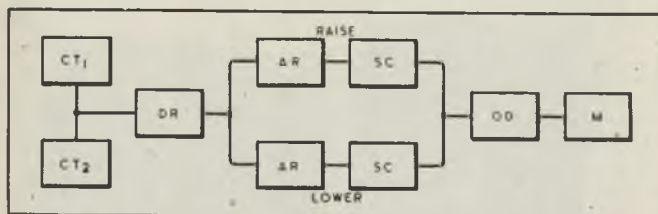


Fig. 2.—Control components for parallel operation

CT—Interconnecting current transformers. DR—Directional relay. AR—Auxiliary relays. SC—Starting contactors. OD—Overload device. M—Driving motor

transformer interconnections but eliminates all of the remaining control components and has therefore been named "self-coupling." This elimination follows naturally from the essential feature that the driving motor is also the directional relay. The resulting sequence corresponding to Fig. 2 is shown in Fig. 3.

In theory any two-phase motor can be used, but in practice the standard induction-disc split-phase motor as used for many years in driving moving-coil voltage regulators and the smaller forms of on-load tap-changing gear is employed. This motor is used in the normal manner for the leader transformer, but for the follower the phase-splitting condenser is disconnected. One phase winding P is permanently connected to a voltage source of suitable phase displacement. The second phase winding Q is connected to the current-transformer circuit in the same way as the original directional relay winding in Fig. 1. The actual connections depend on the characteristics of the motor windings, but Fig. 4 shows a typical arrangement with the current transformers in line A of the transformer and the phase winding P of the driving motor M on the follower units connected to line terminals B and C.

When the two transformers are in correct parallel operation (*i.e.*, with similar voltage ratios) the current-transformer currents are equal and as a consequence of this there is no resultant current in the motor phase winding

the motor phase winding Q vanishes and the motor stops. The process is almost uncanny to the observer since the motor apparently starts, runs and stops through no visible agency, as there are no switches or motor contactors or any moving parts in the follower motor circuit.

Fig. 5 shows 500-kVA and 250-kVA 6.6-kV transformers fitted with mercury-switch on-load tap-changing gear arranged for self-coupling. Each transformer is complete with its astatic voltage relay (in the small control cubicle at the end of the tank) for independent

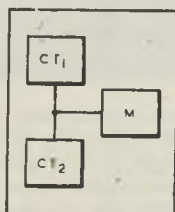


Fig. 3.—Control components for self-coupling operation

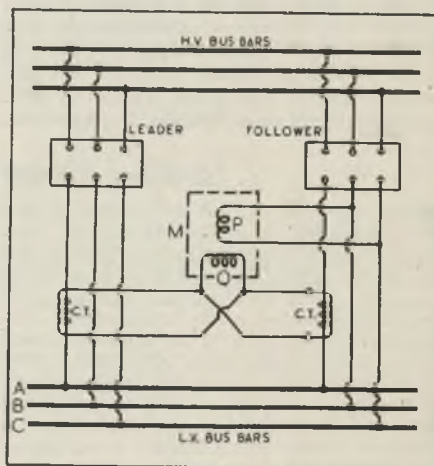


Fig. 4.—Schematic diagram of self-coupling automatic control of parallel operation

automatic operation. For parallel operation the leader transformer remains unchanged and either transformer can be made the follower by switching off its voltage relay and

connecting its motor as in Fig. 4. A small changeover switch is provided for this purpose in the control cubicle.

The current transformers are usually contained inside the transformer or regulator tank, but may be externally mounted and the self-coupling may be added to existing transformers for parallel operation, as when a second trans-

impedance and 1.25 per cent. steps, the current transformer VA rating is thus four times the motor input on load to one phase. The actual size of current transformer is less than the

Fig. 5.—Transformers of 250 kVA and 500 kVA rating with mercury-switch on-load tap-changing gear and automatic self-coupling for parallel operation



former has been added to an existing unit.

The first installation of the system was made in 1940 and has given uninterrupted service. Numerous other installations have followed and the method is now standard practice within its range of application. This range of application is limited at present by the type and size of driving motor and thence of the current-transformer rating. It can be shown that the VA rating of each current transformer is approximately  $Z/S$  times the phase VA of the motor, where  $Z$  is the percentage impedance and  $S$  the percentage voltage step of the regulating gear. Assuming typical values of 5 per cent.

rating would indicate since measuring instrument accuracy of either current ratio or phase angle is not required. Nevertheless the current transformers would become prohibitively bulky for the heavier regulating mechanisms of large power transformers and regulators. For this reason the application is at present limited to three-phase transformers up to 2,000—5,000 kVA depending upon voltage rating and range of regulation.

## Smaller Undertakings' Meeting

**T**HE ninth annual general meeting of the Committee of Smaller Municipal Electricity Supply Undertakings was held at the E.L.M.A. Lighting Service Bureau, London, on June 13th, when the attendance was the largest since the formation of the organisation. The chairman, Alderman S. Myott, after mentioning the fact that the membership was now larger than at any time since its inception, briefly referred to the position of the industry at the present time and reiterated his continued belief in public ownership and the control of distribution to the consumer through the medium of local authorities, as the best means of securing the cheapest and most efficient service.

Reviewing the activities of the organisation during the year, the hon. secretary, Mr. A. J. C. De Renzi, stated that their policy was to continue to co-operate with, and to the greatest possible extent act through the I.M.E.A. on

whose Council they were now well represented. He dealt at some length with the importance of the distribution side of the industry being in the hands of the local authorities who knew the local conditions in their respective areas and the best means of meeting them. Mr. De Renzi also stressed the importance of instilling into the rising generation civic pride in the local government areas in which they resided, as this was the best training ground for those who might eventually go further and interest themselves in national affairs.

A lengthy discussion took place on certain matters raised by members which were to be discussed at the I.M.E.A. annual general meeting the following day and replies were given by Mr. W. P. Lilwall and others to questions raised. The retiring officers were accorded a hearty vote of thanks for their services during the past year and were unanimously re-elected.



# COMMERCE and INDUSTRY

## Equipment for Buildings. Duty on Imported Goods.

### Availability of Materials

**I**N conjunction with other Government Departments concerned, the Ministry of Works has made a review of the supply position of materials and components normally used in housing and other building work. It has been ascertained that for the following items, among others, there is adequate manufacturing capacity, labour and materials immediately available to meet all probable requirements, including orders for stock:—Ceiling roses and blocks; conduit switches and boxes; electric fires; immersion heaters; lampholders; electric plugs and sockets; switches and switch-fuses; thermostats; electric and gas wash-boilers; and electric water heaters.

The supply of the following equipment is not sufficient to meet all present demands in full and there is no surplus which can be used to build up stocks in the hands of manufacturers, merchants or consumers:—Conduit tube; electric and gas cookers; gas fires; electricity and gas meters; and gas water heaters.

The Government desires that for equipment falling within the first category those concerned should place orders now in order to meet their future requirements or to increase their stocks to give a safe margin for contingencies. As regards the second class firms are asked to place orders only to the extent necessary for meeting their immediate needs. The Ministry says that in the industries concerned there is normally an adequate supply of raw materials and sufficient production capacity, but there is a shortage of labour which, it is hoped, will improve as men leave the Services or other war work.

### Import Duties Restored

Brief reference was made in our last issue to the Treasury decision to re-impose import duties upon certain classes of goods which have been allowed in free of duty during the war, mainly for Government purposes. The effect of this is to restore, as from July 1st, the rates of duty which were in force before the outbreak of war. The Import Duties (Exemptions) (No. 3) Order, S.R. & O. 1945 No. 692 (H.M. Stationery Office, 3d.), sets out the classes of goods which now cease to be included in the Exemptions Schedule, including a number of electrical classes. The duties to be charged on certain of these are specified in the Additional Import Duties (No. 2) Order, S.R. & O. 1945 No. 696 (3d.). The duties include the general *ad valorem* duty of 10 per cent.

The following electrical goods become chargeable with a duty of 20 per cent.:—Insulated wires and cables; telegraph and telephone apparatus; wireless apparatus; electric carbons (with certain exceptions); searchlights; ammeters, galvanometers and voltmeters. Duty of 15 per cent. will be charged on the following:—Accumulators; electric cooking apparatus; electric heating apparatus; heating elements for cooking or heating apparatus (other parts of or accessories to these articles will be charged at 20 per cent.); electric motor and generator

casings and unwound rotors and stators; electrically-operated domestic food mixers, dish washers, drink mixers and fruit juice extractors; electric hair clippers and dry shavers; electric refrigerators with a storage capacity not exceeding 12 cu. ft. and complete mechanical units for such refrigerators; electric vacuum cleaners; and self-contained air-conditioning machines, comprising elements for cooling, control of humidity, cleaning and circulating of air.

Apart from these the following classes again become liable to the general *ad valorem* duty:—Copper and alloys containing more than 50 per cent. by weight of copper, in the form of sheets, strip, plates, discs, circles, foil, bars, rods, wire or tubes (not including unwrought copper whether refined or not) in bars or rods; rectifiers similar to wireless valves; and electric furnaces.

### Contract Price Adjustment Formulæ

The latest figures for the B.E.A.M.A. contract price adjustment formulæ are as follows:—(a) Rate of pay for adult male labour at June 16th, 95s. (unchanged). (b) Costs of material: the index figure for intermediate products last published by the Board of Trade on June 16th is 181.1 and is the figure for the month of May (as compared with 181.0 for April).

### Trade with the Channel Islands

Shipping is now available for a limited resumption of private trade to the Channel Islands (Jersey, Guernsey and Sark). Supply will in general be subject to the same conditions as in the United Kingdom home market, and a Purchasing Commission has been set up at the Home Office, 59/67, Great Peter Street, London, S.W.1.

### Supply Undertakings' Employees

The Electricity Commissioners have drawn the attention of electricity supply undertakings to the provisions of the Employment (Control of Engagement) Order which is designed to ensure that men between the ages of 18 and 50 inclusive and women from 18 to 40 inclusive shall be engaged for employment only through offices of the Ministry of Labour and National Service or certain approved agencies. It is pointed out that the Minister of Labour may issue certificates of exemption from the Order and if it is found that an important vacancy or vacancies cannot be filled otherwise the Commissioners will be prepared to consider applying for such certificates to enable undertakings to advertise for candidates within the age limits imposed by the Order.

The Ministry of Labour and National Service has also informed the Commissioners that with certain exceptions it is proposed to encourage men and women at present engaged on war work, etc., to return to their previous occupation or trade. Undertakings are therefore invited to forward to the Commissioners particulars of any ex-employees who wish to return to their previous employment. The particulars wanted



are: Name, age and present address of worker; occupation for which he is required; length of service with undertaking and date of leaving; and the name and address of his present employer.

### Government Surplus Machine Tools

Offers to purchase machines in the Machine Tool Control stock records may be lodged in person or posted to the nearest disposal centre, and the intending purchaser will be informed immediately if the machine is no longer available. Temporary disposal centres are being established at certain factories where a large number of surplus tools are available, and offers for such tools will be received at the factories as well as at the permanent disposal centres. Arrangements have also been made to ensure that the latest stock changes are communicated between headquarters and the centres by telephone several times each day.

### Huddersfield Exhibition

Over 5,000 people visited the Kitchen Planning Exhibition at Huddersfield Electricity Showrooms, which closed on June 16th, after a very successful two weeks. Organised parties of senior school children visited the exhibition



Model kitchen at the Huddersfield Exhibition

every day throughout the period, and E.D.A. films were shown three times daily. A questionnaire was very well received, and criticisms, both constructive and otherwise, will be extremely valuable in future planning.

### Drake & Gorham Development

To meet the difficult period of reversion to peacetime activities and to deal with development, Drake & Gorham, Ltd., who are both electrical installation contractors and makers of l.v. switch and fuse-gear have transferred the greatly expanded manufacturing side of their business to a newly formed company—G. M.

Engineering (Acton), Ltd. Drake & Gorham, Ltd., will thus be free to devote all their activities to contracting. In order to maintain continuity, some of the directors of Drake & Gorham, Ltd., will join the board of the new company which will carry the same staff as at present. The works department of Drake & Gorham contributed much in the way of precision engineering to the war effort, and it is the policy of the new company to enlarge the range of its manufacture.

### Glasgow to Make Trolley-bus Bodies?

Glasgow Corporation is to seek powers in a Provisional Order, to be promoted in November, to manufacture bodies for trolley-buses and motor-buses. At present the Corporation can build its own trams, but must purchase its bus bodies.

### Notification of Factory Building

Section 9 of the Distribution of Industry Act, 1945, which came into operation on June 15th, requires (with certain exceptions) persons who are contemplating the erection of a factory to inform the Board of Trade of their intentions at least sixty days before they let contracts for the erection of the building or begin building operations. No notification is necessary if the proposed building will have an aggregate floor space of 10,000 sq. ft. or less; or is required as an extension of an existing industrial undertaking, and is contiguous or adjacent to an industrial building, used by the undertaking and erected before June 15th, or in respect of which notification under the Act has been given; or replaces another such industrial building used by the same undertaking, and is to be erected on the same site or near it.

The object is to enable the Board of Trade to give industrialists all available information concerning sites, power, labour, transport, housing, amenities and similar matters, and to discuss with them where, in their own and the national interest, they should consider siting their proposed building. Notification should be sent to the Factory Controller

(Location), Board of Trade, Millbank, London, S.W.1, and should, where possible, include information about the proposed situation of the building, the use for which it is required, the estimated floor space and the probable number of employees.

On the expiry of sixty days from the date of notification, or earlier if the Board of Trade agrees, the work may proceed, but there is still an obligation to secure a building licence and the approval of the local planning authority. Where a person was in possession of a building licence on June 15th, the Board of Trade will regard the application for the licence as a notification under Section 9 on which permission to

proceed has been given. If any person receives a building licence on or before August 14th, and the statutory period of sixty days has not expired, the licence may be regarded as permission to proceed.

### International Electrical Association

This Association was registered on June 20th as a company limited by guarantee, without share capital. The original number of members is 100, each being liable for £1 in the event of winding up. Its objects are to provide a central organisation for information on matters relating to the electrical manufacturing, contracting and associated industries, to take over all or any of the property of the unincorporated association of the same name, etc. The subscribers are the English Electric Co., Ltd.; the General Electric Co., Ltd.; Ferranti, Ltd.; A. Reyrolle & Co., Ltd.; the Metropolitan-Vickers Electrical Export Co., Ltd.; the British Thomson-Houston Co., Ltd.; and C. A. Parsons & Co., Ltd. The registered office is at Victoria House, Southampton Row, W.C.1.

### Free Enterprise

In a pamphlet published by the Incorporated Association of Electric Power Companies the success of free enterprise in the electricity supply industry is stressed. Five facts are stated and proofs of each of these are adduced in separate pages. The facts are:—1. Free enterprise created the electricity supply industry. 2. As the early undertakings prospered municipalities took them over. 3. Municipalities avoided the risks of rural electrification. 4. Free enterprise took light and power to rural Britain. 5. The brains and goodwill behind free enterprise have lowered consumers' costs.

### Modern Building Tools

The first of a series of demonstrations of power-driven hand tools to be given by a mobile unit which will tour the country was opened by Mr. Duncan Sandys, Minister of Works, on Wednesday last, on a bombed site in Watling Street. The Lord Mayor of London presided at the opening.

The demonstrations are being given continuously between noon and 8 p.m. until June 30th. The demonstration unit will then move to Nottingham, where it will be open from July 11th to 14th, and then to Leeds, where it will be open from July 25th to 28th. A programme is being arranged to include a number of other towns in England, Scotland and Wales.

### Bruce Peebles Extensions

Bruce Peebles & Co., Ltd., have received a permit to build a large extension at their works at East Pilton, Edinburgh.

### Trade Publications

**Wild-Barfield Electric Furnaces, Ltd.**, Elecfurn Works, Watford By-pass, Watford, Herts.—Illustrated leaflet (RF.545/T) concerned with radio-frequency preheating of moulding powders and pre-forms for the plastics moulding industry.

**Silentbloc, Ltd.**, Victoria Gardens, Ladbroke Road, Notting Hill Gate, London, W.11.—New illustrated catalogue, printed in colours and thumb-indexed, constituting a book of

reference to numerous applications of anti-vibration mountings, flexible bearings and couplings, including technical data and dimensions.

**Meritus (Barnet), Ltd.**, Wood Street, Barnet, Herts.—Illustrated technical catalogue (No. 20/45) specifying battery chargers, including circuit diagrams of trickle and garage types.

**Midland Electric Manufacturing Co., Ltd.**, Reddings Lane, Birmingham, 11.—Illustrated and priced catalogue (No. 270/C45) containing comprehensive details of a new range of h.r.c. cartridge fuses and carriers.

**Aerialite, Ltd.**, Castle Works, Stalybridge, Cheshire.—Illustrated and priced booklets on television aerials and the "Mastatic" noise-reducing (screened and transformer coupled) aerial for broadcast sound reception.

Applicants for copies of these publications should write on business letter headings.

### Patent Extension Application

Application has been made to the High Court for an extension of four years and eight months ("or such other term as the Court shall think fit") of the period of Patent No. 304928/1928, granted to Santon, Ltd., and H. C. Sanders for "Improvements in electric liquid heaters." The matter is to come before Mr. Justice Uthwatt on July 24th and notice of opposition must be lodged at Room 248, Royal Courts of Justice, by at least eleven days before that date, copies being sent to the Solicitor to the Board of Trade and to Gibson & Weldon, 27, Chancery Lane, W.C.2, solicitors.

### Yalta Liner Installation

Stewart Thomson & Sons, Liverpool, inform us that their firm was instrumental in installing at short notice the whole of the electrical equipment in the liner *Franconia* employed for the "Big Three" conference at Yalta.

### Trade Announcements

**Benjamin Electric, Ltd.**, state that the telephone number of their Birmingham office is now Birmingham (Midland) 5197. The number of their Leeds office (Leeds 25579) is unchanged.

**Scottish Cables, Ltd.**, are closing their works from July 13th to 23rd. A skeleton staff will deal with customers' urgent requirements.

**Sams Distribution, Ltd.**, are moving on Monday to new offices and showrooms at 100, Wardour Street, London, W.1.

## 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 "Magnus" ultra-violet ray lamps.



# Fluorescent Lighting

## Comparison of Cost

**T**HERE is little doubt that the generally most acceptable form of illumination available at the present time is that provided by fluorescent lamps—either daylight or warm-white. The use of any illuminant, however, depends not only on its acceptability but also on comparative economics. One method of gauging the value of a lamp is by determining the cost of producing a definite amount of light, as it is necessary to consider not only the original cost of the lamp

By S. D. Lay, F.I.E.S.

output is 1,920 lumens, the lamp cost per million lumen hours has recently been reduced to 24s., and at the same time its rated life increased to 3,000 hours. This reduces the cost per million lumen hours to 4s. 2d., i.e., 44 per cent. of the original figure, thus opening up new possibilities for the use of these lamps which could originally be justified only on the basis of quality. It is now frequently cheaper to use them than filament lamps.

