

Vol. CXXXV. No. 3494

NOVEMBER 10, 1944

POLITECHNIK

9d. WEEKLY

# ELLISON ELECTRIC CONTROL GEAR FOR CRANES, HOISTS & WINCHES



Ellison Limit Switches make the break circuit millions of time without fail. They are made for Series and Shunt circuits.

Ellison Controllers are mistakeproof in operation and are suitable for any machinery on which the motors are frequently statted, stopped, reversed or subjected to speed regulation. Ellison Main Circuit Breakers give true protection to all Hoist and Winch equipment. They are made for use on circuits of up to 660 volts.





Every piece of Holophane Glassware is made to an exact design embodying many prisms each redirecting the light in a particular way. This scientific design and accurate manufacture ensure the production of glassware giving strict control of the light at high efficiency.

> There is a complete range of units available for all purposes

-distributions ranging from extensive, intensive or focussing—some providing additional upward light. Holophane glass is specially made, it will not depreciate, it is unaffected by heat, sunlight, atmospheric impurities or time.

 Specialists

 Image: Specialist single state

 Image: Specialist st

# The Art of Knowing How



#### LEADERS IN ELECTRIC WATER HEATING

The whole art of Falconry depended upon supreme patience in the training of the birds. As with all animals, it was, and still is, the art of winning their confidence.

Our experience, as a Firm, is that the winning of confidence means EVERYTHING both in a Firm's relations to its workers and consequently in the ever-improving types of products that happy and contented workers turn out. In other words, satisfaction at work breeds satisfaction—in the product.



HEATRAE LTD., NORWICH

PHONE: NORWICH 25131

GRAMS : HEATRAE, NORWICH



# EMPIRE RUBBER C. DUNSTABLE BEDS. Grams: SPANDIT. DUNSTABLE 533 Grams: SPANDIT. DUNSTABLE

#### USE OUR AMPLE PRODUCTION AND RESEARCH FACILITIES





ELECTRICAL REVIEW



V.I.R. and Synthetic Insulated Cables produced by this Company are being used for all essential war purposes

Manufactured in accordance with Government Specification

Standard Telephones and Cables Limited

(Cable Sales Department) North Woolwich · London · E.16 Telephone : Albert Dock 1401 3

CLI

Steel clips, bronze clips, stainless clips, big clips, little clips, wide clips, narrow clips, in fact clips in every conceivable shape and size.

CLI

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

Maybe a clip of special shape would be necessary for the job you have in mind. Well, we can help you because we make clips for hundreds of uses, including war purposes. We can make to print or specification, or our Research Department will design for you. Our knowledge of clips has advanced side by side with our 88 years' spring-making experience, and we should like to send you our wartime catalogue.

> 6 doz. ass. sizes No. 80 and 81 dips. 24/- (Sub.)

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

CLI



TERRY SPRINGS

HERBERT TERRY & SONS LTD., REDDITCH London — Birmingham — Manchester

CLIPS-

# **"THREE-PHASE FROM** SINGLE-PHASE" CONVERSION

SYSTEM ( PATENT No. 485495 )

The most economical method of installing or extending electric drives in Factories where singlephase supply only is available.

Enables standard three-phase motors and control gear to operate on singlephase supply.

 Adaptable to all likely load conditions with equally high standard of performance.

 Gives exceptionally good voltage balance under all working conditions, thus enabling the full three-phase output to be obtained from the load motors.

Easy to control.

THE BRITISH THOMSON-HOUSTON CO., LTD.



A3410

Group of single- to three-phase con-verters in an 800 H.P. Factory installation.

Let BTH Engineers advise vou.

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ELECTRICAL REVIEW

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November 10, 1944



in this extract

## 4 YEARS' CONSTANT USE HAVE PROVED THE WORTH OF A CABLE DESIGN One user expresses his satisfaction

the beginning of 1956. The object of the users of this cable was to avoid corkscrewing, there-fore, to test the design it was put in use with an arcwall coal cutter. In spite of the an arcwall coal cutter. In spire of une abnormal amount of coiling and uncoiling that arcwall machine cables are subject to, no corkscrewing or distortion was obvious. After six months use it was brought out of the pit for examination at the surface and the pit for examination at the surface and returned to the Colliery. The cable was used in a seam where the sharp nature of the shale would test the tough rubber sheathing. The cable has been out for were few sheath months cable has been out for very few sheath repairs during its four years of life. For the last twelve months the short-lay cable has worked with a longwall coal cutte