Two of the qualities which account largely for the preference for fluorescent lighting are the low brightness of the lamp and the large measure of light diffusion. It is therefore justifiable to compare the cost of this lamp used with a simple back-plate reflector with that of (for instance) a "Glassteel" diffuser. The average light output of the latter is similar to that of the simple fluorescent unit, which makes direct comparison reasonable. Figs. 1 and 2 show that with a charge as low as a penny per kWh it is economically advantageous to use an 80-W fluorescent lamp, provided the installation is employed for more than 640 hours per annum. Hitherto fluorescent lamps have been used solely for industrial purposes where the charge for energy is comparatively low. Now they are being considered for post-war use in commercial situations, and

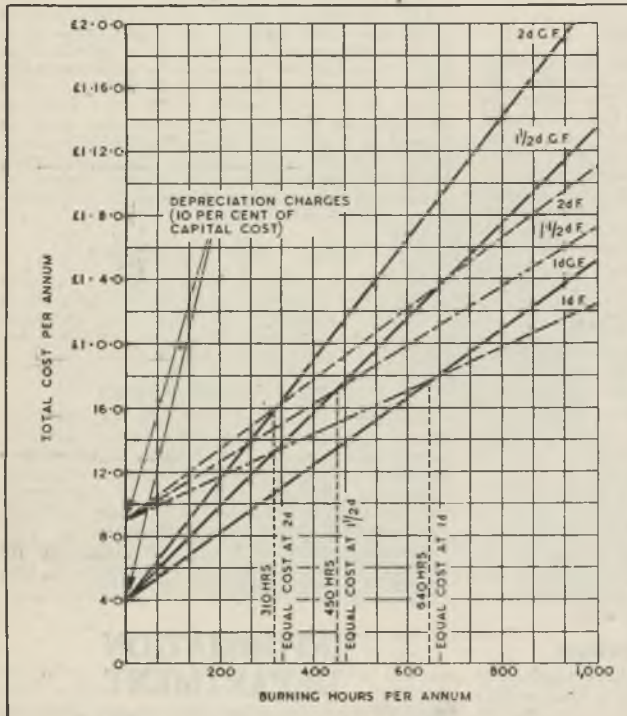


Fig. 1.—Comparison of total annual costs of 200-W gas-filled lamp in "Glassteel" diffuser and 80-W fluorescent lamp in simple backplate reflector at various charges per kWh; burning hours per annum up to 1,000

but also its useful life. A convenient unit for this purpose is one million lumen hours.

When the fluorescent lamp was introduced in 1940, the list price was 36s. and its rated life 2,000 hours. As the average light

Table 1 shows the saving effected at 3 1/2d. per kWh (which is taken as an average charge in such situations as offices, public buildings and schools), including depreciation at 10 per cent. per annum. As a less efficient



diffuser is normally used in offices, etc., the advantage of using a fluorescent lamp is even greater.

Another form of comparison is to calculate the number of burning hours necessary to pay off the extra capital cost of the fluorescent installation and to indicate the saving per 1,000 hours that will be enjoyed thereafter throughout its life. For example, the difference between the capital cost of the fluorescent reflector and control gear at £4 8s. 10d. and of the 200-W diffuser at £1 19s. 10d. is £2 9s. 0d.

Fig. 2.—Comparison of total annual costs as in Fig. 1 but up to 3,000 burning hours per annum

Running costs per 1,000 hours at 3½d. per kWh are for the 200-W tungsten-filament lamp £3 2s. 11d. and for the 80-W fluorescent lamp £1 13s. 1d. the difference being £1 9s. 10d. The number of burning hours to save the extra cost of fluorescent equipment is therefore 1,400 and the saving per 1,000 hours thereafter in favour of fluorescent equipment is £1 9s. 10d.

In a comparatively small office block thirty-eight 200-W tungsten lamps with diffusers of the type referred to were replaced by the same number of 80-W fluorescent lamps with reflectors. The burning hours per annum average approximately 1,000 (3½ hours per working day). In this case the annual saving (at 3½d. per kWh) is £46 17s. 0d. or, alternatively, the extra cost of the fluorescent installation will be paid

off in less than 1½ years, and thereafter there will be an annual saving of £56 13s. 8d. or nearly 48 per cent. on the previous running cost of the tungsten-filament installation, which was £119 10s. 10d.

A tariff frequently employed for hotels,

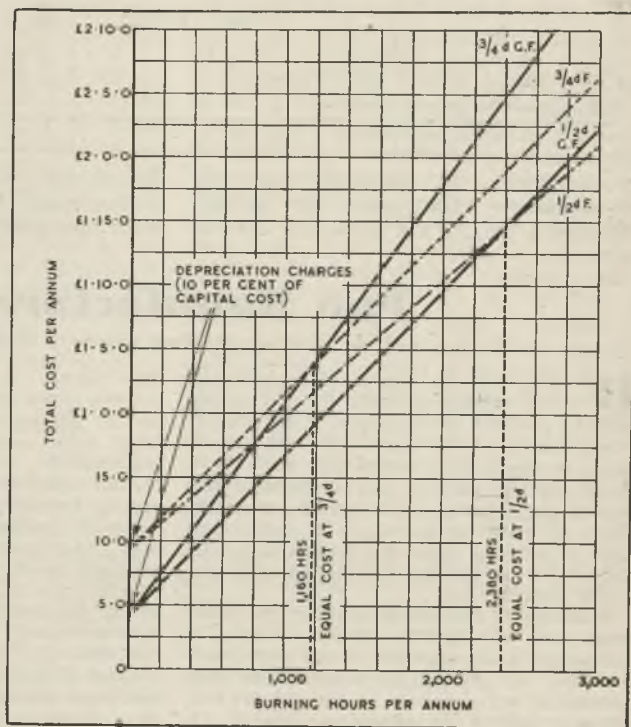


TABLE 1.—COST COMPARISON WITH ELECTRICITY AT 3½D. PER KWH

Type of Lamp	Burning hours per annum and annual costs					
	500	1,000	1,500	2,000	3,000	4,000
200-W gas-filled ("Glassteel" diffusers) ..	£ s. d. 1 15 6	£ s. d. 3 6 11	£ s. d. 4 18 5	£ s. d. 6 9 10	£ s. d. 9 12 9	£ s. d. 12 15 8
80-W fluorescent (back-plate reflectors) ..	1 5 7	2 2 1	18 8	3 15 2	5 8 2	7 1 3
Saving by use of fluorescent lamp. .	9 11	1 4 10	1 19 9	2 14 8	4 4 7	5 14 4
Percentage saving .. .. .	28	37	41	42	44	45

shops, etc., is on a sliding scale from perhaps 3½d. down to 1d. Comparison should be made at the lowest figure, and as this type

1d. per kWh there will be a very substantial saving (£1 2s. 1d. per point) with fluorescent lighting. These considerations

TABLE 2.—COMPARISON WITH ELECTRICITY AT £9 PER KW PER ANNUM PLUS 1D. PER KWH

Type of Lamp	Burning hours per annum and annual costs					
	500	1,000	1,500	2,000	3,000	4,000
200-W gas-filled ("Glassteel" diffusers) ..	£ s. d. 2 10 7	£ s. d. 3 1 1	£ s. d. 3 1 8	£ s. d. 4 2 2	£ s. d. 5 3 3	£ s. d. 6 4 4
80-W fluorescent (back-plate reflectors) ..	1 12 4	1 19 6	2 6 8	2 13 10	3 8 1	4 2 5
Saving by use of fluorescent lighting	18 3	1 1 7	1 5 0	1 8 4	1 15 3	2 1 11

of installation is commonly used for approximately 3,000 hours per annum, reference to Fig. 1 will show that even at

indicate that a much wider field is now open to fluorescent lamps in many situations where tungsten-filament lighting is now used.

## Fan Manufacturers

### First Annual Meeting of the F.A.M.A.

ON June 20th the Fan & Allied Manufacturers' Association held its first annual meeting, preceded by a luncheon, at the Waldorf Hotel, London. The Association, which now has a membership of twenty-five, was formed about eighteen months ago to promote and protect the interests of British fan manufacturers, to assist the promotion of standardisation, to formulate codes of practice and encourage research, to establish fair trading conditions in the industry, etc.

Presiding at the annual meeting, the chairman, Mr. M. Geoffrey Woods (Woods of Colchester, Ltd.) reported on the past year's activities. He said that the proposed Technical Committee had now been set up with the hon. secretary (Mr. F. D. Moul) as chairman. It was now dealing with methods of testing axial flow and other fans, the proposed revision of B.S. 848, performance guarantees and other matters. There had been discussions between the Association and the Department of Scientific & Industrial Research, E.R.A., and other bodies upon the subject of collective research and a report on the matter was being circulated.

No further conversations had taken place between the F.A.M.A. and the Fan Manufacturers' Association since the latter did not feel that permanent relations were necessary. The Council, however, still thought that a joint committee was desirable. Mr. Woods pointed out that there was no distinct line of demarcation between the two associations; members of the F.A.M.A. were producing the whole range of fans and he claimed that the Association was more representative of the fan industry. He felt that there was no justification for two bodies and was convinced that time would eventually bring them together. Present relationships were perfectly friendly.

They had been approached with regard to the formation of a separate association for

filter makers. It was thought that it was not possible to set up a section of the Association for the purpose and members who produced filters were recommended to join the new organisation.

After a reference to the cordial relations existing between the Association and kindred American bodies, Mr. Woods said that the B.S.I. had invited the Council to nominate members to the Technical Committee dealing with fans and Mr. Moul and two other members of the Association's Technical Committee had been nominated. Contact had been made with the Ministry of Supply on the question of the disposal of surplus fan equipment and a promise had been secured that the Association would be consulted in the matter.

Members had been asked to give statistics of their business which would be invaluable in discussions with the Board of Trade. The Board had agreed that if the volume of trade justified it fans would be shown separately in the import and export returns, and even divided into classes.

A brochure was being prepared to publicise British fan makers all over the world and the Department of Overseas Trade would undertake its distribution to embassies and trade commissioners. A questionnaire was being enclosed which when completed would enable them to gauge the possible extent of business in the various countries. Copies would also be sent to appropriate Home Government Departments.

A proposal was afoot to hold an Engineering and Marine Exhibition in 1947 and the Council was to secure members' views upon the manner of participation.

When Mr. Woods had concluded his remarks there was a discussion upon the nature of the brochure. The chairman and Council were re-elected, as were the honorary secretary and honorary auditors.

# Surplus Stocks Disposal

## What is Happening in the United States

**T**HE United States to-day is on the threshold of the greatest merchandising job in history. Surplus materials of all kinds, which have been accumulating for over four war years, are soon to be sold. Although much is being said on the subject, plans for actual, large-scale disposal are still in the preliminary stages, particularly with respect to transactions outside the continental United States. At present the Government's vast stockpile of war-surplus materials is being sold to individual consumers in America at the rate of more than \$1,000,000 a day. Estimates of the volume of surplus supplies by informed sources exceeds \$100,000,000,000.

By **Betty Frank**  
(New York)

Lease and foreign relief, the decisions as to the maintenance or disposal of American military installations abroad, and the requirements of the war in the Pacific must all be considered.

A Senate Committee, headed by Senator Burton K. Wheeler of Montana and including Senators McFarland, Riggs, Hawkes and Capehart left for Europe in May to investigate the disposal of surplus war equipment there. This Committee, accompanied by the chairman of the Federal Communications Commission (Mr. Paul A. Porter), Rear-Admiral Joseph R. Redman, Director of Naval Communications, Major-General Frank P. Stoner of the Army Signal Corps and Mr. Edward Cooper, Committee secretary, will concern itself with an investigation into the disposal of \$160,000,000 of communications equipment now largely surplus. Another group of six senators, headed by Senator Harley M. Kilgore, of West Virginia, also left in May for undisclosed destinations overseas to make other specific inquiries into surplus materials. This Committee's findings will, undoubtedly, have much bearing on the Government's subsequent plans for the disposal of all goods which will become surplus.

### Types of Equipment Available

There are available now, in limited quantities, various kinds of electrical and communications equipment. Such items as electrical mixers, micro-ammeters, toggle switches, Diesel and petrol-driven generator sets, rotary convertors, AC and DC motors, motor starters and controllers, rheostats, switchboards, power transformers, batteries, lightning arrestors, cut-outs, relays, and all types of other miscellaneous electrical equipment are beginning to be offered for sale to civilian consumers. As yet, none of the individual items is available in any great quantity, but what is being released is, on the whole, in pretty good condition.

What the ultimate policy of the American Government will be with respect to foreign sales is still to be announced. In the meantime, the temporary policy of the Surplus Property Board is to prohibit, so far as is feasible and necessary, importation into the United States of surplus property from abroad. The Board's policy is also to make sales of surplus property for export from the United States on the same basis as domestic sales. Such exports will, of course, continue to be cleared through the regular wartime priorities, allocations and export controls.

The amount and types of surplus property available abroad will depend upon several factors, all more or less still unpredictable at this time. The progress of military operations in Europe, the status of Lend-

### "Sell as Much as Possible"

In the meantime, there is considerable speculation and talk on the part of many spokesmen as to the Government's policy and plans for such disposal. Suggestions of all kinds are being offered to the Surplus Property Board. Mr. Bernard M. Baruch, a respected Government adviser, has urged the Board to follow the policy of "selling as much as possible as soon as possible." Mr. Baruch believes that the disposal of materials which are not needed for war purposes, both in the United States and abroad, will be helpful in the distribution of food abroad and of all kinds of products in the United States.

Those agencies which have been charged with the responsibility of disposing of surplus property have been instructed by the Surplus Property Board to give priority in the purchase of all goods to the Federal, State and local governments. They are to be given thirty days in which to exercise their



options to purchase. After the expiration of this period, all available remaining property is to be offered for sale to commercial buyers. During the month of March, surplus property disposals reached a new high level, totalling \$39,861,000, compared with \$35,452,000 in February. Inventories of disposal agencies stood at \$1,399,283,000 on March 31st, compared with \$1,315,449,000 a month earlier.

United States industry, as well as the Government, is deeply concerned with the entire problem of surplus property, for on its sound solution depends much of the success of changing the national economy over from war to peacetime balance. Although the final programme for disposal still remains to be seen, several trends of opinion are becoming increasingly clearer, as many proposals are made. Disposal of such goods will, undoubtedly, be handled in a manner that will not cut off normal exports from the United States. Surpluses in foreign countries will, most probably, be disposed of in the countries where they are in use or stored, over a period of time sufficient to operate against a glutting of normal export markets there. Shipments in volumes which will tend to flood foreign markets or which will endanger future trade will, therefore, be discouraged. And the materials which are shipped will be suitable in quantity and specifications to meet the foreign buyers' needs. A plan is being considered at the present time under which the British and French Governments will act as agents in selling surplus United States consumer goods overseas. The Surplus Property Board has just been transferred from the Treasury to the Commerce Department and a new administrator, Col. Alfred E. Howse, has been appointed to handle the job.

## Mr. Alexander Replies

### What the Sailor Said

**I**N response to the telegram (to which we referred in our last issue) from Mr. A. J. Fippard, chairman of the Joint Committee of Electricity Supply Organisations, relating to the comparison of electricity charges mentioned in the broadcast address by Mr. A. V. Alexander, First Lord of the Admiralty in the late Government, the latter says:—

"I had your telegram on my return to the office. I used a remark made to me by a naval officer to illustrate a point which I desired to make and although the name of the place was not mentioned I believe it was

somewhere in the Hants area. However, apart from the remark made to me by the naval officer, I have no doubt you are aware that there are numerous instances of differential charges as between municipal and company concerns. Compare for example the charges for light in Southwark and Holborn."

Mr. Fippard has replied to Mr. Alexander: "I thank you for your letter of the 14th instant, and I am sure you will forgive me in saying that the statement you made on the information supplied to you by a naval officer is most misleading, for on comparing like with like, no such position exists. That you would intentionally mislead is unthinkable, but much damage can be done by the repetition of remarks which cannot be substantiated. You did not give me the name of the area to which the naval officer referred, and I am therefore unable to give you the facts which would show a very different state of affairs from those stated in your speech."

## Post-war Homes

### Exhibition at Dorland Hall

**A**N opportunity to compare the merits of electric, gas and coal kitchens is given at a "Post-War Homes Exhibition" now being held by the *Daily Herald* at Dorland Hall, Lower Regent Street, London, S.W.1. The British Electrical Development Association is responsible for one of the all-electric types, which includes a separate laundry room equipped with a washing machine and wringer and a drying cabinet. In the kitchen proper, in addition to fluorescent lighting, an upright type of cooker, refrigerator, kettle, clock and plug points for the apparatus, there is a small heater (120-W) for drying tea-cloths, etc. In the space between the kitchen and the laundry is accommodated a "two-in-one" water heater, with cupboard space above.

All the apparatus is designed on the unit principle and this applies also to a pair of "Ortyx" kitchens shown by Sir Lindsay Parkinson & Co., Ltd., one all-electric and the other "all-gas," the latter incidentally having electric lighting, fan, clock, radio and no washing machine. Pressed steel construction is employed throughout, the equipment of the electric type including all the items to be found in the E.D.A. design plus an extract fan. The washing machine is built-in and the cooker is of the new horizontal type. All the wiring, etc., is housed in an easily accessible duct running right round the walls at table-top height. An inset fire, toaster and television set are features of a model living-room equipped by E.D.A.

A new streamlined iron and a heater-cooker shown are the first of a range of products to be introduced by a newcomer to the electrical market, B. & T. (Components), Ltd., 4-12, Whiston Road, E.2.

# ELECTRICITY SUPPLY

## Croydon Power Station Design. Rationing in Australia.

**Airdrie.**—ELECTRICITY FOR HOUSES.—The Council is to discuss with the Clyde Valley Electrical Power Co. the installation of electricity for all purposes in future housing schemes.

**Blackpool.**—ILLUMINATIONS.—The Electricity Committee considers that it will not be possible for the town to hold an illuminations season this year, owing to the restrictions on fuel.

**Bridport.**—INCREASE IN CHARGES.—It is proposed to apply to the Ministry of Fuel and Power for permission to increase all charges for electricity and appliances by 5 per cent. Originally it was intended to make the increase  $7\frac{1}{2}$  per cent. In reply to an inquiry why it was necessary to increase the cost of old appliances which had already been paid for, the electrical engineer (Mr. H. F. Castle) said that the cost of spares and maintenance work had risen by between 50 and 75 per cent.

**Burton.**—CONTRIBUTION TO RATES.—The Electricity Committee has decided to allot £2,500 for rate relief for the year.

**SUPPLY EXTENSIONS.**—Electricity supplies are to be provided to temporary bungalows at the Harper estate at a cost of £2,271 and to farms at Netherseal and Drakelow (£1,809).

**Clitheroe.**—SUPPLY EXTENSION.—The Electricity Committee has approved an application for a supply of electricity to Gisburn Hall, Deer House Farm, Law Mill and Ellenthorpe and Coppice Farms, the owner offering £133 towards the cost of laying of the cable.

**Cockermouth.**—BORROWDALE VALLEY SCHEME.—The Mid-Cumberland Electricity Co., Ltd., is preparing a scheme for supplying electricity to the Borrowdale Valley.

**Croydon.**—DESIGN OF POWER STATION.—For the first section of the new power station C. S. Allott & Son are to undertake the duties of consultants for the civil engineering work and Mr. Robert Atkinson, F.R.I.B.A., is to prepare designs, etc., for the new buildings.

**SUPPLY TO ESTATES.**—The Electricity Committee has obtained sanction to borrow £7,090 for a supply to the Long Heath housing estate. At a cost of £1,674 it is providing a supply to the Gravel Pits estate, Mitcham Road.

**Cwmamman.**—STREET LIGHTING.—The Council is asking the South Wales Power Company for terms for lighting the streets of Cwmamman, where hitherto gas has been used.

**Darlington.**—SUPPLY TO HOUSES.—The Town Council is to supply electricity to temporary housing sites at Harrowgate Hill, Green Street and East Cemetery at a cost of £5,555.

**Eton Wick.**—ELECTRICITY PROSPECTS.—The inhabitants have for a long time agitated for electricity to be made available in the village. Now, according to the *Windsor Express*, following negotiations in connection with the erection of temporary houses, for which approval could not be obtained unless there was a supply, it is possible that the need may be met.

**Lincolnshire.**—AGRICULTURAL COMMITTEE'S RESOLUTION.—The Holland County Agricultural Committee has proposed a resolution

calling the attention of the three County Councils and War Agricultural Executive Committees of Lindsey, Kesteven and Holland to the vital necessity of increasing to the fullest possible extent and at the earliest possible moment the supply of electricity to every district of Lincolnshire.

**Markinch.**—HOUSES TO BE ALL-ELECTRIC.—It was decided at the monthly meeting of the Council that electricity only should be supplied to temporary houses. Councillor Keddie, moving a resolution in favour of this course, said that the all-electric scheme at Dundonald "proved up to the hilt" that electricity was far superior to gas. Councillor McInnes remarked that he had found electricity much cheaper than gas. Bailie Maxwell favoured gas for cooking, but thought electricity would be better in temporary houses.

**Renfrew.**—TEMPORARY HOUSES.—The Housing Committee has agreed that in the first hundred temporary houses allocated to the town gas shall be provided for cooking in 50 and electricity in the remainder.

**Stockton-on-Tees.**—LOANS SANCTIONED.—The Town Council has received sanction to borrow £10,000 for unspecified works for the electricity undertaking and £5,430 for a h.v. mains extension from Thompson Street substation to Mile House substation.

## Overseas

**Australia.**—SYDNEY RATIONS ELECTRICITY.—Electricity has been rationed in Sydney as from Monday last and, according to *Reuter*, consumers who exceed the ration will be liable to a fine of £500. Rationing has been introduced because of the big drop in coal stocks, following a series of strikes.

## I.E.E. Transmission Section

AN informal dinner was held by the Transmission Section of the Institution of Electrical Engineers on June 19th at the Connaught Rooms, London, at which Mr. H. W. Grimmitt (Section chairman) presided over a gathering of 240 members and guests. The chairman advised every I.E.E. member to join a specialised section and recommended all politicians to study the presidential address. The adoption of a "scientific approach" would prevent the making of loose promises.

Deputising for the President, Sir Harry Railing, Mr. T. G. N. Haldane (vice-president), expressed the view that, whatever the Government of the future, there would be greater national unity than there had been in the past. Its members would tend to approach problems in a more scientific spirit and would make more use of the senior engineering institutions. The I.E.E., in its turn, would have to turn to the specialised sections the chairman of which, under the revised By-Laws, would serve on the Council for two years.

Mr. E. W. Moss (past-chairman, Measurements Section) returned thanks on behalf of the guests.



# FINANCIAL SECTION

## Company News. Stock Exchange Activities.

### Reports and Dividends

**Walsall Conduits, Ltd.**, records a net profit for 1944 of £194,999 (£206,742 in 1943). Provision for taxation takes £120,702 (£126,526) and general reserve £20,000 (same). A final dividend of 35 per cent. makes 55 per cent. (same) and £101,589 (£93,542) is carried forward. The report states that a wide range of the company's wartime products depart little from the ordinary peacetime efforts and consequently there are no unusable stocks, nor has there been any change-over in methods of production.

**The Rheostatic Co., Ltd.**—The directors propose an increase in capital from £120,000 to £250,000 by the creation of £50,000 6 per cent. cumulative preference and £80,000 ordinary shares. It is proposed to offer part of the new preference to preference shareholders and part of the ordinary to ordinary shareholders *pro rata* up to a total in the first instance of £50,000. The remainder of the new capital will be available for issue as needed.

**Johnson Matthey & Co., Ltd.**, report a net profit of £560,066 for the year ended March 31st last. This compares with £536,656 in the previous year. An ordinary dividend and bonus amounting to 12 per cent. (10 per cent.) are to be paid. Tax reserve receives £260,000 (£250,000) and £50,000 (same) is set aside for writing down goodwill, leaving £872,764 (£722,869) to be carried forward.

**Kerry's (Great Britain), Ltd.** (formerly the East London Rubber Co., Ltd.) reports a net profit of £126,178 for 1944-45 (against £127,577 for the preceding year). Taxation reserve receives £89,925 (£90,500) and the staff pension scheme £6,000 (same) and after the payment of an unchanged dividend of 10 per cent. £55,800 (£42,714) is carried forward.

**Cable & Wireless (Holding), Ltd.**—The accounts show a total revenue for 1944 of £1,357,670, as compared with £1,356,838 in the previous year, the net profit being £1,199,079 (£1,220,976). The ordinary dividend is maintained at 4 per cent.

**Cable & Wireless, Ltd.** (the operating company) reports total receipts of £9,252,298 for 1944, £672,546 less than in the previous year. After providing for taxation there remains £8,793,415 (£9,420,909). Adding income from subsidiaries, investments, etc., the total income was £9,648,414 (£10,201,395). The net profit was £1,237,757 (£1,228,892). The dividend is maintained at 4 per cent. and £447,323 (£409,566) is carried forward.

**Marconi's Wireless Telegraph Co., Ltd.** (which is controlled by Cable & Wireless, Ltd.) states that after providing £190,000 (nil) for E.P.T. the profit for 1944 was £796,073 (£890,731) and the net profit £210,381 (£244,829). The dividend is maintained at 7 per cent. and £307,231 (£255,759) is carried forward.

**The Eastern Telegraph Co., Ltd.**, a subsidiary of Cable & Wireless, Ltd., reports an income for 1944 of £744,910 (£756,600). After providing for debenture interest and expenses, there remains

£658,044 (£664,820). The dividend is maintained at 11½ per cent. and £55,016 (£41,972) is carried forward.

**British Electric Traction Co., Ltd.**—At the company's annual meeting last week the chairman, Mr. R. J. Howley, C.B.E., said that the associated companies concerned with electricity supply, although relatively small compared with those in the road passenger transport industry, sold nearly 330 million units in 1944. Referring to the scheme put forward by the Electricity Board for Northern Ireland which provided in effect for the undertaking of the Antrim company to be taken over by the Board, he said it would be unfortunate to say the least if the Northern Ireland Government decided to cut short the company's tenure just when the undertaking was showing promise of some reward for the many years of pioneering service.

**The Lightfoot Refrigeration Co., Ltd.**, reports a net profit for 1944 of £21,068 (£35,745). There was also a profit of £31,316 on the sale of Calcutta factories. Reserve for subsidiary companies' losses no longer required amounted to £8,940. A sum of £3,591 is carried forward as against a debit of £26,417. There is to be a distribution of 5 per cent. (nil) out of capital profits.

**The Chloride Electrical Storage Co., Ltd.**, reports a profit for the year ended March 31st last amounting to £526,034 (£517,672). A final dividend of 5 per cent. and a bonus of 5 per cent., both less tax at 8s. 10d., on the "A" and "B" ordinary stock make a total distribution of 15 per cent.

**The Revo Electric Co., Ltd.**, from a net profit of £70,121 (against £66,845), is again paying a final dividend of 10 per cent. and a bonus of 2½ per cent., making 17½ per cent. for the year (unchanged).

**Radiovisor Parent, Ltd.**, shows a profit of £5,708 for the year ended March 31st last as compared with £2,466 in 1943-44. This has reduced the adverse balance from £34,184 to £28,476. The bank overdraft has been reduced from £5,393 to £3,580.

**The Telephone Manufacturing Co., Ltd.**, is to pay a final dividend of 6½ per cent., again making 9 per cent. The net profit for 1944 was £217,719 before taxation, the figure for 1943 being £274,083.

**Ruston & Hornsby, Ltd.**—The combined trading profits for the year ended March 31st last (after deducting E.P.T.) of the company and its wholly owned subsidiaries, together with dividends from subsidiary not wholly owned and from associated companies, amounted to £372,560 as compared with £362,723 for the previous year. An ordinary dividend of 12½ per cent. is again to be paid.

**The Power Plant Co., Ltd.**, reports a profit for 1944 of £25,876 (against £24,188), to which are added £12,828 brought in and £4,500 tax reserve no longer required. The dividend is maintained at 15 per cent. and £13,704 is carried forward.

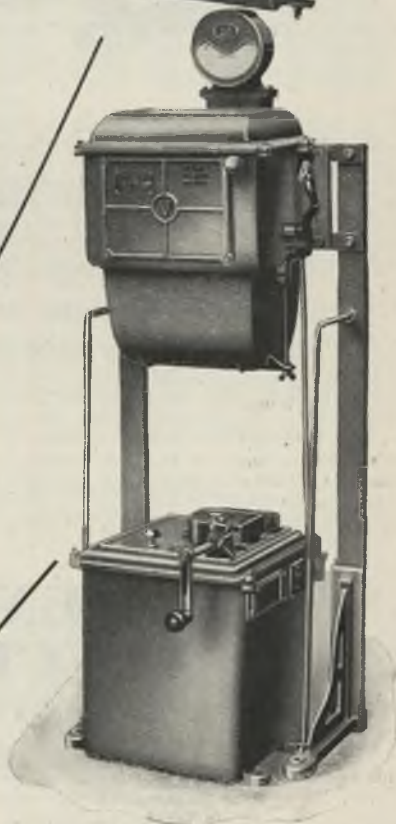


*control  
for  
slip-ring  
motors  
from*



Oil immersed combined rotor  
and stator starter with or  
without isolator up to 90 H.P.  
400/440 V.

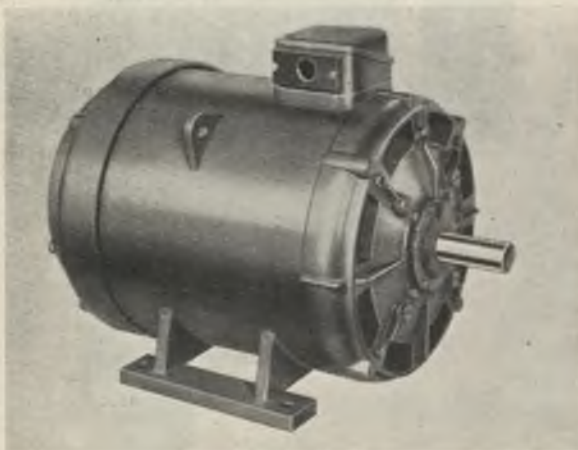
Oil immersed rotor and  
stator control panel for  
motors up to 250 H.P.  
400/440 V.



**WORKS : ASTON, BIRMINGHAM 6**

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## *The L.S.E. Range of Electric Motors*



### **The L.S.E. RANGE includes :**

Standard A.C. & D.C. Motors in all enclosures and ratings ;  
Variable speed equipments,  
A.C. & D.C.

Motors for mines, cranes, mill auxiliaries, etc.

Marine Motors, electric Cargo Winches, electrical equipment for steering gear.

Generators, Alternators, Welding generators, Control Gear. Precision electro-mechanical Instruments, etc.

*The machine illustrated is an "EMCOL" squirrel cage motor in the industrial range.*

**"EMCOL"** The patented "EMCOL" cooling system enables L.S.E. to build totally enclosed machines of practically any required output. Particularly valuable when outputs of several hundred horse-power are required, the advantages of its efficiency are also of importance for smaller machines.

This cooling system can be applied to practically all L.S.E. motors\* which may be required to work in dirty situations or where the atmosphere is very damp or charged with harmful vapours.

*\* Including standard A.C. & D.C. Motors ; variable speed A.C. Motors, flameproof Motors, etc.*

## **LAURENCE, SCOTT & ELECTROMOTORS LIMITED**

*Electrical Engineers since 1883*

NORWICH &



MANCHESTER

The Victoria Falls & Transvaal Power Co., Ltd., is to pay a final dividend of 11 per cent., again making 15 per cent. The accounts for 1944 are not yet completed, but the directors are satisfied that the net profit will not differ materially from that of 1943.

The Electric Furnace Co., Ltd., is to pay a second interim dividend of  $4\frac{1}{2}$  per cent. (same), again making 8 per cent.

Turner & Newall, Ltd., are maintaining their interim dividend at  $3\frac{1}{2}$  per cent.

R. B. Pullin & Co., Ltd., are again to pay an interim dividend of 5 per cent.

## New Companies

**Scientific Kitchens, Ltd.**—Public company. Registered June 9th. Capital, £12,000. Objects: To adopt an agreement with E. W. Mees, and to carry on the business of manufacturers of and dealers in domestic kitchen equipment, all electric kitchens, electric washing and dish-washing machines, cookers, refrigerators, etc. Permanent directors: E. W. Mees, 17, Arcadia Avenue, Brooklands, Manchester, and G. H. Howorth, 230, Oundle Road, Peterborough. Registered office: Gloucester Mansions, Cambridge Circus, W.C.2.

**A. W. Fisher & Sons (Ipswich), Ltd.**—Private company. Registered June 14th. Capital, £1,000. Objects: To acquire the business of electrical engineers, carried on as "A. W. Fisher & Sons," at 10, Dial Lane, Ipswich. First directors: A. W. Fisher and R. A. Fisher, both of 46, Valley Road, Ipswich. Registered office: 10, Dial Lane, Ipswich, Suffolk.

**Neon Signs (Ulster), Ltd.**—Private company. Registered in Belfast May 16th. Capital, £5,000. Objects: To manufacture, purchase, hire, procure on hire-purchase or otherwise acquire all classes of neon signs, mechanical devices and electrical goods, etc. First directors: Leo Scop, 17, Downview Avenue, Belfast and three others. Registered office: Ocean Buildings, Donegall Square East, Belfast.

**Hulme & Son (Derby), Ltd.**—Private company. Registered June 14th. Capital, £10,000. Objects: To acquire the business of an electrical engineer carried on by A. B. Hulme at 8-9, Sadler Gate, Derby, and Bridge Street, Belper, as "Hulme & Son," and to carry on the business of electrical, radio and general engineers, etc. Directors: A. B. Hulme, J. Hulme and R. Hulme, all of 29, Keats Avenue, Littleover, Derby. Registered office: 8-9, Sadler Gate, Derby.

**Mayfair Radio & Television, Ltd.**—Private company. Registered May 28th. Capital, £2,000. Objects: To carry on the business of manufacturers of and dealers in electrical and mechanical apparatus, wireless and television sets and accessories, etc. Directors: A. C. Blacknell, 1, Albert Road, Whalebone Lane, Dagenham; and A. W. Lines, 57, Sutton Lane, Hornchurch, director of A. W. Lines, Ltd. Registered office: 1, Albert Road, Whalebone Lane, Dagenham.

**J. H. Hayman (Electrical Engineers), Ltd.**—Private company. Registered June 14th. Capital, £5,000. Objects: To carry on the business of electrical and mechanical engineers, etc. J. H. Hayman, 97, Woodlands Avenue, London, E.11, is the first director. Registered office: 252, High Road, Leyton, E.10.

**Refrigeration A-Z (Guildford), Ltd.**—Private company. Registered June 15th. Capital, £1,500. Objects: To carry on the business of manufacturers and repairers of and dealers in refrigerators and domestic appliances of all kinds, etc. Directors: P. W. E. Baker, Sancroft, Hoe Lane, Abinger, and two others. Registered office: 4, Mill Lane, Guildford.

## Companies' Returns Statements of Capital

**Pennington, Stevens & Taylor, Ltd.**—Capital, £7,000 in £1 shares. Return dated November 21st. 6,912 shares taken up. £6,762 paid. £150 considered as paid. Mortgages and charges: Nil.

**Electro-Rentals, Ltd.**—Capital, £15,000 in £1 shares. Return dated August 7th (filed November 25th). 13,100 shares taken up. £13,100 paid. Mortgages and charges: Nil.

**Newcastle & District Electric Lighting Co., Ltd.**—Capital, £600,000 in £1 shares (all ordinary). Return dated April 6th. All shares taken up. £600,000 paid. Mortgages and charges: £350,000.

**Stearn Electric Co., Ltd.**—Capital, £4,000 in £1 shares. Return dated November 2nd, 1944. All shares taken up. £2 paid. £3,998 considered as paid. Mortgages and charges: £18,200.

**Rigby & Partners, Ltd.**—Capital, £500 in £1 shares. Return dated October 11th, 1944 (filed November 9th, 1944). All shares taken up. £500 paid. Mortgages and charges: Nil.

**Sydney Hellyar, Ltd.**—Capital, £2,000 in £1 shares. Return dated October 12th (filed November 11th, 1944). All shares taken up. £2,000 considered as paid. Mortgages and charges: Nil.

## Mortgages and Charges

**Accumulator & Contracting Co., Ltd.** (formerly Accumulator Contracting Co., Ltd.).—Particulars filed of £2,000 debentures authorised June 4th, 1945, charged on the company's property, present and future, including uncalled capital, the whole amount being now issued.

**Fyfe Wilson & Co., Ltd.**—Satisfaction in full on November 10th, 1944, of mortgage dated December 17th, 1921, and registered December 22nd, 1921, securing £700. (Notice filed June 8th.)

## Bankruptcies

**W. C. Lloyd**, formerly electrical appliance renovator, 73, St. Anns Well Road, Nottingham.—The public examination was held at the County Court House, St. Peter's Gate, Nottingham, recently. According to the statement of affairs returned there were liabilities of £201 and assets estimated at £14, a deficiency of £187. The examination was adjourned.

**R. A. Young**, electrical and mechanical engineer, Gullet Passage, Shrewsbury.—Application for discharge to be heard on July 23rd at the Shire Hall, Shrewsbury.