This cable was delivered at Colliery about the beginning of 1938. The object of the design



THE LIVERPOOL ELECTRIC CABLE CO. LTD. LINACRE LANE - BOOTLE - LIVERPOOL - 20"

ELECTRICAL REVIEW

November 10, 1944

# THE POCKET **TESTOSCOPE**

Size of a Fountain Pen

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

> for use on 100-750 volts

#### FOR TESTING

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

The Electriciais Good Companion

### **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 St., Temple. DUBLIN : 2 Church Lane, College Midland Representative : [Green W. T. BOWER, 184 Jockey Road, Sutton Coldfield



LAM



A STEMENS QUALITY PROBUCT

#### Advit. of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED 38/39 Upper Thomes Street, London, E.C.4 38;39 Upper Inames Street, London, Less Branches at Belfast, Birmingham, Bristol, Candill, Dublin, Glasgow, Leedt, Everpool, Munchester, Newcastle-on-Lyne, Nottingham, Sheffiels

ELECTRICAL REVIEW

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BICOLON



**BICOLON COVERED WIRE** backed by exhaustive Laboratory trials and service tests, brings to the Engineer new facilities for the design and manufacture of electrical apparatus.

Among its chief characteristics are remarkable mechanical properties and abrasion resistance – excellent dielectric properties – chemical stability and resistance to solvents. BRITISH INSULATED CABLES LTD Head Office: PRESCOT, LANCS. Telephone: PRESCOT 6571

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**MVFR** 

THE TECHNIQUE

Recommend Elasta lamps, the lamps your customers can rely upon to give them dependable service all the time.

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 "Pope's. Leeds 22119."
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 "Pope's. Leeds 22119."

 19 Pope's, Deansgate 5687."
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Foremost

## THE CORONA

This design, with illuminated disc decoration, proved so popular on its introduction shortly before the war began, that we plan to put it into production again as soon as conditions allow.... to meet the more urgent demands of your customers for efficient radiant heating.



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Hottest

ELECTRIC FIRES

Ferranti Ltd., Moston, Manchester, 10.

London Office: Kern House, Kingsway, W.C.2.

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ETROVICK

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aids IMPROVE YOUR LIGHTING in consultation with oduction METROVICK'S ILLUMINATING ENGINEERS

CO. LTD.

ELECTRICAL REVIEW

Brilliant

-be bright say CROMPTON

# STRONĠ SUPPORT

Crompton stockists will have the support of a strong publicity campaign. The advertisement shown here is one of a series which will appear in the National newspapers, weekly periodicals, and an effective list of Provincial newspapers. The campaign will be reinforced by posters, painted signs, and arterial road signs.

# \* BE BRIGHT ... Stock CROMPTON

ווהדיהונהה:



for money. No wonder the go-ahead dealer handles Atlas Lamps : just reckon up the extra profit. And remember all the other

benefits—large scale national advertising, attractive sales aids, generous rebates, plus complete freedom to stock whatever make of other good lamps you like. You are throwing profits away if you don't sell





Nothing better has come to light

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 Phone : Euston 183

 Northern Branch : 55 Blossom Street, Manchester.
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 'Phone : Newcastle 24068

BROOK

A L T E R N A T I N G C U R R E N T O N L Y WITH OR WITHOUT FEET

BROOK Itd MOTORS SS ER

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ELECTRICAL REVIEW

November 10, 1944

# **"ERSATZ"**

..... The literal meaning of this word is simply "substitute," but through German misuse it has become distorted into "cheap" or "inferior."

In this country, however, not all substitutes which have become necessary owing to shortage of imported material are inferior. Many new ideas which would never have been considered but for war conditions, will prove to be either better or more economic than the originals which they have replaced.

For example, where electrical engineers have specified non ferrous metals in the past because steel fitments have been prone to rusting, they will find that the substitution of "PARKERIZED" and "BONDERIZED" iron and steel in lieu of brass, copper, etc., is practical and economical.

Experience has shown that a high degree of resistance to corrosion can be obtained by "PARKERIZING" or "BONDERIZING," thus enabling iron and steel to be used for projects for which in the past ferrous metals were not considered suitable.



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#### ELECTRICAL REVIEW

#### R E A L SCREWED GLASS FITTING 60 W, 100 W—and 200 W IN PREPARATION

WINNER!