**A. J. Harding**, 50-51, Broad Street, and West Street, Hereford, electrical engineer.—Last day for receiving proofs for dividend July 7th. Trustee, Mr. O. B. Wallis, 133, St. Owen Street, Hereford, Official Receiver.



## STOCKS AND SHARES

TUESDAY EVENING.

**S**TOCK EXCHANGE markets and prices have recovered to a large extent from the weakness that overtook them early last month upon Mr. Churchill's announcement that a General Election would take place in July. The mild shock administered to confidence by the apprehension that if the Labour Party should be returned they would start nationalisation on an extensive scale, has given way to a calmer state of affairs. There is no lack of capital waiting investment. A good part of the money which was held back early in May, is now coming into the Stock Exchange markets, with the result that prices, on the whole, improve from week to week. Business, however, is quiet. Every company report and every chairman at annual meetings emphasise the necessity for relaxation of Government control, while the Government, on its side, insists upon the imperative necessity for increasing the export trade of the country. A minor feature of the past few days has been a recovery in Home Railway stocks.

### Price Fluctuations

Comparing current prices with those of a month ago, it will be noticed that the majority show advances. The improvements are well spread, covering the investment shares and extending to those more speculative, of which the radio group supplies examples. In the former group, Murex have risen 5s. to 97s. 6d. and Callender's at  $6\frac{1}{4}$  ex dividend are similarly better. Automatic Telephone at 69s. show a rise of 3s. 6d. Hopkinsons at 83s. 9d. are  $\frac{3}{8}$  to the good and Metal Industries (B) are 3s. 3d. up at 49s. Ever Ready shares have been a good spot at 41s. 6d. and Associated Electrical at 57s. 3d. are 1s. 9d. higher. Numbers of smaller rises have occurred in this department. Elsewhere, Calcutta Trams made a jump of 6s. to 75s. 6d., and Calcutta Electric at 54s. 6d. are 3s. 6d. up. Cable and Wireless issues were little changed by publication of the annual report and figures.

### Radio Market Activity

The principal activity for the time being in the radio market centres around A.C. Cossor shares. The price has risen substantially during the past month, touching 40s. at one time and holding the greater part of the improvement. The chairman has said that the statement as to a deal having been completed between the Cossor company and United States interests, is premature, but he added that negotiations involving important developments have reached an advanced stage. These developments have been going on for the past six months and, according to rumour, a new company will be created in order to deal with the joint English and United States interests. The Cossor company, as is

well known, manufactures electrical and scientific instruments, and radio equipment. Other shares in this group have been less active. E.M.I. at 34s. 6d. show a gain of a few pence as compared with a month ago. E. K. Cole, fell to 40s., and recovered to 41s. 3d. Pye deferred shares at 33s. 6d. are 1s. higher.

### W. T. Henley's

The excellent results reported by W. T. Henley's Telegraph Works, to be submitted to the meeting on Friday in this week, made little difference to the price of the shares, which, at 27s. 3d., is ex the dividend and bonus of 15 per cent., making 20 per cent. for the year. The company's net profits are £6,700 lower, accounted for by increased provision for depreciation. The actual trading balance, after taxation and special war expenditure, comes out at £445,800, which is £7,600 up on the year. The company has paid 20 per cent. every year since 1937 inclusive. The balance sheet is exceptionally strong, one feature being that there is no goodwill. Against the capital of £1½ million, there are reserves of £1,174,326.

### Chloride Electrical

The annual meeting of the Chloride Electrical Storage Co. is to be held on July 25th, and, as already announced, the dividend and bonus make 15 per cent. for the year. A similar rate has been paid annually since 1935, with the exception of 1938 when the bonus was doubled and the distribution for the year came to 20 per cent. Income tax is deducted at 8s. 10d. in the £ from the dividend, this applying to the company's "A" and "B" ordinary stock. The only difference between the "A" and "B" is that the "A" has one vote per £1 of stock, whereas the "B" ordinary votes only in the case of the company's being wound up. Chloride control a number of companies dealing with accumulators, batteries, etc. The present price of the shares, 90s., compares with 55s. in 1940 and 50s. in 1935. In 1937, the price touched 97s. 6d.

### Telegraph Condenser

The bonus of  $2\frac{1}{2}$  per cent. added to the dividend of  $7\frac{1}{2}$  per cent. on Telegraph Condenser shares raises the yield to £3 18s. 6d. per cent. at the current price of 25s. 6d. The company's report shows that demand for its manufactures was so great that output was raised to considerably more than the pre-war level. The war work will continue until Japan gives in, and after that, the problems arising from the change-over to peacetime conditions will not be easy. Negotiations are well advanced, however, for the renting of an additional factory. Some contraction of output is anticipated, which does not necessarily mean that the profits will be affected to any material extent. The 10 per cent. dividend and bonus are paid out of earnings of nearly 27 per cent.

(Continued on page 958)

# ELECTRICAL INVESTMENTS

## Past Month's Price Changes

Company	Dividend		Middle Price June 25	Month's Rise or Fall	Yield p.c.	Company	Dividend		Middle Price June 25	Month's 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	-1/-	4 0 0	Aron. Elec. Ord.	10	15	63/-	+1/-	4 15 3
British Power and Light ..	7	7	31/-	-6d.	4 10 4	Assoc. Brit. Eng.	6	7	53/9	..	2 12 0
City of London ..	5½	6	31/-	..	3 17 5	Assoc. Elec. :	..	..	..	..	..
Clyde Valley ..	8	8	42/-	-6d.	3 16 1	Ord. ..	10	10	57/3	+1/9	3 10 0
County of London	8	8	42/-	..	3 16 1	Pref. ..	8	8	41/-	..	3 18 1
Edmundsons ..	6	6	31/-	+1/-	3 17 5	Automatic Tel. & El.	12½	12½	69/-	+3/6	3 12 6
Elec. Dis. Yorkshire	9	9	46/-	..	3 18 3	Babcock & Wilcox	11	12	56/9	+3/9	4 4 6
Elec. Fin. and Sec- urities ..	12½	13½	61/3	-½	4 8 1	British Aluminium	10	10	42/-	-1/9	4 15 4
Elec. Supply Cor- poration ..	10	10	49/6	-6d.	4 1 0	British Insul. Ord.	20	20	6½xd	..	3 5 4
Lancs. Light and Power ..	7½	7½	37/-	-1/-	4 1 1	British Thermostat (5/-) ..	18½	18½	29/3xd	-1/3	4 16 1
Llanely Elec. ..	6	6	28/6	-1/6	4 4 3	British Vac. Cleaner (5/-) ..	30	30	33/-	-6d.	4 11 0
Lond. Assoc. Electric	3	4	26/6	..	3 0 6	Brush Ord. (5/-)	8	9	10/-	+6d.	4 10 0
London Electric	6	6	31/6	+6d.	3 16 3	Burco (5/-)	15	15	15/3	-9d.	4 18 4
Metropolitan E.S.	8	8	42/-	..	3 16 1	Callender's ..	15	20	6½xd	+½	3 2 0
Midland Counties	8	8	42/3	..	3 15 9	Chloride Elec. Storage	15	15	90/-	..	3 6 8
Mid. Elec. Power	9	9	45/-	..	4 0 0	Christy Bros. ..	12½	17½	77/6	..	4 10 2
Newcastle Elec.	7	7	31/6	-6d.	4 9 0	Cole, E. K. (5/-)	15	20	41/3	..	2 6 0
North Eastern Elec.	7	7	35/6	-6d.	3 18 4	Consolidated Signal	24	27½	6½	..	4 1 4
Northampton ..	10	10	50/6	-6d.	3 19 0	Cossor, A. C. (5/-)	7½*	10*	39/6	+5/6	1 5 5
Northmet Power	7	7	40/-	..	3 10 0	Crabtree (10/-)	17½	17½	43/-	+6d.	4 1 5
Richmond Elec.	6	6	26/6	..	4 10 7	Crompton Parkinson Ord. (5/-)	20	22½	32/-	-2/-	3 10 3
Scottish Power ..	8	8	40/-	..	4 0 0	De La Rue ..	40	40	10½	+½	3 15 0
Southern Areas	5	5	24/-	-6d.	4 3 4	E.M.I. (10/-)	6	8	34/6	+6d.	2 6 5
South London ..	7	7	30/-	..	4 13 4	Elec. Construction	10	12½	60/-	-2/-	4 3 4
West Devon ..	5	5	25/-	..	4 0 0	Enfield Cable Ord.	12½	12½	63/9	-6d.	3 18 4
West Glos. ..	4½	3½	27/6	..	2 11 0	English Electric	10	10	53/-	+1/9	3 15 5
Yorkshire Elec. ..	8	8	44/6	-6d.	3 12 1	Ericsson Tel. (5/-)	22*	20*	54/-	-1/-	1 17 0
Public Boards						Ever Ready (5/-)	40	40	41/6	+1/6	4 16 5
Central Electricity :	..	..	..	..	..	Falk Stadelmann	7½	7½	35/6	+6d.	4 4 6
1955-75 ..	5	5	115	..	4 7 0	Ferranti Pref. ..	7	7	33/6xd	-6d.	4 3 7
1951-73 ..	4½	4½	106xd	..	4 5 0	G.E.C. :	..	..	..	..	..
1963-93 ..	3½	3½	104½	..	3 7 0	Pref. ..	6½	6½	34/6	..	3 15 4
1974-94 ..	3½	3½	101	..	3 3 9	Ord. ..	17½	17½	96/-	+1/-	3 13 0
London Elec. Trans.	2½	2½	98½	..	10 9	General Cable (5/-)	15	15	19/-	..	3 19 0
London & Home Counties 1955-75	4½	4½	112	+1	4 0 4	Greenwood & Batley	15	15	48/3	..	6 3 0
Lond. Pass. Trans. Bd.	..	..	..	..	..	H.T.A. (10/-)	12½	12½	30/-	..	4 3 4
A ..	4½	4½	120½xd	-2	3 14 6	Henley's (5/-)	20	20	27/3	+6d.	3 13 5
B ..	5	5	120½xd	-2½	4 3 0	4½% Pref. ..	4½	4½	24/6	+6d.	3 13 6
C ..	3½	3	67½	..	4 9 0	Hopkinsons ..	17½	20	83/9	+3/9	4 15 8
West Midlands	..	..	..	..	..	India Rubber Pref.	5½	5½	24/-	..	4 11 9
J.E.A. 1948-68	5	5	106½	..	4 14 0	Intl. Combustion	30	32½	7½	+½	4 2 6
Overseas Electricity Companies						Johnson & Phillips	15	15	75/-	+½	4 0 0
Atlas Elec. ..	Nil	Nil	8/-	+9d.	—	Lancashire Dynamo	22½	22½	105/-	..	4 5 10
Calcutta Elec. ..	6*	6*	54/6	+3/6	2 4 0	Laurence, Scott (5/-)	12½	12½	13/-	-1/-	4 16 3
Cawnpore Elec. ..	10	7	52/-	+4/-	2 13 10	London Elec. Wire	7½	7½	39/-	..	3 17 0
East African Power	7	7	34/-xr	..	4 2 4	Mather & Platt ..	10	10	53/9	..	3 14 4
Jerusalem Elec. ..	7	5	27/6	-6d.	3 12 9	Metal Industries (B)	8	8½	49/-	+3/3	3 9 5
Kalgoorlie (10/-)	5	5	10/-	..	5 0 0	Met. Elec. Cable Pref.	5½	5½	21/3	..	5 3 6
Madras Elec. ..	Nil	4	34/6	-6d.	2 6 6	Mid. Elec. Mfg. ..	25	25	7½	..	3 5 7
Montreal Power	1½	1½	26	+½	—	Murex ..	20	20	97/6	+½	4 2 0
Nigerian Elec. ..	8	10	38/6	+6d.	5 4 0	Newman Ind. (2/-)	20	20	7/9	+6d.	5 3 1
Palestine Elec. "A"	5*	5*	39/-	-1/-	2 11 4	Philco (2/-)	..	..	14/6	-6d.	—
Perak Hydro-elec.	6	7	16/6	+6d.	—	Power Securities	6	6	28/6	-1/-	4 4 3
Tokyo Elec. 6%	6	6	27	-1½	—	Pye Deferred (5/-)	25	25	33/6	+1/-	3 14 7
Victoria Falls Power	15	15	88/9	..	3 7 7	Ransome & Maries	20	20	83/9	..	4 15 7
Whitehall Inv. Pref.	—	6	26/-	..	4 12 4	Revo (10/-)	17½	17½	44/-	..	3 19 7
						Reyrolle ..	12½	12½	73/3	..	3 8 4
(Continued on next page)											

(Continued on next page)

\* Dividends are paid free of Income Tax.

Company	Dividend		Middle Price June 25	Month's Rise or Fall	Yield p.c.	Company	Dividend		Middle Price June 25	Month's Rise or Fall	Yield p.c.
	Pre-vious	Last					Pre-vious	Last			
<b>Equipment and Manufacturing (Continued)</b>											
Siemens Ord. ..	7½	7½	34/6	+6d.	4 3 4	Cape Elec. Trams	5	6	25/-	..	4 16 0
Strand Elec. (5/-)	10	12½	10/6	..	5 19 3	Lancs. Transport	10	10	49/-	..	4 1 0
Switchgear & Cow-ans (5/-)	20	20	21/6	-6d.	4 13 0	Southern Rly. : 5% Prefd.	5	5	73	+2	6 17 0
T.C.C. (10/-)	7½	10	25/6	..	3 18 6	5% Prefd.	5	5	115½	-3	4 6 7
T.C. & M.	10	10	61/6	+6d.	3 5 0	T. Tilling	10	10	57/6	+6d.	3 9 7
Telephone Mfg. (5/-)	9	9	12/6	+3d.	3 12 0	West Riding	10	10	48/-	-1/-	4 3 4
Thorn Elec. (5/-)	20	20	28/-	-1/-	3 11 5	<b>Telegraph and Telephone</b>					
Tube Investments	20	22½	5 11	-½	4 2 9	Anglo-Am. Tel. :					
Vactric (5/-)	Nil	22½	22/-	+6d.	5 4 2	Pref. ..	6	6	122½	-2	4 18 0
Veritys (5/-)	7½	7½	9/-	+6d.	4 3 3	Def. ..	1½	1½	30½	-	4 18 4
Walsall Conduits (4/-)	55	55	53/6xd	-9d.	4 2 0	Anglo-Portuguese	8	8	28/-	..	5 14 4
Ward & Goldstone (5/-)	20	20	30/6	..	3 5 8	Cable & Wireless :					
Westinghouse Brake	14	14	76/9	-½	3 13 0	5½% Prefd. ..	5½	5½	115	+1	4 15 6
West, Allen (5/-)	7½	7½	8/-	..	4 13 9	Ord. ..	4	4	86xd	..	4 13 0
<b>Traction and Transport</b>						Canadian Marconi	\$1 Nil	4 cts.	17/6	+2/9	—
Anglo-Arg. Trans. :						Globe Tel. & Tel. :					
First Pref. (£5)	Nil	Nil	2/6	..	—	Ord. ..	8½*	5*	42/6	-6d.	2 7 0
4% Inc.	Nil	Nil	7½	+1½	—	Pref. ..	6	6	31/6	+6d.	3 16 2
Brit. Elec. Traction :						Great Northern Tel. (£10)	Nil	Nil	33	+1	—
Def. Ord.	45	45	1165	..	3 18 0	Inter. Tel. & Tel.	Nil	Nil	35	+1	—
Pref. Ord.	8	8	190	..	4 4 3	Marconi-Marine ..	7½	7½	35/6	+6d.	4 4 4
Bristol Trams ..	10	10	59/-	-6d.	3 7 10	Oriental Tel. Ord.	4	4	57/-	+1/-	—
Brazil Traction ..	1½	2	29½	+2½	6 15 7	Telephone Props.	Nil	6	21/-	+1/-	5 14 3
Calcutta Trams.	6½	7½	75/6	+6/-	1 19 7	Tele. Rentals (5/-)	10	10	11/9	+3d.	4 5 0

\* Dividends are paid free of Income Tax.

**Stocks and Shares (Continued from page 956)**

on the ordinary shares, the highest ratio since 1940, when 33 per cent. was earned. In 1938, the company made a loss, and the price of the shares in the following year fell to 3s. 6d.

**Telegraph Construction**

The Telegraph Construction & Maintenance shares have recovered to 61s. 6d., at which price the return is a modest 3½ per cent. This indicates the expectation that it may not be long before the company is in a position to increase the 10 per cent. dividend distributed annually since 1937, with a capital bonus in 1939. Dividends are paid in equal instalments of 5 per cent. half yearly, and the company has maintained a strong financial position in spite of the present burden of taxation. This financial strength will prove its value when the company is called upon to satisfy peacetime demands of home and export markets, both of which, according to the chairman's statement, will undoubtedly be heavy.

**Four per Cent. Yields**

The recent reductions in the prices of electricity supply shares have given some of the ordinary a cheaper looking appearance. For instance, Lancashire Electric can be bought at 37s. 6d., to yield 4 per cent. on the money, and a similar return is obtainable from Scottish Power ordinary at 40s. The Northampton Electric pays 10 per cent. annual dividends and the shares, obtainable now at 50s. 9d., yield a

little under the round 4 per cent. Electric Supply Corporation is another company which pays 10 per cent. dividends, and, here, shares are obtainable at 50s., yielding 4 per cent. on the money. British Power and Light ordinary at 31s. 6d., afford £4 8s. 9d. per cent. on the basis of the 7 per cent. dividends that the company is now regularly paying.

**Great Northern Telegraph**

The shares of Great Northern Telegraph have recently been rising and now stand at 33. No dividends have been paid since January, 1940, but previous to the war the company made substantial distributions and the shares were regarded as one of the soundest to be found in the telegraph list. The shares quoted in our lists are of £10 each, and there are 150,000 in issue. They have recently come into notice as being a healthy post-war lock up.

**International Finance**

THE Federation of British Industries has issued a second report on the Bretton Woods Plan—the "Final Act" of the United Nations Monetary and Financial Conference. The interim report, which was issued last November, gave general approval to the objectives of the Plan. The latest report deals with further aspects in some detail and the conclusion is reached that even if the United Kingdom is unable to secure what it considers to be desirable amendments, the F.B.I. would continue to support the broad principles of the Final Act in the event of its being approved by the Congress of the United States.



# 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 Patents Office, 25, Southampton Buildings, London, W.C.2.*

**A**GA-BALTIC Aktiebolag.—“Electric course-indicating navigation instrument.” 20159/43. February 2nd, 1943. (569839.)

Aktiebolaget Elektrolux.—“Hinged supporting shelves of refrigerator cabinets.” 15989/43. August 22nd, 1942. (569790.)

J. E. Allan.—“Lamps and lighting systems.” 20027. December 1st, 1943. (569746.)

Automatic Telephone & Electric Co., Ltd., and T. B. D. Terroni.—“Electric terminal assemblies.” 16205. October 4th, 1943. (569827.)

Birmingham Electric Furnaces, Ltd., and R. J. Lean.—“Cam-operated electric switches for controlling a sequence of operations.” 17404. October 22nd, 1943. (569793.)

H. T. Bourne.—“Electrically driven drying apparatus.” 15113. September 15th, 1943. (569763.)

British Thomson-Houston Co., Ltd.—“Electrodes.” 6243/43. April 22nd, 1942. (569685.)

Chloride Electrical Storage Co., Ltd. (L. E. Lighton).—“Heat transfer means for electric accumulators.” 15013. September 13th, 1943. (569756.)

J. H. Cozens and Telegraph Condenser Co., Ltd.—“Electrical condensers.” 14401. September 3rd, 1943. (569700.)

Electrical Components, Ltd., and W. Sommer.—“Fuse unit for the protection of electrical circuits.” 15096. September 15th, 1943. (569761.)

H. G. C. Fairweather (Magnetic Analysis Corporation).—“Method of and apparatus for demagnetising magnetic bodies.” 19909. November 29th, 1943. (569806.)

V. Hope.—“Combined electric switchgear and fusible cut-outs, distribution boards and the like.” 20329. December 6th, 1943. (569840.)

W. Ireland, H. T. Pasmore and Automatic Coil Winder & Electrical Equipment Co., Ltd.—“Apparatus for cutting wire and the like.” 14276. September 1st, 1943. (569694.)

Linde Air Products Co.—“Electric welding.” 490/44. January 12th, 1943. (569810.)

H. S. Macadie and Automatic Coil Winder & Electrical Equipment Co., Ltd.—“Electric measuring instruments.” 20349. December 6th, 1943. (Addition to 545391.) (569807.)

R. F. Oxley.—“Variable electric condensers.” 17783. October 28th, 1943. (569767.)

W. F. Parker, L. R. Perkins, E. J. Sutton and J. W. Woolley.—“Electrical wiring of buildings.” 14360. September 2nd, 1943. (569697.)

Revo Electric Co., Ltd., and F. H. Reeves.—“Means of glazing apertures.” 14949. September 11th, 1943. (569755.)

J. H. Runbaken.—“Heating devices for the water systems of internal-combustion engines.” 17998. November 26th, 1943. (569805.)

F. Sigmund and W. S. Hlavin.—“Dynamo-electric machines.” 13101. August 12th, 1943. (569748.) “Magnetisable cores for dynamo-

electric machines.” 17300. October 20th, 1943. (569792.)

M. Bond-Smith.—“Electrical goods.” 20385. December 6th, 1943. (569808.)

Standard Telephones & Cables, Ltd., and S. J. Powers.—“Methods of carbonising the metal electrodes of electron discharge devices.” 15278. September 17th, 1943. (569819.)

Standard Telephones & Cables, Ltd., P. J. Chatterjea and T. W. Wingent.—“Thermionic valves.” 20238. December 3rd, 1943. (569776.)

F. C. Stephan.—“Insulated electric terminals.” 15117. September 15th, 1943. (569764.)

A. V. Summers and V. R. Summers.—“Electrically heated clothing and equipment.” Cognate applications 14395/43 and 21037/43. September 3rd, 1943. (569699.)

Svenska Turbinfabriks Aktiebolaget Ljungstrom.—“Radial flow turbine of the double rotation type.” 18254/43. December 11th, 1942. (569802.)

Swift, Levick & Sons, Ltd., G. D. L. Horsburgh and F. W. Tetley.—“Manufacture of permanent magnet material.” 14698. September 30th, 1940. (569719.)

J. S. Turnbull and Metropolitan-Vickers Electrical Co., Ltd.—“Method and means for forming substantially right angle flanges on blanks of sheet material by pressing.” 19199. November 17th, 1943. (569773.)

Venner Time Switches, Ltd., and W. E. Brook.—“Mechanical time fuses and other delay action mechanisms.” 8043. May 4th, 1940. (569715.)

Westinghouse Brake & Signal Co., Ltd. (Union Switch & Signal Co.).—“Railway traffic controlling apparatus.” 1376. January 27th, 1943. (Convention date not granted.) (569720.)

C. S. Weyandt.—“Vibratory electric motor.” 10790/43. July 17th, 1942. (569782.)

## TRADE MARKS

**R**ECENT applications for trade marks include the following, objections against which may be entered within a month from June 20th:—

ARCHIMEDES. No. 630,987, Class 7. Electric motors and internal combustion engines, starting devices for motor engines, etc. (not for land vehicles).—Aktiebolaget Archimedes, Karlsbodavagen, 205, Sundbyberg, Sweden. Address for service, c/o F. Watson, Aldwych House, Aldwych, London, W.C.2.

TANNOY. No. 633,456, Class 7. Electric motors (not for land vehicles), electric generators and electric-motor driven machinery. Also 633,457, Class 11. Installations, apparatus and appliances for lighting, heating, drying, cooking, refrigeration and ventilating; and ozone sterilisers.—Guy R. Fountain, Ltd., Tannoy Works, Canterbury Grove, West Norwood, S.E.27.

PHILORA. No. 633,204, Class 11. Lighting installations, apparatus and fittings, but not including electric lamps (ordinary) and lighting fittings of common metal.—Philips Lamps, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

# 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.

**Birmingham.**—July 20th. Electricity Department. Circulating water pipework, etc., for Hams Hall "B" power station extensions. (See this issue.)

**Burnley.**—June 30th. Electricity Department. Supply and delivery of transformers and e.h.v. cables. (June 8th.)

**Darlington.**—July 10th. Electricity Department. 6.6-kV overhead line. (See this issue.)

**Epsom and Ewell.**—July 2nd. Electricity Department. Supply and delivery of high and low voltage cables, paper insulated, lead covered, and armoured. (June 22nd.)

**Gellygaer.**—June 30th. U.D.C. Electricity Department. House service units. (June 1st.)

**Hazel Grove and Bramhall.**—June 30th. Electricity Department. Three 250-kVA transformers. (June 15th.)

**Hull.**—July 13th. Electricity Department. Pumps. (June 15th.)

**Manchester.**—July 12th. Electricity Committee. Water valves for Stuart Street generating station, and ash sluicing plant at Barton. (See this issue.)

**Plymouth.**—July 10th. Electricity Department. Ash conveyor belts. (See this issue.)

**Prestonpans.**—July 2nd. Town Council. Various works, including electric lighting, at three blocks of houses and shops. Schedules from R. and A. K. Smith, F.S.I., chartered quantity surveyors, 4, Forbes Street, Edinburgh, 3.

### Orders Placed

**Bedford.**—Electricity Committee. Accepted. Four 500-kVA transformers (£2,026).—Bonar Long & Co. One four-panel 11-kV switchboard (£1,445).—Ferguson, Pailin.

**Bury.**—Electricity Committee. Accepted. Electric meters.—Aron Electricity Meter. Cables.—Scottish Cables.

**Glasgow.**—Transport Committee. Accepted. Asbestos covered wire.—London Electric Wire Co. & Smiths.

**Corporation Health Committee.** Accepted. Electric ice-cream freezer for Knightswood Hospital (£220).—J. & E. Hall.

**London.**—FULHAM.—High-voltage switchgear for Fulham Cross substation (£802).—English Electric Co. Transformers (£2,203).—British Electric Transformer Co.

**METROPOLITAN WATER BOARD.** Accepted. Transformer and switchgear for Ferry Lane pumping station (£1,368).—Ferranti.

**Middlesbrough.**—Corporation. Accepted. Cable (£174).—Britannic Cable Co.

**Watford.**—Corporation. Accepted. Cable for twelve months.—Henley's.

### 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.

**Audenshaw.**—Additions to Globe Engineering Works; J. & E. Arnfield, Ltd., general engineers, Guide Street.

**Denby Dale.**—Houses (200) for U.D.C.; Simpson & Moxon, architects, Southgate Chambers, Wakefield.

**Dewsbury.**—Dining hall and kitchen, Boothroyd Lane Council School; M. H. Forward, borough architect, Municipal Offices.

**Hollinwood.**—New works; Farebrother, Hall & Hedges, architects, 18, Edward Street, Blackpool.

**Lancashire.**—Canteen and dining hall, Leigh Girls' Grammar School; A. T. Nicholson, county architect, Fishergate Hill, Preston.

**Liverpool.**—Secondary school, Breckside Park; L. H. Keay, city architect, Blackburn Chambers, Dale Street.

**London.**—L.C.C. — Temporary schools (£58,750); Architect, County Hall, Westminster Bridge Road, S.E.1.

**ISLINGTON.**—Flats, Essex Road and Carlsbad Street (£757,152); borough architect.

**Lowestoft.**—Temporary shops (19); borough engineer.

Dairy, Church Road; F. Long & Son, Ltd.

**Manchester.**—Additions to works, Ashton New Road and Corbett Street, Bradford, for F. Shaw & Co., Ltd.; Sydney Moss, architect, 13, Portland Road, Eccles.

Additions to works, Queen's Road and Leyburn Street, Cheetham, for D. Matz (Manchester), Ltd.; A. M. Isaacs, architect, 136, Middleton Road, Crumpsall, Manchester, 8.

Municipal school, Crossacres site, Wythenshawe; G. H. Gawler, chief building superintendent, Education Department, 140, Deansgate, Manchester, 3.

Extensions to Urmston Hospital (£10,206).—J. C. Ratcliffe, architect, 7, Cheapside, Manchester, 2.

**Oldham.**—Workshop, office, stores, etc., Gibb Street; Greenwood & Tyson, Ltd., builders, Lees Street, Salem, Oldham.

Three-bedroom houses (40), Stoneleigh and Strinesdale estates; A. L. Hobson, borough engineer, 75, Union Street.

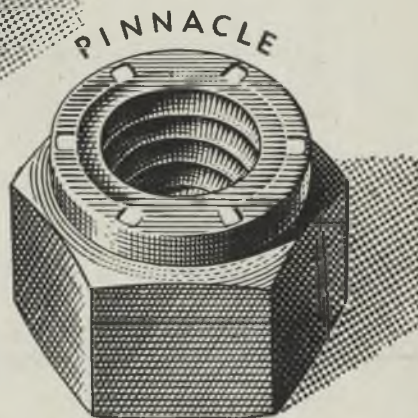
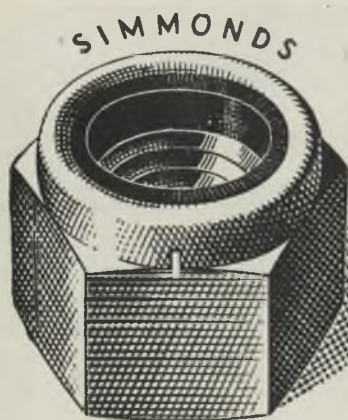
**North Shields.**—Additions, Tyne Brand factory, Brewhouse Bank, for Tyne Brand Products; Tasker & Child, architects.

**Rochdale.**—Canteen and dining room, Townhead Junior School; S. H. Morgan, borough surveyor, Town Hall.

**Sheffield.**—Works offices, Pond Hill; G. Senior & Sons, Ltd., Pond's Forge, Sheffield.

**Worthing.**—Houses (68), Barrington Road; C. Cowles Voysey, architect.





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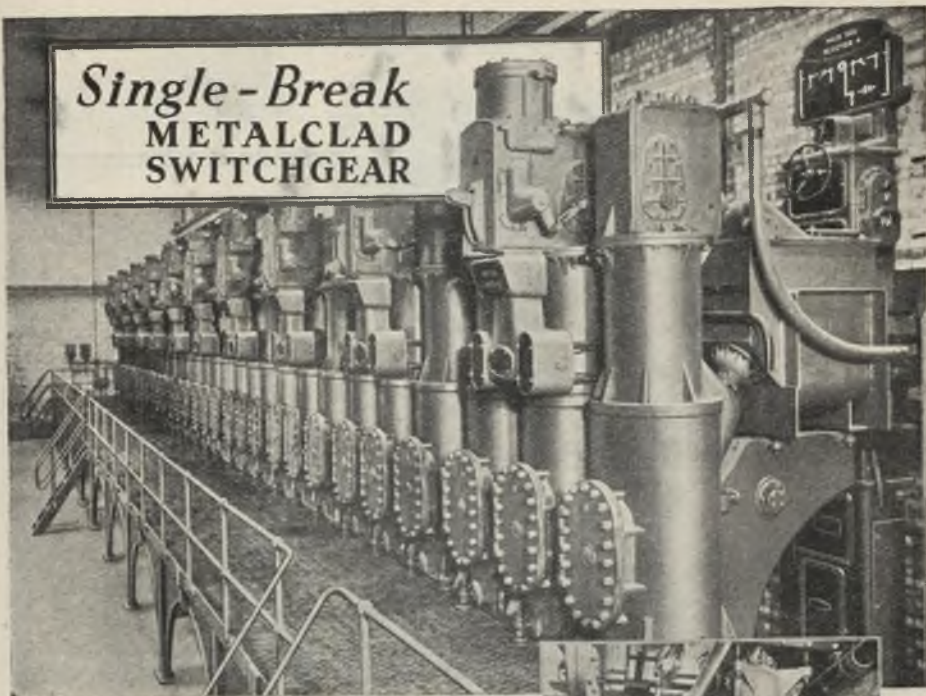
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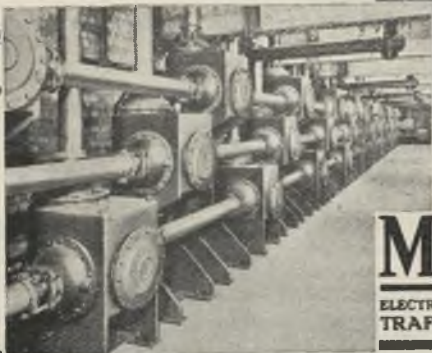
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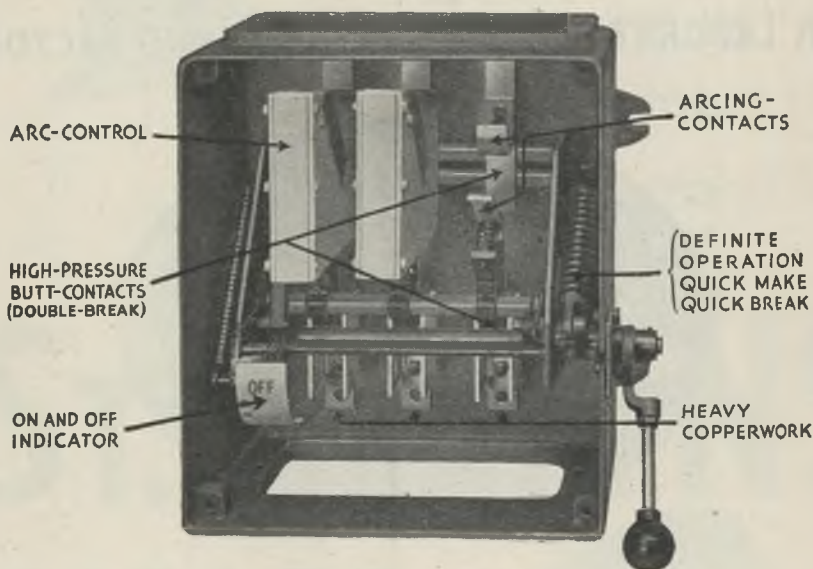
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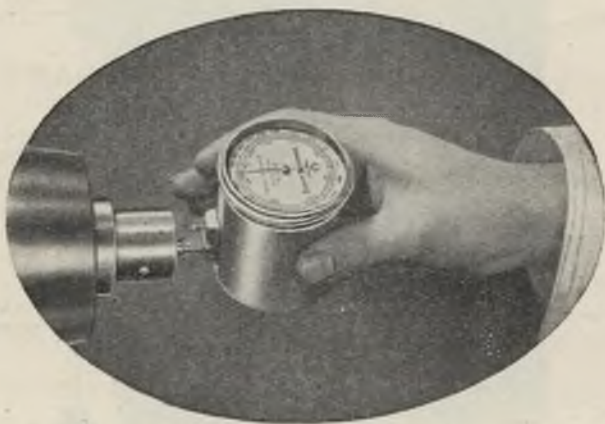
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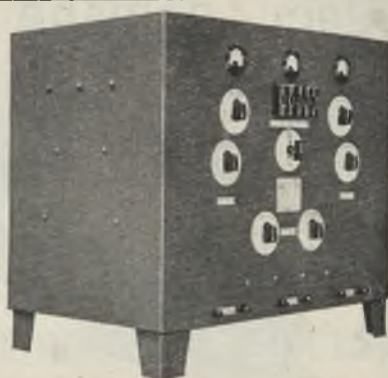