EXTRA TOUGH QUALITY POR-CELAIN—one-piece lampholder.

HEAVY-QUALITY PRESSED WELL GLASS-gives much higher threading accuracy, closer limits and a heavier, stronger glass.

DIE CAST MAZAC TOP MEMBER —engaging on rubberised asbestos washer.

HEAVY RUBBER GASKET- giving a definitely watertight joint.

Can be supplied without Mazac Top for mounting direct to standard B.E.S.A. conduit box for positions where headroom is limited.

No steel authorisation required.

Issued by Rowlands Electrical Accessories Ltd., R.E.A.L. Works, BIRMINGHAM 18

# REMEMBER

the men who are fighting today . . . at sea, on land and in the air. Thank them by helping to safeguard their future.

You can do this by sending a gift to help forward the work of the British Legion for ex-Service men and women of ALL Ranks and ALL Services, their families, and the dependants of those who fall in action.

Gifts should be sent to :--

## HAIG'S FUND RICHMOND SURREY



Johnson & Phillips Ltd., Charlton, S.E.7

1944





This single reduction geared motoris the most compact power unit yet devised for slow speed drives. Its slight extra cost is more than balanced by the elimination of expensive countershafts and superfluous belting.

Made by HIGGS in sizes from  $\frac{1}{2}$  H.P. to  $1\frac{1}{2}$  H.P. with a maximum gear ratio of 6 to 1

Birmingham, Bristol, Dundee, Nottingham, Peterborough

С

Glasgow, Sheffield,

London, Manchester, Wolverhampton. -11-12

Worit it be grand?

CLIVE UPTON

NOW on war production. AFTER VICTORY—finishes to protect and beautify man's products and possessions.

LACQUERS · PAINTS · VARNISHES · ENAMELS

TITANINE

TITANINE LIMITED COLINDALE LONDO





# YOUR TARGET



THE ENGLISH ELECTRIC COMPANY LTD. - stafford-



# Don't miss the boat

Still available

To sell a lamp is almost equivalent to recommending it. Therefore, if you sell inferior lamps now you should not be surprised if your customers "leave you behind" when the war is over and they



KYE

can pick and choose. Sell Kye—the lamp that is worth recommending because it is reliable. Kye always was a best-seller—and it always has been best to sell, for goodwill.

FOR GOODWILL AND SALES

41 V2 194

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CONTACTS

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November 10, 1944

ELECTRICAL REVIEW

HEBBURN-ON-TYNE

is no substitute for the best

ENGLAND.

METALCLAD SWITCHGEAR TYPE-E7 Inclustional Application SUITABLE FOR EVERY INDUSTRIAL APPLICATION CIRCUIT- BREAKER WITHDRAWABLE

FOR SAFE INSPECTION AND MAINTENANCE EASY TO ERECT AND WORK EASY TO MAINTAIN AND EXTEND

NORMAL-CURRENT RATING: 600 AMPERES BREAKING-CAPACITY: 25 MVA AT 400/66 O VOLTS ( 36,000 AMPERES AT 400 VOLTS 3 - PHASE)



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

Yet they offer definite price advantages.

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



London (North): Clay Hill, Bushey, Watford, Herts, London (South): 10, Kingston Hill, Kingston on Thames, Glasgow C2: 42 York Street, Surrey, Manchester 4: 20 Swan Street,

Birmingham 1: 40 & 42 Summer Row. Leeds 1: Wellington Street Cardiff: 50 Bridge Street. N Ireland: 38 Bedford Street, Belfast ľ

#### ELECTRICAL REVIEW



#### ENFIELD CABLE WORKS LTD. THE BRIMSDOWN · MIDDLESEX

#### THE ENFIELD CABLE WORKS, LTD.

Head Office and Works BRIMS-DOWN, ENFIELD, MIDDLESEX, Telephone Howard 2661 (10 lines), London Office and Estimating

Departments Victoria House, Southampton Row, LONDON, W.C.I.

Telephone: Holborn 0591 (4 lines). Light Engineering & Mains Cable

Accessories. West Road, Northumberland Park, N.17.

Telephone : Tattenham 2708 (2 lines).

#### HOME BRANCHES:

The Enfield Cable Works, Ltd. Prudential Buildings, Crown St. ABERDEEN. Telephone: Aberdeen 7504

The Enfield Cable Works, Ltd., Broad Street Chambers, BIRMINGHAM, 1.