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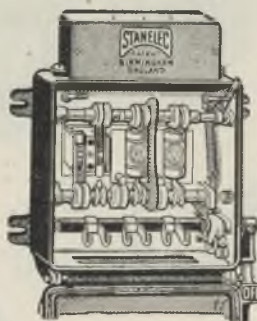
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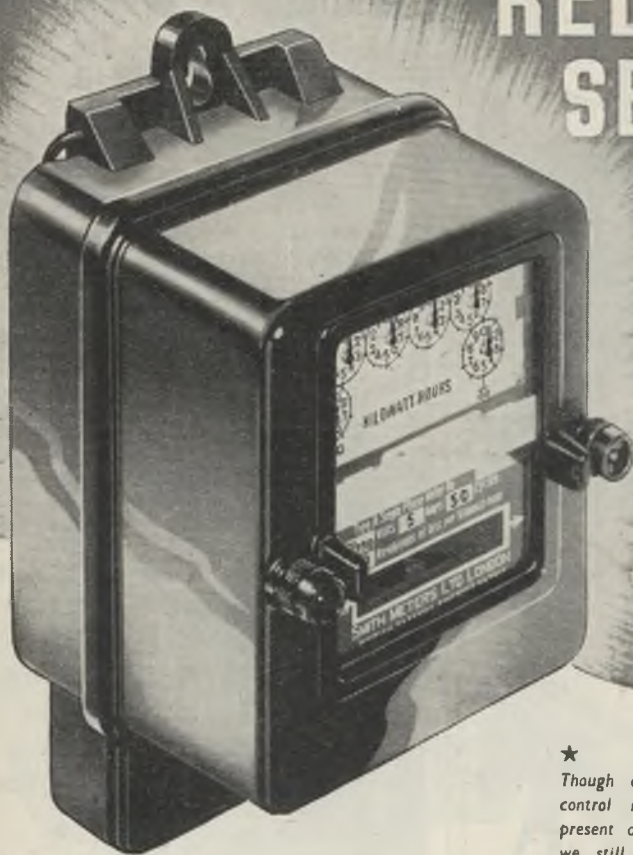
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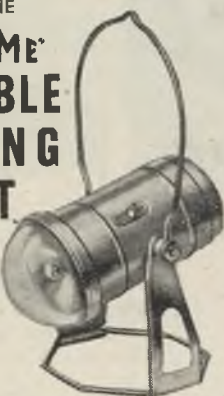
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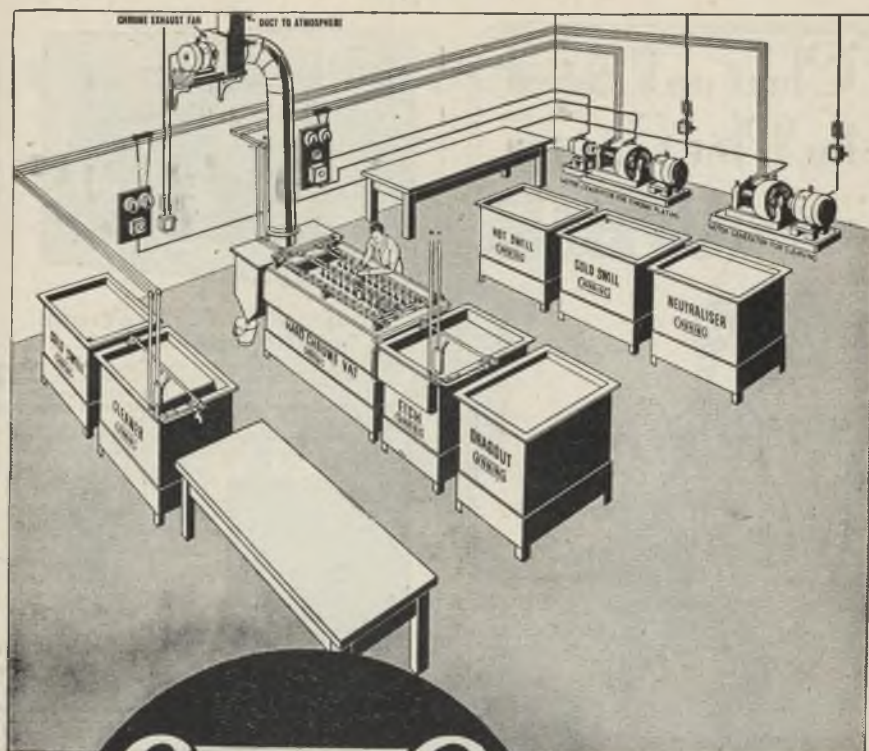
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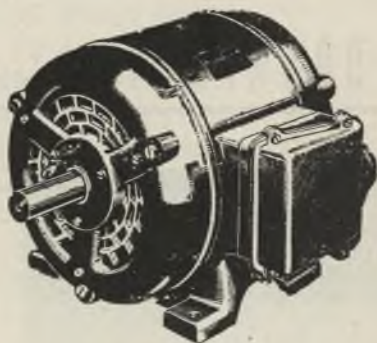
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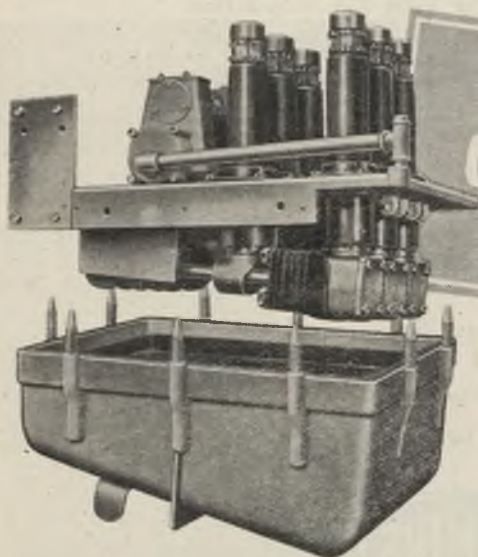
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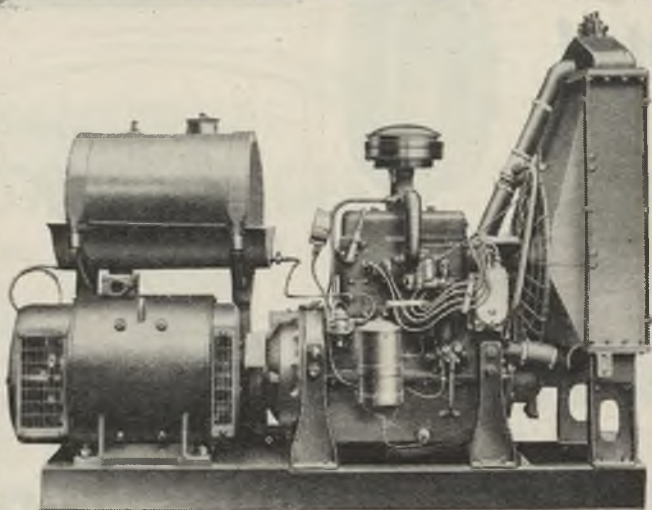
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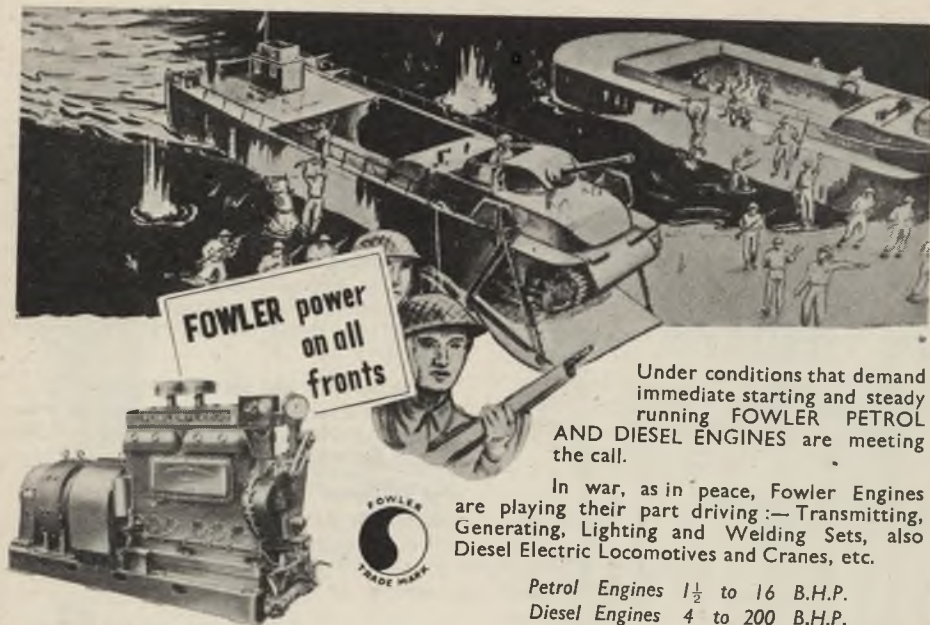
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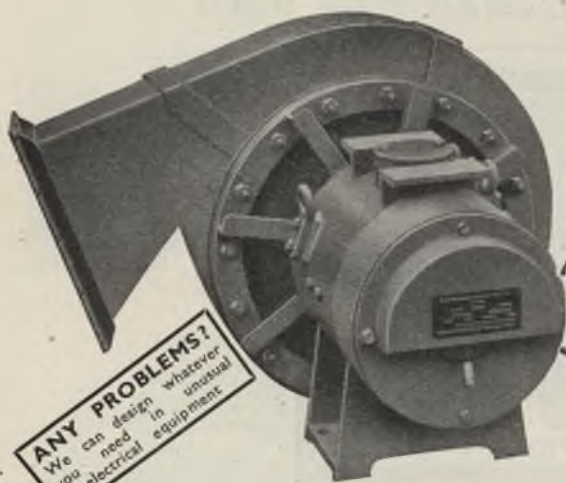
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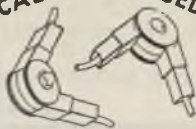
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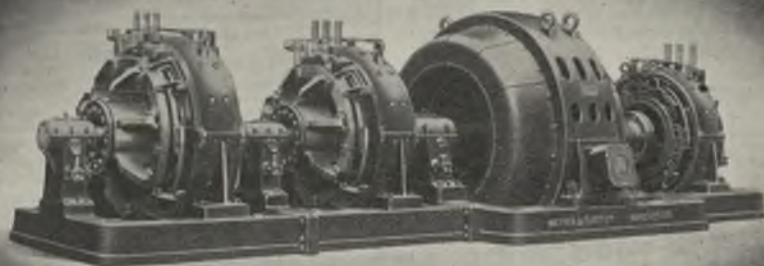
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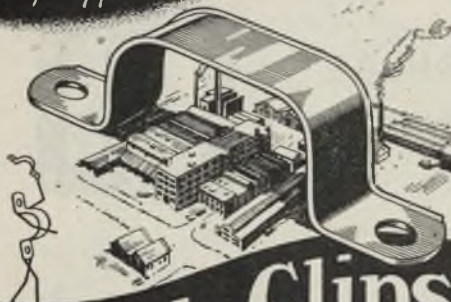
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Engineers wishing to know more about a truly non-bleeding paper insulated cable are invited to write for the new Brochure—B.I. "Sandwich" Type Cables (British Patent No. 364710). These cables are obtainable with any of the standard paper cable finishes.



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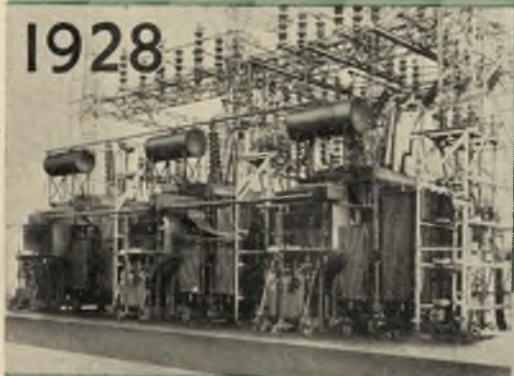
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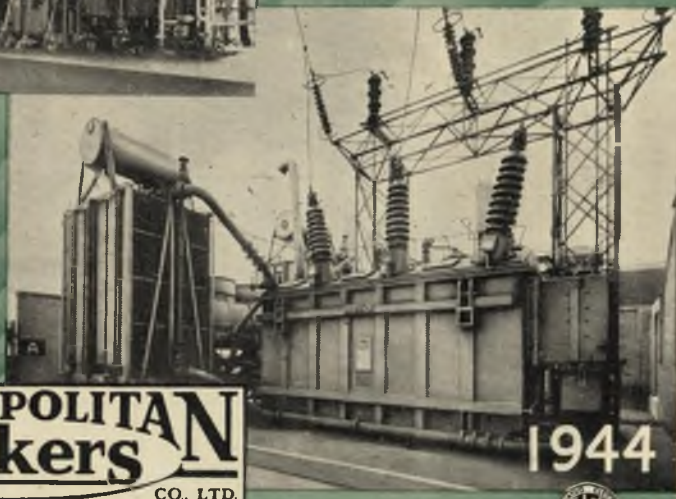


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units forming a 3-phase 132/20 kV.  
Transformer, the first of this type  
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A modern 60 MVA. 132/33  
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# CLASSIFIED ADVERTISEMENTS

**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 30/- 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.

### CITY OF BIRMINGHAM ELECTRIC SUPPLY DEPT.

Circulating Water Pipework, etc.

**THE** Electric Supply Committee invites experienced contractors to tender for the supply, delivery, erection, testing and putting to work of

**CAST IRON CIRCULATING WATER PIPEWORK** (34" and 46" bore) AND ASSOCIATED VALVES, etc., required in connection with the extensions at the HAMS HALL "B" POWER STATION, LEA MARSTON, WARWICKSHIRE. (Alternatively, suitably lined STEEL PIPEWORK may be considered.)

The General Conditions of Contract (which include the Corporation's usual Fair Wages and Conditions of Labour Clause), Specification and Drawings may be obtained upon application to the undersigned, accompanied by a deposit of Two Pounds, which will be returned on receipt, by the appointed time, of a bona fide tender not subsequently withdrawn. Cheques must be made payable to the "City of Birmingham Electric Supply Department."

Sealed tenders, enclosed in the official envelope provided and endorsed for the purpose, must be delivered to the undersigned not later than 10 a.m. on Friday, 20th July, 1945, when they will be opened. Tenders not complying with the foregoing will be rejected.

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

14, Dale End,  
Birmingham, 4.  
12th June, 1945.

F. W. LAWTON,  
Chief Engineer and Manager.

2211

### COUNTY BOROUGH OF DARLINGTON

E.H.T. Overhead Line

**THE** Darlington Corporation is prepared to receive tenders for the supply of a 6,600-volts E.H.T. Overhead Line.

Copies of the specification and conditions for the above tender may be obtained on application to the Borough Electrical Engineer, Electricity Works, Houghton Road, Darlington.

Tenders are to be sent in a plain sealed envelope, endorsed "Tender for E.H.T. Overhead Line," and are to be delivered to the undersigned not later than July 10th, 1945.

H. HOPKINS,

Town Clerk's Office,  
Darlington.

Town Clerk.  
2210

### CITY OF PLYMOUTH ELECTRICITY SUPPLY DEPARTMENT

**THE** Plymouth Corporation invite tenders for the supply of Ash Conveyor Belts. Specifications and form of tender may be obtained from the City Electrical Engineer, Armada Street, Plymouth.

Completed tenders must be returned to the undersigned not later than noon on 10th July, 1945.

COLIN CAMPBELL, Town Clerk.

Plymouth, June, 1945.

2233

### CITY OF MANCHESTER

**THE** Electricity Committee invites tenders for the following:—

- Supply of L.P. WATER VALVES, 6" to 62" bore STUART STREET GENERATING STATION (Specification No. 830);
- Supply and erection of ASH SLUICING PLANT EXTENSIONS at BARTON GENERATING STATION (Specification No. 831);
- Purchase, dismantling and removal from site of TWO ELECTRICALLY OPERATED ASH TELPHERS and STRUCTURAL STEELWORK at BARTON GENERATING STATION (Specification No. 832).

Specifications, etc., may be obtained from Mr. R. A. S. Thwaites, Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2, on payment of a fee of one guinea for each specification, which amount will be refunded on receipt of a bona fide tender.

Tenders, addressed to the Chairman of the Electricity Committee, to be delivered not later than 10 o'clock a.m. on Thursday, 12th July, 1945.

Town Hall,  
Manchester, 2.  
22nd June, 1945.

PHILIP B. DINGLE,  
Town Clerk.  
2238

## SITUATIONS VACANT

None of the vacancies for women advertised in these columns relates to a woman between 18 and 40 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.

### BOROUGH OF LEIGH

Appointment of Borough Electrical Engineer and Manager

**A**PPPLICATIONS are invited for the above-mentioned appointment from Engineers who are conversant with all aspects of the management and administration of an electricity undertaking. The salary attaching to the appointment, which is in accordance with the agreement between the National Joint Committee of Local Authorities and Chief Electrical Engineers for the Electricity Supply Industry, dated the 9th July, 1941, will commence at £895 per annum, rising as provided by clause 10 of the Agreement to £1,053 per annum, plus cost of living bonus, at present amounting to 28s. per week.

The appointment will be determinable by two months' notice in writing on either side, and will be subject to the provisions of the Local Government Superannuation Act, 1937, and to the successful applicant passing satisfactorily a medical examination to be conducted by the Council's Medical Officer of Health.

Applications, stating age, qualifications, details of experience and present appointment, together with copies of three recent testimonials, are to be delivered to the undersigned not later than the 10th July, 1945, endorsed "Borough Electrical Engineer and Manager."

ALBERT JONES,

Town Hall,  
Leigh, Lancashire,  
12th June, 1945.

Town Clerk.

2174



**BOROUGH OF STAFFORD****Electricity Department****Consumers' Engineer**

**A** PPLICATIONS are invited for the above appointment from Electrical Engineers with sound knowledge and experience of all classes of Electrical Appliances and Installations.

The successful applicant, who must have had a good technical training and held a similar position with an Electricity Supply Undertaking, will be required to assist generally in the development of the use of electricity for all purposes, and be responsible for the management and efficient working of the Department's Showroom, embracing Sales, Hire and Hire Purchase Schemes, and the organisation of Demonstrations and Exhibitions.

His duties will also include (a) the preparation of Specifications and Estimates for Wiring in accordance with the I.E.E. Regulations, (b) supervision of installation and repair work on consumers' premises, the reconditioning of domestic appliances, together with meter maintenance and connections.

Preference will be given to Corporate Members of the Institution of Electrical Engineers.

Salary and conditions of employment will be in accordance with the N.J.B. Schedule, (Class F, Grade 6, at present commencing at £459 p.a.

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

Applications, endorsed "Consumers' Engineer," stating age, training, qualifications and full details of experience, and accompanied by copies of not more than three recent testimonials, should be forwarded to the Borough Electrical Engineer and Manager, Electricity Department, Galsgate, Stafford, to reach him not later than Saturday, 7th July, 1945.

The Ministry of Labour and National Service, A9(D), have given permission under the Control of Engagements Order, 1945, for the advertisement of this vacancy.

**T. BROUGHTON NOWELL,**

Borough Hall, Town (Jerk).  
Stafford. 2202

**COUNTY BOROUGH OF DONCASTER****Electricity Department**

**A** PPLICATIONS are invited for the position of SWITCHBOARD ATTENDANT in the Corporation's Generating Station.

Applicants should have good technical knowledge and have had experience in the parallel operation of turbo alternators and the control of rotary converting plant and switchgear.

Wages and conditions in accordance with District Council (No. 2), Section A, rates of pay, at present 28.25d. per hour.

The Ministry of Labour and National Service have given permission, under the Control of Engagements Order, 1945, for the advertising of this vacancy.

Applications, stating age, present position and details of training and experience, to be addressed to the undersigned.

**T. W. HIBBERT,**

Borough Electrical Engineer.  
Grey Friars Road, Doncaster. 2217

**BRADFORD EDUCATION COMMITTEE****Technical College, Bradford**

**A** PPLICATIONS are invited for appointment as ASSISTANT LECTURER in ELECTRICAL ENGINEERING in this College.

Salary at present according to the old Burnham Scale, which is from £186 to £480 per annum. Commencing salary according to qualifications and experience. A war bonus of £52 is also paid. The salary scale is at present under review.

Further particulars of the appointment and forms of application may be obtained from the Director of Education, Town Hall, Bradford, and completed forms should be returned to the Principal of the College not later than 14th July.

**THOS. BOYCE,** Director of Education.  
2226

**HONG KONG ELECTRIC CO. LTD.**

**A** PPLICATIONS are invited from fully qualified and experienced Electrical and Mechanical Engineers for the post of Deputy General Manager of the Company's Undertaking in Hong Kong with prospects of promotion to General Manager.

Age, preferably between 35 and 47.

The successful candidate will be required to take up duty in Hong Kong shortly after re-occupation of the Colony has been completed.

Prior to enemy occupation the Company generated current in its North Point Power Station, Hong Kong, and distributed it throughout the Island for power, traction, lighting and domestic purposes. The maximum load on the generating station was 20,000 kilowatts. Units sold 76 million per annum. Number of consumers 51,000.

The salary of the post will depend upon qualifications and experience, but will not be less than £1,500 per annum, or its equivalent in Hong Kong currency. In addition, a furnished house and motor-car will be provided free of charge. There is a liberal provident fund scheme. Free first-class passages to and from Hong Kong will be provided for the successful candidate, his wife and two children not exceeding 12 years of age.

Full particulars of education, qualifications and experience should be forwarded to Messrs. Preece, Cardew & Rider, 8 & 10, Queen Anne's Gate, S.W.1, to arrive not later than 6th August, 1945. 2197

**COUNTY BOROUGH OF GREAT YARMOUTH****Electricity Supply Department****Appointment of Deputy Borough Electrical Engineer**

**A** PPLICATIONS are invited from Chartered Electrical Engineers for the position of DEPUTY BOROUGH ELECTRICAL ENGINEER to the Great Yarmouth Corporation. Salary in accordance with the N.J.B. Scale, (Class G, Grade 1 (commencing at £771 per annum).

Candidates must have been engaged on Electricity Supply for an extended period, and have had practical experience in the Generation and Distribution of Electricity in both Town and Rural Areas.

Applications, on forms to be obtained from the undersigned, must be returned by Monday, 16th July, 1945.

Canvassing members of the Council directly or indirectly will disqualify a candidate.

The Ministry of Labour and National Service have given permission under the Control of Engagements Order, 1945, for the advertising of this vacancy.

**FARRA CONWAY,**

Town Hall, Town Clerk.  
Great Yarmouth. 2224

**A** PPLICATIONS are invited for the position of Testing Superintendent by a well-known firm of manufacturers in the South-West London district. Salary £450-£550 per annum. Applicants must have 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, etc., to—Box 2178, c/o The Electrical Review.

**A** SSISTANT Area Engineer required by Buckrose Light & Power Co., to be responsible to Area Engineer for construction, maintenance and operation work on transmission (22 and 11 kV) and distribution systems in areas of Buckrose and South-East Yorkshire Companies which are adjoining. Applicants should be trained engineers with at least 10 years' experience, preferably in an electricity undertaking operating a large rural area with an extensive overhead transmission and distribution system. They must be capable of organising and supervising constructional and maintenance work carried out by contractors and by direct labour. Salary £540, including war bonus. Applications, accompanied by full particulars of technical training, qualifications and experience, should be addressed to Buckrose Light & Power Co. Ltd., Central House, Kingsway, London, W.C.2. The Ministry of Labour and National Service, Branch A9(D), have given permission under the Control of Engagements Order, 1945, for the advertisement of this vacancy. 2173

**A** SSISTANT Manager (service department) required for well-known radio manufacturer, London area. Sound technical knowledge of radio and television, experience in administration and record. Applications from Class "A" men invited only. Write, stating age and full particulars, to—Box 7260, A.K. Adv., 212a, Shaftesbury Avenue, W.C.2. 2113



**A**SSISTANT Mains Engineer required with experience in underground and overhead construction and operation, and substation equipment. Salary about £400 per annum plus current war bonus, according to experience. Applications endorsed "Assistant Mains Engineer" should reach The Northampton Electric Light & Power Co. Ltd., 25, Bridge Street, Northampton, not later than first post on July 9th. The Ministry of Labour and National Service, A.9 (D.), have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy. 2240

**B**UYER required for radio and electrical instrument manufacturer. Permanent post to suitable applicant. Previous experience essential. Write, giving age, salary and particulars.—Box 2122, c/o The Electrical Review.

**C**ATHODE Ray Tube Engineer required. University trained, with at least 10 years' experience of cathode ray tube development and manufacture. Must possess initiative to follow a new type through to the shop and ensure economical manufacture. Applications from Class "A" ex-service men only. Write in confidence to—Box 7340, A.K. Adv., 212a, Shaftesbury Ave., London, W.C.2. 2201

**C**HIEF Draughtsman required (over 51, or Class "A" ex-service men only) by well-known electrical and radio instrument manufacturer. Previous experience essential. Good prospects. Write, stating age and full particulars to—Box 2212, c/o The Electrical Review.

**C**OUNTY Borough of Brighton Electricity Undertaking: Assistant Distribution Engineer. Applicants must be qualified electrical engineers with sound technical training and must have had experience on A.C. and D.C. systems in (1) laying, jointing and testing of high and low voltage cables; (2) location of faults, and (3) methods of change over of supply. Salary in accordance with N.J.B. Schedule, Class J, Grade 2, at present £382 per annum. Appointment will be subject to provisions of the Local Government Superannuation Act, 1937, and selected candidate will be required to pass a medical examination. Write, quoting D.1254XA, to Ministry of Labour and National Service, Appointments Dept. A.9, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for application form, which must be returned completed by 30th July, 1945. 2219

**D**OMESTIC Electric Appliances, Cooking and Heating Apparatus. Production Manager required for small but progressive works in Midlands. Excellent prospects. Full particulars to—Box 2196, c/o The Electrical Review.

**E**LECTRICIAN required by Electrical Contractors (Central London). Permanency to suitable man. Applicant must be over 51. Apply—Box 2192, c/o The Electrical Review.

**E**LECTRICAL Contractors in London district who are well known and long established, require the services of an Estimating and Supervising Engineer. Applicant must have had good experience and be capable of organising and operating large and small contracts, both technically and commercially. Reply, stating age, experience and salary expected. Advertisers are prepared to pay a good salary to applicant having proved ability. This position is only open to those over 51 years of age, or Class "A" ex-service men.—Box 2203, c/o The Electrical Review.

**E**LECTRICAL Plant Engineer required for motor vehicle factory with substation, machine tools, electric furnaces of various types, welding machines and other special manufacturing facilities. Applicants must have good technical qualifications with experience of Factories Act requirements. State salary desired. Early engagement essential. The Ministry of Labour and National Service, Division A.9(D.), have given permission under the Control of Engagement Order, 1945, for the advertisement of this vacancy. Address—Works Manager, Albion Motors Ltd., Scotstoun, Glasgow, W.4. 2225

**J**UNIOR Shorthand-Typist (under 18) required for Engineers' office at Victoria. Excellent salary and prospects of promotion. A first-class opportunity for a suitable girl. Essential work. Apply—J. G. Statter & Co. Ltd., 82, Victoria St., London, S.W.1. 2239

**L**ABORATORY Assistants (female) required for routine testing, research and development work associated with high vacuum technique over a wide range of application. Two grades are required, one with educational standard up to Matriculation and the other Inter-B.Sc. (Physics or Engineering) or equivalent technical standard. Industrial laboratory experience for both grades desirable, with experience of scientific measurements and familiarity with physical or engineering research. Salary up to £250 and £350 for the two grades respectively. Posts are permanent and interesting, with superannuation opportunities and every encouragement for advancement. This advertisement is published by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1945.—Box 2208, c/o The Electrical Review.

**I**NVOICING and Costing Clerk required by large firm of electrical contractors in N.W. London district. Must be able to act on own initiative. Progressive and well-paid position to capable male applicant who is over 51 years of age. Applications also considered from Class A ex-service men. Apply, stating age, experience and salary required to—Box 2163, c/o The Electrical Review.

**L**ONDON manufacturer of electrical accessories wishes to appoint Designer-Draughtsmen, over 51 years of age or outside present engagement restrictions only. Positions offered have good prospects and will carry good salaries. Please give age, experience and salary required.—Box 2199, c/o The Electrical Review.

**M**K. Electric Ltd. invite applications for vacancies for Designer-Draughtsmen, over 51 years of age or outside present engagement restrictions only. Applicants should have had previous experience in design and development of electrical accessories. Please write, giving age, experience and salary required, to—M.K. Electric Ltd., Wakefield Street, Edmonton, N.18. 2198

**R**ADIO Valve Engineer required, university trained, with at least 10 years' experience of valve development and manufacture. Must possess initiative to follow a new type through to the shop and ensure economical manufacture. Applications from Class "A" ex-service men only. Write in confidence to—Box 7339, A.K. Adv., 212a, Shaftesbury Avenue, London, W.C.2. 2200

**T**RANSFORMERS. Works Manager required for N.W. London. Must be fully experienced in manufacture of transformers of all types up to 500 kVA and capable of managing labour. Salary £750, plus commission on profits. Full particulars of age, experience, etc., to—Box 2223, c/o The Electrical Review.

**W**ORKING Foreman for small winding shop (Sheffield). Must be fully experienced all classes A.C. and D.C. winding. Reliable, trustworthy man able to organise shop to get work out promptly and teach apprentices, and with thorough knowledge of what is wanted, would soon be given complete charge of department. Good disciplinarian over 51, with plenty of experience, is what is required for position.—Box 2235, c/o The Electrical Review.

**W**ORKS Manager required by small firm in Midlands, employing 100/150 work people. Must have experience in manufacture of transformers and rectifying equipment. Sound managerial qualifications essential. Excellent salary and prospects for right man. Apply in confidence, giving full details of qualifications and salary required, to—Managing Director, c/o Enock Cox & Co., Berrington Chambers, Tettenhall Road, Wolverhampton. 2243

**W**ELL-known Electrical Engineering Company have vacancies for suitable lads, under 18 years of age, with matriculation or general school certificate, for apprenticeship in the above industry. Good rates of pay and living accommodation provided.—Box 2245, c/o The Electrical Review.

## 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.

**G**LOUCESTER Corporation—Shift Charge Engineer: St. Austell & District E. L. Co. Ltd.—Consumers' Superintendent. 717

## SITUATIONS WANTED

**A**DVERTISER, free July, seeks appointment Southern England, 20 years' experience as Chief Engineer or Foreman, covering selection, installation, maintenance, etc., of large works, hotels, etc., plant. Excellent refs. for ability and organising qualities, first-class technical qualifications. Last 5 years civilian electrical instructor to R.A.F.; 50 years of age.—C. Hawkes, 42, Herbert Road, Sompot, Worthing. 711

**A**DVERTISER (50), experienced all branches, sales office organisation, many years administrative position, methodical and efficient controller, seeks change.—Box 7256, c/o The Electrical Review.

**D**EVELOPMENT Officer, experienced public supply, including all methods of extending and increasing load, controlling staff, organising trade shows, thorough knowledge all domestic appliances, including water heating, refrigeration, both in electric and competitive fuels, two diplomas, testimonials prove unusually good results before war work, now free.—Leggett, 2, Addison Road, Chesham, Bucks. 7241

**D**OMESTIC Electric Heating and Cooking Appliances. Engineer, 25 years in all its branches, desires dependable post.—Box 7193, c/o The Electrical Review.

**BUYER.** A.M.P.O.A., experienced in present-day conditions, desires change, preferably with company manufacturing scientific electrical instruments, electricity meters or electrical apparatus. At present in London area, but prepared to work anywhere in Southern England.—Box 7170, c/o The Electrical Review.

**ELECTRICAL Engineer, B.Sc.,** age 39, shortly returning from important post abroad, seeks executive position. Fully conversant H.T. and L.T. distribution systems, including installation and construction of substations en route, industrial layouts and power station work. Experienced both consulting and supervising capacities.—Box 7245, c/o The Electrical Review.

**ELECTRICAL Engineer, exempt, H.N.C.,** 5 yrs. works. 1 yr. admin., desires position Technical or Sales Representative Midlands.—Box 7237, c/o The Electrical Review.

**ELECTRICAL Engineer, Grad.I.E.E.,** 14 years' experience in manufacture and design of control switchgear having complicated circuits, lifts, ventilation and small generating plant, anxious to hear of permanent executive post in London. Excellent education, initiative, ideas, writing ability, languages.—Box 7114, c/o The Electrical Review.

**ELECTRICAL Engineer, trained technically and practically,** thirty years' experience in installation work, industrial and residential power and lighting, fourteen years with public supply authority, inspecting and testing and S. and D. used to estimates, costing and accounts. South or South-west districts preferred. Could manage technical side and office for electrical contractors.—Box 7258, c/o The Electrical Review.

**ELECTRICAL Engineer, twenty-two years' experience** of cable manufacture, including testing at works and on site, also fault location, and the installation of underground mains and overhead lines, requires progressive post.—Box 7222, c/o The Electrical Review.

**ELECTRICAL Engineer (25),** wide experience in E.H.T. and L.H.T. switch and fusegear, apprenticeship, also 2 years' flying in R.A.F. at outbreak of war, seeks position, preferably in sales department.—Box 7255, c/o The Electrical Review.

**ELECTRICAL Engineer (42),** with wide experience in design and installation of works power plant, requires post in London. Extensive drawing office experience. Technical qualifications to A.M.I.E.E. standard. Free shortly.—Box 7188, c/o The Electrical Review.

**ELECTRICIAN, Supervisor, Energetic man (30),** requires position. Installation, maintenance or inspection. Factory and contracting experience. Good organiser.—Box 7219, c/o The Electrical Review.

**ENERGETIC Sales Engineer** invites representation or agencies. First-class connection, all branches, Midlands and North, own car.—Box 7208, c/o The Electrical Review.

**ENGINEER, 25 yrs. old, apprentice 5 yrs.,** Ord. Nat. Cert. (elect.), 12 mths. production planning, exempt, seeks change.—Box 7246, c/o The Electrical Review.

**EXPORT Manager, A.M.I.E.E. (37),** good education, works training, wide experience, requires position with progressive firm.—Box 7224, c/o The Electrical Review.

**PLANT and Maintenance Engineer (44), A.M.I.E.E.,** comprehensive experience, desires responsible position.—Box 7189, c/o The Electrical Review.

**PLUMBER-Joiner (36), married,** requires situation. South or South-east coast preferred. 15 years' experience supply and contracting.—Box 7252, c/o The Electrical Review.

**REPRESENTATION** offered, thoroughly practical in all things electrical, with old-established connection in Midlands and East Anglia, guaranteed large turnover in good solid business. Firms requiring post-war results can rely on this service. Highest references, many years with Siemens, Korting & Mathiesen Ltd., Tuckers and six years Diamond H. Switches on cookers, etc. Working with son, William, thoroughly trained, or separate agencies. This is genuine business, please communicate—Arthur Wakington, "Ridsdale," Burton Joyce, Nottingham. 7220

**REPRESENTATIVE, 22 years' electrical trades and sales experience,** age 37. Managerial or executive position considered. Car available, London preferred.—Box 7243, c/o The Electrical Review.

**ROYAL Engineers, Electrical and Mechanical Officer,** immediate demobilisation, desires suitable position of trust. Twenty years' civilian experience in technical and commercial sides of electrical contracting, accustomed to handling labour, could take complete control, London district preferred.—Box 7205, c/o The Electrical Review.

**SKILLED Draughtsman** requires change, release promised, age 35, 15 years' exp. covering radio, elect. insts., small mechanisms and general engg.—Box 7239, c/o The Electrical Review.

**WORKS and Plant Engineer, electrical and mechanical (49),** with extensive theoretical, practical and administrative experience with big firms and accustomed to handling large staffs, seeks similar or other executive position.—Box 7235, c/o The Electrical Review.

**YOUNG Electrical Engineer (21), apprenticeship, Higher National Cert., Stud. I.E.E.,** good draughtsman, conversant with H.T. and L.T. switchgear, layout and design rotary and static substations, heating, lighting, willing to learn, desires interesting post, preferably design.—Box 7213, c/o The Electrical Review.

**YOUNG, progressive Electrical Engineer, having a large connection throughout Northern Ireland,** would like to get in touch with manufacturers of domestic and industrial electrical appliances and accessories, with view to representing them in this area.—Box 7190, 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.

**280-h.p. PETTER VERTICAL 4-CYLINDER** "ATOMIC" DIESEL ENGINE, new 1934. No. 220497, 300 r.p.m., complete with bedplate, under bearing and pulley, starting Compressor, with Engine and Air Bottle, Cooling Tanks and Streamline Filter. First class condition.

**120-h.p. RUSTON & HORNSBY VERTICAL TWIN-CYLINDER DIESEL ENGINE,** No. B.222, 333 r.p.m., complete as above, first-class condition.

**60-h.p. DAVEY PAXMAN VERTICAL TWIN-CYLINDER SPRING INJECTION DIESEL ENGINE,** No. 23477, new 1933, 370 r.p.m., complete with bedplate, electric type flywheel, Tanks, Compressor, etc.; 41-kVA CROMPTON PARKINSON Alternator, 365 volts, 3-phase, 50 cycles, available for this machine.

**45-h.p. PETTER VERTICAL SINGLE-CYLINDER "ATOMIC" DIESEL ENGINE,** new 1933, 375 r.p.m., complete with Tanks, Flywheel, Bedplate, Starting Bottle, etc., overhauled and ready for despatch; 29-kW, 460/230-volt D.C. Generator available for this Engine.

**37½/42-h.p. CROSSLEY VERTICAL SINGLE-CYLINDER ENCLOSED "COMPRESSORLESS" DIESEL ENGINE,** No. 103235, new 1935, 500 r.p.m., complete with Tanks, Filter, Shaft Extension, Pulley and Bearing, Air Bottle, etc., overhauled and ready for despatch.

**22-h.p. BLACKSTONE HORIZONTAL SINGLE-CYLINDER SPRING INJECTION DIESEL ENGINE,** No. O.P. 23505, Type OP, new 1942, speed 600 r.p.m., complete with water-cooling Tanks, Service Tank, Filter, Shaft Extension and Belt Pulley, 220-volt D.C. Generator, Battery and Switchboard available.

**NEWMAN INDUSTRIES LIMITED, YATE, BRISTOL**  
2182

## WATER TUBE BOILERS IN STOCK

Two 25,000 lbs. evaporation,	175 lbs. W.P.
Three 20,000 lbs. "	175 lbs. "
One 12,000 lbs. "	200 lbs. "
One 12,000 lbs. "	160 lbs. "
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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.,**  
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**ELECTRAWINDS LIMITED.**  
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We have several of the following Motors coming in for disposal which are equal to new.

8-h.p. Brook, 720 r.p.m., 400/3/50.  
12½-h.p. Brook, 720 r.p.m., 400/3/50.

Send us your enquiries for Brushes, Controller Contacts and all spare parts. 2234



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**GUARANTEED ELECTRICAL  
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 Telephone: Shepherds Bush 2070  
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**STANNINGLEY, NEAR LEEDS.**  
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 Established 1834.

27

**BOROUGH OF LUTON****Dismantling and Purchase of Lighting Equipment  
in Tunnel Shelters**

**TENDERS** are invited for the dismantling and purchase of the above lighting equipment consisting of approximately 2,700 yards of Conduit and Cables, with Switchfuses, Well-glass Fittings, etc., Emergency Lighting Sets, Batteries and Transformers.