\* Telephone: Midland 3215. The Enfield Cable Works, Ltd., 5. Queen's Road Quadrant. BRIGHTON, 1.

Telephane: Brighton 6429. The Enfield Cable Works, Ltd.,

Colston Street. BRISTOL, I

Telephone: Bristol 26584 The Enfield Cable Works, Ltd., Second Floor, Suite II, 130, George Street, EDINBURGH, 2.

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The Enfield Cable Works, Ltd Mitchell Street. GLASGOW, C.I

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The Enfield Cable Works, Ltd., Trent Warehouse. Wetmore Road, BURTON-ON-TRENT.

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GREENWOOD F 3



MANUFACTURERS OF WIRE WIRE ROPE HEMP CORDAGE HEAD OFFICE : DONCASTER. OFFICES WORKS THROUGHOUT GREAT BRITAIN

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ELECTRICAL REVIEW

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# NATIONAL FIRE PROTECTION COMPANY LIMITED RICHMOND • SURREY Telephone RICHMOND 2342.34



Sole Manufacturers of the Essex METHYL BROMIDE FIRE EXTINGUISHING EQUIPMENT

The

# ECONOMY IN OPERATION



Transmission losses are eliminated by putting NEWMAN MOTORS close up to the job at the working points where motion is required. Total enclosure ensures freedom from breakdown in spite of chips, grinding dust, or cutting oils. Fan cooling keeps the motors compact and light in weight.



Head Sales Office : 32 VICTORIA STREET, WESTMINSTER, LONDON, S.W.I Tel. 1 ABBey 2023 30

November 10, 1944

# SELI: Y Amp5 Fuel Watchers need Good Lamps **CRYSELC**0 BEDFORD.

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## **TURBO - ALTERNATORS**

#### COMPACTNESS WITH HIGH EFFICIENCY. FOR SMALL OR LARGE STATIONS

Top illustration shows a 37.000 kW Turbo-Generator typical of many sets installed in large power stations, whilst below is a group of smaller sets of various sizes installed from time to time in an industrial station to meet a developing load.

1,000 kW to 60,000 kW.

Full details on application.



2.1







### LUNNULLIJ WAR EMERGENCY LIMPET ADHESIVE TAPE

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

This tape represents the highest quality which can now be manufactured. It is sold only on a yardage basis in  $\frac{1}{2}$ ",  $\frac{3}{4}$ " and 1" widths, in rolls of 50-yds., 25-yds. and 10-yds.

We shall be pleased to furnish prices, technical data, etc., on application.

CONNOLLY'S (BLACKLEY) LTD., MANCHESTER 9

Telephone : Cheetham Hill 1801 (3 lines) Telegrams : "Connollys, Blackley." London Office : OSWALDESTRE HOUSE, STRAND, W.C.2 Telephone : TEMple Ber 5506-7 Telegrams : "Syllonnoc, Estrand, London."



## at a high standard of quality...

The term "standardisation" may stand for mere uniformity. At the M.E.M. Factory, however, it means that all production is brought up to a high level of quality, design and finish.

The architect who specifies M.E.M. switch and fusegear and the electrician who selects M.E.M. know that a reliable installation is certain *and* at a reasonable cost. For although M.E.M. gear is good it is not expensive.



Good design and modern factory practice have cut out all waste of both materials and man-hours. The M.E.M. Factory is self-contained and self-sufficient. It produces good electrical gear from start to finish—good all through.



#### SWITCHGEAR · MOTOR STARTERS FUSEGEAR · ELECTRIC FIRES

MIDLAND ELECTRIC MANUFACTURING CO. LTD., TYSELEY, BIRMINGHAM, 11 London Showrooms & Stores : 21-22 Rathbone Place, W1 : Manchester Showrooms & Stores : 48-50 Chapel St., Salford, 3

REMEMBRANCE DAY Nov. 11th. Give generously for your POPPY.

# WATERWORKS PUMPING EQUIPMENT

N many pumping stations there is a combination of lift and force duties. Often water is drawn from a well or borehole where there is a considerable seasonal variation and is delivered into a force pump which operates against practically constant head.

In these situations an oil-electric drive provides an ideal and economical solution, for the borehole or well pump may be driven by a variable speed direct-current motor which derives its energy from a generator driven by an oil engine which can be run at constant speed to suit the force pump duty.

The illustration shows an installation of this kind where the force pump and generator are driven by vee-ropes from the engine shaft. A well pump, driven by a vertical d.c. motor, lifts water from a depth of 89 feet below surface, into a settlement and treatment tank, from which it is discharged by the force pump against a total external head of 600 feet.

The engine driving the force pump and generator is a 5-cylinder unit having a continuous day and night rating of 163 b.h.p. at 488 r.p.m. The generator, in addition to supplying current to the well pump, provides power for the compressors and auxiliary plant.

The complete pumping and electrical equipment is of Allen manufacture and the arrangement is economical in space, simple to handle and highly economical for so small a plant, since the fuel consumption per W.H.P. + E.H.P. does not exceed 0 486 lb.

W. H. ALLEN, SONS & CO., LTD., BEDFORD, ENGLAND
November 10, 1944

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Dimensional accuracy, strength and reliability are features of Harland craftmanship in Fabricated Structures.

THE HARLAND ENGINEERING CO.LTD. ALLOA.SCOTLAND

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# TRADE MARKS A guarantee of Quality

A registered trade mark is the sole property of the trade mark owner and distinguishes his products.

The word **"MEGGER"** is the registered trade mark of Evershed & Vignoles Ltd. and must only be used to describe their products.

For example, a "**MEGGER**" Insulation Tester means the instrument is made to the designs, standards and inspection of Evershed. & Vignoles Ltd.

Thus the registered trade mark **"MEGGER"** which is known all over the world, is your guarantee of a high quality product.



Announcement of Evershed & Vignoles Ltd., Chiswick, London, W.4

5/49







THE EDISON SWAN ELECTRIC CO. LTD. 155 CHARING CROSS RD., LONDON, W.C.2 (L.55)

Managing Editor :

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C. O. Brettelle, M.I.E.E.

Hugh S. Pocock, M.I.E.E.

Commercial Editor:

J. H. Cosens

# November 10, 1944

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Power and Lighting Switch-

Ship Lighting Switchboards Theatre and Cinema Switchboards

Battery Charging Switchboards

SWITCHBOARDS BUILT TO SPECIFICATION

# IGRANIC ELECTRIC COLD LONDON & BEDFORD

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November 10. 1944

# FUSE & LINK UNITS for PANEL MOUNTING

A useful range of Panel type Units is described in Catalogue W.O.I. This includes Wedge type H.R.C. Cartridge Fuses in Porcelain Carriers, Wedge type Links with or without Porcelain Carriers, all of which are available for front or back connection, with or without bases.

CAMBRIDGE INSTRUMENTS for ELECTRICITY METER TESTING

ELECTRICAL DISTRIBUTION EQUIPMENT

The illustrations show a front connected unit fitted with a wedge type link (on left) and a back connected unit with H.R.C. cartridge fuse in porcelain carrier (on right)

WTHENLEY'S TELEGRAPH WORKS CO.LTD. MILTON COURT. WESTCOTT. DORKING. SURREY

# CAMBRIDGE METER-TESTING INSTRUMENTS

### THIS FOLDER

### (No. 64-X)

contains useful information regarding a series of accurate and reliable Cambridge instruments which have been approved for use under the Electricity Supply (Meters) Act, 1936, including specifications of complete meter-testing equipment and a list of over 100\* SUPPLY UNDERTAKINGS in which Cambridge meter testing instruments are employed.

\*Now over 200

CAMBRIDGE INSTRUMENT COMPANY LIMITED

MAY WE SEND YOU A COPY?

THE OLDEST ELECTRICAL PAPER - ESTABLISHED 1872

Vol. CXXXV. No. 3494.

NOVEMBER 10, 1944

9d. WEEKLY

# **National Grid Tariff**

Varying Views of I.M.E.A. Members

THE averaging of a variety of charges is bound to benefit some people and put others in a worse position and it is only natural that the adversely affected parties should view any change with disfavour. Thus it is with the I.M.E.A. proposals for a national grid tariff (to apply to both selected station owners and other undertakings), graded though it might be; the difference of opinion between benefactors and beneficiaries was apparent at the Bristol meeting of the I.M.E.A. South-West England and South Wales Centre last week.