Details and form of tender may be obtained from the Borough Engineer, Town Hall, Luton, on payment of a deposit of two guineas, which will be returned to contractors from whom a bona fide tender has been received, which is not withdrawn. The lowest or any tender will not necessarily be accepted. Cheques should be made payable to "Luton Corporation."

Sealed tenders, in the official envelopes provided, endorsed "Purchase of Tunnel Lighting Equipment," must reach the Town Clerk's Office not later than noon on Monday, 16th July, 1945.

W. H. ROBINSON, Town Clerk.

Town Hall, Luton.  
 15th June, 1945.

2216

**3,000-kW OERLIKON TURBO ALTERNATOR.**  
 200 lbs. working pressure, 6,600 volt, 3-phase, 50 cycles, 3,000 r.p.m., with Condenser, Pumps, Motors and Switchgear.

**1,250-kW BROWN BOVERIE GEARED TURBO GENERATOR.** 215 lbs. pressure, speed 3,600 r.p.m., Generator for 500 volts D.C., speed 550 r.p.m., complete with Condenser, Pumps, Motors and Switchgear.

**500-kW BELLIS/WESTINGHOUSE TURBO ALTERNATOR.** 155 lbs. working pressure, speed 3,000 r.p.m., 500 volts 3-phase, 50 cycles, complete with all auxiliaries.

**500-kW WESTINGHOUSE MIXED PRESSURE TURBO ALTERNATOR.** 95 lbs. and 16 lbs. working pressure, speed 3,000 r.p.m., 500 volts, 3-phase, 50 cycles, complete with all auxiliaries.

**350-kW RATEAU PASS-OUT TURBO ALTERNATOR.** 150 lbs. working pressure, pass-out 2,200 lbs. at 21 lbs. pressure or 6,600 lbs. at 49 lbs. pressure, voltage 400 volts, 3-phase, 50 cycles, speed 3,000 r.p.m., complete with all auxiliaries.

**NEWMAN INDUSTRIES LIMITED, YATE, BRISTOL**  
 2181

**ELECTRIC MOTORS AND DYNAMOS**

**WE** hold one of the largest stocks of New and Second-hand Motors. Secondhand machines are thoroughly overhauled. Inspection and tests can be made at our Works.

For Sale or Hire. Send your enquiries to:—

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 22-26, BRITANNIA WALK,  
 CITY ROAD, LONDON, N.1.

Telephone: 5512-3 Clerkenwell.

13

**REBUILT MOTORS AND GENERATORS**

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**SEND US YOUR ENQUIRIES.**

**OVER 1,000 RATINGS ACTUALLY IN STOCK HERE.**

**DYNAMO & MOTOR REPAIRS LTD.,**

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**Also at Phoenix Works, Belgrave Terrace, Soho Road,  
 Handsworth, Birmingham.**

Telephone: Northern 0898.

26

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**T**HE Newport Corporation Electricity Department has for disposal the following:—

One gravity bucket Coal Conveyor as now working, approx. 800 ft. in length, capacity 35 tons per hour, driven by a 15-h.p. D.C. motor through a David Brown "Radicon" reduction gear and spur wheels, complete with supporting structure, running rails, guide wheels, etc.

Two 30-ft. Portable Motor-driven Coal Conveyors (one A.C. 400 v., one D.C. 480 v.) by C. H. Johnson, Manchester, capacity 30 tons per hour.

Five Mark II all steel "Consol" Shelters.

Applications for permission to inspect and offers should be made to T. H. Wood, M.I.Mech.E., A.M.I.E.E., Borough Electrical Engineer and Manager, Electric House, Dock Street, Newport, Mon. 2232

**ROTARY CONVERTORS FOR SALE**

**500-kW Rotary Converter** by B.T.H., 230 volts D.C., 2,170 amps., compound wound with interpoles, pony motor started, complete with switchboard and oil-cooled transformer, primary 6,300 volts, 3-phase, 50 cycles.  
**250-kW Rotary Converter** by B.T.H., 220/240 volts D.C., 1,040 amps., compound wound with interpoles, complete with starting panel and oil-cooled transformer, primary 6,300 volts, 3-phase, 50 cycles.

Both the above could be run in parallel.

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 WOOD LANE, LONDON, W.12.

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17

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MADE TO REQUIREMENTS

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2230

**A**.C. and D.C. House Service Meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one year. Repairs and recalibrations.—The Victoria Electrical Co., 47, Battersea High Street, S.W.11. Tel. Battersea 0780. 16

**A**.C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 4422). 6781

**A**.C.-driven Plating Dynamo, 1,000 amps., 16 volt, 570 r.p.m., direct coupl. on bedplate, reconditioned.—The Electroplant Co., Wembley, Middx. 2229

**A**.C. Motors, 1/50th h.p. to 10 h.p., from stock. Also D.C.—The Johnson Engineering Co., 86, Great Portland Street, London, W.1. Tel.: Museum 6373. 57

**A**ERIAL Cables, all sizes quoted for: good deliveries against Government contract numbers.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7257

**A**LTERNATOR, 200 kVA, 250 r.p.m., 400/3/50, for coupling.—The Electroplant Co., Wembley. 2227

**A**LTERNATOR, 500 kVA, 3 p., 50 c., 400/440 v., 750 revs., direct coupled exciter, 2 brgs., on bedplate.—Stewart Thomson & Sons, Fort Road, Seaforth, Liverpool, 21. 58

**A**UTOMATIC Kohler Lighting Sets, 110 volt, 800 and 1,500 watt, fully reconditioned for quick delivery.—The Electroplant Co., Wembley, Mdx. 2229

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**E**LECTRIC Lamp Shades and Standards, unique design and finish. Send for prices and particulars from—Art Shades Ltd., 46, Market Place, Reading. 7206

**E**LECTRIC Lighting Plant, paraffin engine, 100-v., 3-kW dynamo, battery and switchboard. View Colchester. Guaranteed 12 months. £170 or offer.—Berkeley Electrical Engineering Co. Ltd., Vincent House, Vincent Square, Westminster, S.W.1. 2241

**E**XHAUST Fans, new, 14", 1-phase, 200/250 v., 1,900 cu. ft./min., £11 15s.—Southern Ignition Co. Ltd., 190, Thornton Road, Croydon. 75

**F**OR sale, One Air Break Circuit Breaker Switch, capacity 500 amps., suitable for 400-v., 3-phase A.C. circuit, totally enclosed. Details from and offers to—Box 2242, c/o The Electrical Review.

**F**OUR identical 150-kW "Weir Sulzer / E.C.C." Diesel-driven Generating Sets, 220 volt D.C.—Stewart Thomson & Sons, Fort Rd., Seaforth, L'pool, 21. 74

**G**ENERATING Sets for sale, 18 kVA, 400/3/50, petrol; 24-kW, 220-v. D.C. Crude Oil Set.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford.

**H**IGH Voltage Electrostatic Test Apparatus tests from 500 to 5,250 volts with visual and aural indication of test breakdown, complete with special test prods. Essential for all manufacturers of electrical apparatus and suitable for M.A.P., A.I.D. and Admiralty tests. Price on application.—Kentish Electrical Engineering Co., 3a, Mornington St., London, N.W.1, or Sole Distributors, Duncan Electrical, 238, Euston Road, N.W.1. 2236

**I**NSUL-Glass covered Plain or Enamelled Instrument Wires, No. 18 s.w.g., No. 40 s.w.g., stock deliveries.—Saxonia, Roan Works, Greenwich, S.E.10. 29

**L**ARGE quantity of various types Insulated, Screened, P.V.C. and Polythene-covered Wire, can be inspected at—Brookside Metal Co. Ltd., Honeypot Lane, Stanmore, Middlesex. 2206

**L**EAD-covered and Armoured Cables, P.I. and V.I.R., various special lines at low prices.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7261

**L**ESLIE Dixon & Co. for Dynamos, Motors, Switchgear, Chargers and Telephones.—214, Queenstown Road, Battersea, S.W.8. Telephone, MACaulay 2159. Nearest Rly. Sta.: Queen's Road, Battersea (S.R.). 19

**M**OTOR Generator Sets and Convertors, all sizes and voltages from 1/4 kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, City Road, London, N.1. Telephone, Clerkenwell 5512, 5513 & 5514. 28

**M**OTOR Generators, Small D.C./D.C. Motor Generators, drive off 12-volt accumulator and give 230 volts, 30 m.a. D.C. output; off 6-volt, 110 v., 15 m.a. output. Originally made for Gvt. radio; two commutators, ball bearings, laminated fields, insulated brush gear, covered armatures, windings. In new condition; 75s. each. Aluminium Tubing, in approx. 12-foot coils, 1/16" I.D., new, surplus W.D. stock, 3s. 6d. each.—Leslie Dixon & Co., 214, Queenstown Road, Battersea, London, S.W.8. 65

**N**AMEPLATES, Engraving, Diesinking, Stencils, Steel Punches.—Stilwell & Sons Ltd., 152, Far Gosford Street, Coventry. 14

**O**NE new totally enclosed vertical Lancashire Dynamo 8-h.p. Fan Motor, for 200 v., 2-ph., 50 cys., with four facings, without feet, shaft 2 1/2" dia., 10" long, keyway 6" long, with starter complete. Ex stock. For price apply—H. J. H. King & Co. Ltd., Engineers, Nailsworth, Glos. 71

**P**HONE 98 Staines, 130-kW, 110-v. D.C. Diesel Generating Set; 60-kW, 220-v. D.C. ditto; 7/9-kW, 110-v. D.C. ditto; 50-kW, 440/220-v. D.C. Steam Set; 400-kW Belliss Surface Condenser; Weir Feed Pumps, 9 1/2" x 7" x 21" and 8 1/2" x 6" x 13".—Harry H. Gardam & Co. Ltd., Staines. 60

**P**ORCELAIN Cleats, 2 and 3 groove, various sizes ex stock, price list.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7262

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**R**OTARY Converters in stock, all sizes; enquiries invited.—Universal Electrical, 221, City Road, London, E.C.1. 16

**S**EVERAL Telescopic Tower Ladders ready for essential work. Extensions, Trestles and Steps to order.—Shaftesbury Ladders Ltd., 453, Katherine Road, E.7, Grangewood 3363. 15

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**S**TAFF Time Checking and Job Costing Time Recorders (all makes) for quick cash sale. Exceptional condition. Write—Box 528, Smiths, 100, Fleet Street, London, E.C.4. 31

**S**TEAM Alternating Sets, Two, 150 kVA, by Browett Lindley, vert. H.S. engine, 150 lbs. pressure.—Norman E. Potts (Birmingham) Ltd., 405, Alcester Road South, Birmingham, 14. 2204

**S**WITCH and Fuse Units, Conduits and fittings, works requirements stocked.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 7265

**S**WITCHBOARDS suitable for dynamos and alternators, all sizes from 100 amp. up to 1,500 amp.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 25

**T**RANSFORMER Lead-in Wire, 7/38 and 14/38 s.w.g., Insu-Glass finished, various colours, stock.—Saxonia, Greenwich, S.E.10. 34

**T**RANSFORMER, 100 kVA, 3-phase, 50 periods, 10/750/400/230 volts, oil cooled, Metropolitan-Vickers, as new, £80.—Walker Bros. (Electrical Engineers) Ltd., Temple Row, Birmingham. 7250

**T**RANSFORMERS, single and three-phase. All types up to 10 kVA.—Woden Transformer Co. (Phone, Bilston 41959), Moxley Road, Bilston, Staffs. 12

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**71** kW Steam-driven Generating Set, Ashworth Parker vertical engine coupled to L.D.M. compound wound 230-volt generator, 1120—Stewart Thomson & Sons, Fort Road, Seaforth, Liverpool, 21. 54

**12** v., 40-a. Charger (met. rect.), 1-amp. Venner Time switch, T.R.S. Cables, Switches, etc. List 4d.—Box 7248, c/o The Electrical Review. 56

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**C** OIL Winding Machines wanted for essential work.—Box 63, c/o The Electrical Review. 30

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**E** LECTRIC Irons, Table Lamps and Standard Lamps and other electrical accessories are urgently required. Good continuous contracts offered. Will manufacturers communicate with—Brooks & Bohm Ltd., 90, Victoria Street, S.W.1 (Victoria 9550). 2112

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**E** NGINEERING Technical Books (new or secondhand) wanted in any quantity. Attractive cash offers. Call—Third floor, 356, Oxford Street, W.1, or "Stoneleigh", St. George's Avenue, Weybridge. 62

**G** ENERATORS wanted, 12/18-volt, 25-amps., 3,000-r.p.m. continuous rating Generators for battery charging. Standard frames acceptable, 1,000 immediately required.—Box 2218, c/o The Electrical Review. 7249

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**500** v. Megger urgently required by essential factory.—Write—Buying Department, The General Electric Co. Limited, Witton, Birmingham, 6. 2207

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## COMPANY MEETING

### BRITISH ELECTRIC TRACTION

#### War-Time Activities

**T**HE Forty-ninth Annual General Meeting of the British Electric Traction Co. Ltd. was held on 22nd June in London.

Mr. Richard J. Howley, C.B.E., the chairman, said that they were largely interested in the provision of road passenger transport and in the supply of electricity. Both these public utility services had been of major importance during the war, and in the aggregate their associated companies had played a not unimportant part in the successful prosecution of the war. The omnibus undertakings now operated just over 9,000 public service vehicles, which during 1944 had run approximately 240 million miles and carried 1,500 million passengers, the gross receipts amounting to £21,500,000. The figures had been much the same during the other war years and illustrated the magnitude of the transport services which they had been able to provide for the general public and, in particular, to meet the needs of the large number of workers engaged in vital war-time production. The undertakings had had to face many difficulties, but they had been successfully overcome.

Of their employees, over eleven thousand, or about 30 per cent., were called up under the National Service Acts. He was sorry to say that 576 of these had been killed or were missing or were taken prisoner, and 961 were invalided out; 5,565 had at one time or another been in receipt of allowances from the companies. It was pleasing to know that 55 men had, so far, been awarded decorations.

Throughout the war their associated electricity supply companies had provided electricity for many essential war-time purposes, and during 1944 had sold a total of close on 330 million units.

While he was able to give a good report of their various activities during the war, he was not unmindful that they were about to face a difficult and anxious time in settling down to peace conditions. The industry had to find new levels of receipts and expenses which would be reasonable for those engaged in it and for the public. Those changes could not be accomplished without close co-operation between employers and employees. They could not be carried through merely by changing a Government and, least of all, by turning our social and economic life topsy-turvy.

Trade unions had a great and responsible part to play in the coming years. Their leaders knew that they could not go on for ever demanding increased rates of pay. Many of them also knew that under nationalisation their bargaining powers on behalf of their members would be curtailed. Let them give a lead to their members and adopt a policy of fair play all round. The public must have comfortable and convenient travel at a reasonable cost; the employees must receive reasonable remuneration for the work they did, and the employers must have a fair return on the capital they had expended.

The report was adopted.



## PARTNERSHIPS

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### APPLIED SCIENCE DEPARTMENTS

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Lecturer in Electrical Engineering: R. G. Isaacs, M.Sc. (Bristol), B.Sc. (London), A.M.I.E.E.  
Lecturer in (Civil Engineering): A. A. Fordham, Ph.D. (London), Assoc. M.Inst.C.E., M.I. Struct. E.  
Lecturer in Mechanical Engineering: J. Selwyn Caswell, M.Sc. (Wales), M.I. Mech. E., Assoc. M.Inst.C.E.  
Lecturer: W. E. J. Farvis, B.Sc. (Bristol).

#### Metallurgy

Professor: C. A. Edwards, D.Sc. (Manchester), F.R.S.  
Assistant Professor: R. Higgins, Ph.D. (Glasgow).  
Lecturers: R. Griffiths, M.Sc. (Wales); T. B. Wilkinson, Ph.D., B.Eng. (Liverpool), A.M.I. Mech. E.; D. W. Hopkins, B.Sc. (Wales).

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Persons who are not desirous of studying for Degrees or Diplomas may attend selected College classes, provided they satisfy the authorities of the College that they are qualified to benefit by such classes.

Entrance Scholarships will be offered for competition in April, 1946.

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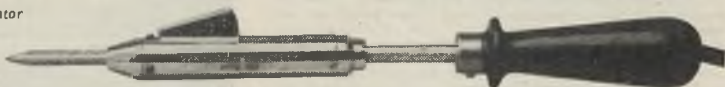
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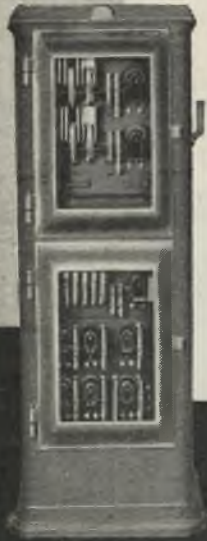
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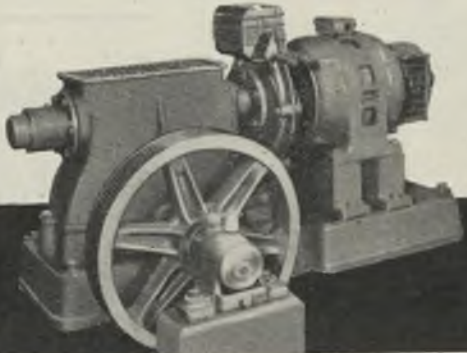





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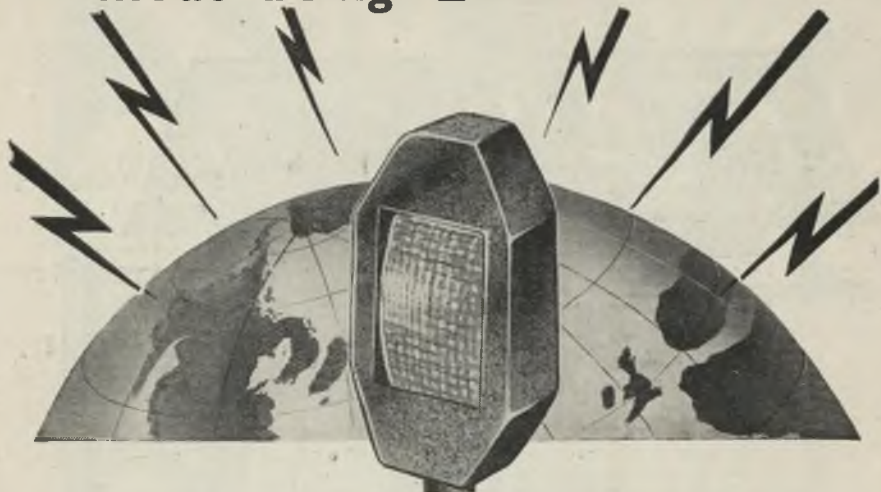
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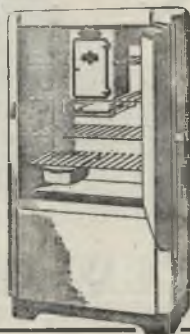
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