### Selected Station Owners' Position

While the president (Mr. W. P. Lilwall) thought that under a national tariff no undertaking would be charged more than 10 per cent. above the present rates, representatives of some of the larger undertakings (now protected by Section 13 of the 1926 Act) failed to appreciate why their customers should be expected to pay up to put the less fortunate in a better position. Their attitude can be appreciated when it is realised that they have had to quote very close terms for the large industrial supplies upon which An they have built up their systems. addition of 10 per cent. to their power charges would seriously affect their bargaining powers in their endeavours to spread industrial electrification. And if they decided that the increase would, in consequence, have to fall upon the non-industrial consumers they might be in an even worse case. The addition would then be considerably above the 10 per cent. mentioned and probably make it very difficult for the undertakings to go on developing their domestic load in the face of keen gas competition.

Mr. Lilwall (following the "Brown Memorandum") coupled the national grid tariff proposal with the taking over by the Central Electricity Board of the whole of the burden of bulk-supply transmission by which means, he said, the Board would secure the benefits of diversity which now accrue to individual undertakings. In their recent memorandum on the subject the municipal authorities owning selected stations pointed out that 94 per cent. of their output was absorbed by their own requirements so that hypothetical costs could easily be checked against actual costs, and they maintained that to hand over transmission to the Central Board would complicate matters and add to operation costs.

### **Reasons for Higher Charges**

The subject was dealt with at length in our issue of May 19th last by Mr. J. F. Field (Edinburgh) who contended that selected station owners were not being paid too much (or charged too little) but that the grid tariff was high because of the cost of the grid. The grid had justified itself, however, and the smaller undertakings were benefiting from it. Going further, he suggested that charges to consumers in the less compact areas were high, not because of the grid tariff, but because of the high distribution

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costs which overwhelmed any extra cost of bulk supply. This does not apply so much to the smaller mainly urban areas such as Mr. Lilwall's Fleetwood. Presumably, as they stand between the large urban undertakings and the country towns, they would be placed in an intermediate grade of any differential national tariff. In this case they would probably remain much where they are at present and if this is true Mr. Lilwall can claim to be an impartial judge.

BUT if Section 13 costs Lack of Data are hypothetical so are the probable figures and effects of a national grid tariff. The necessary data have not been collected and collated and the Electricity Commissioners who have been asked by the I.M.E.A. to look into this question have been unable to do so, for apart from wartime considerations-lack of staff, etc.-the uncertainty regarding future organisation makes it impossible to do anything in the matter at the present time. It is not forgotten that the I.M.E.A. has recommended only a standard form of tariff; it suggests as one factor a sliding scale of kilowatt charge related to demand and this might result in some interesting differences between undertakings. The Board's present tariffs embody a kW charge graded in increments based on developments in each case in 1938; the smaller increments in the case of heavier demands benefit the large undertakings.

Part-Time Education

OWING to lack of accommodation and teaching staff it has been necessary to postpone the

raising of the school leaving age. While this is regretted by advocates of extended education Dr. P. Dunsheath, in a recent article in the Spectator, does not regard it as a tragedy in view of the nature of the present educational system. He considers part-time education of greater real benefit to young people entering industry and suggests that the first year after leaving school should be spent half in gainful employment and half under educational influence. Under this arrangement an employer would employ two boys for each job and divide the week's pay between them, thus meeting to some extent the "economic" objections of parents who wish their children to begin earning at an early age. Moreover, Dr. Dunsheath contends that the number of new teachers required would be reduced by about 40,000 and the child would gain from this method of introduction into industry.

WITH the widening scope of electrical engineering Relative comes a greater tendency Knowledge towards specialisation-

very necessary, but apt to lead to a loss of sense of proportion unless a particular line of work is viewed in relation to what is being done in other fields. That alone would justify the publication in the I.E.E. Journal of abstracts of papers, which are also printed in full for the benefit of the smaller number of those more closely concerned in the details. Additional point is given to this aspect in the foreword to the October issue, in which is emphasised the importance to the purposes of the Institution of literary contributions of a high standard which cover the whole range of applied electricity from developments that are on well-established lines to those that are just appearing over the horizon.

CONSIDERABLE modifications in the relationship Unregulated between price of coal and rates of interest since the

Severn Barrage Committee reported in 1933 may be expected to improve the case for putting this scheme in hand at the end of the war. Prospects would be further improved if the problem of dealing with the irregularity of electricity production that comes from tidal vagaries could be solved otherwise than by constructing an ancillary storage station, which added very materially to the estimated capital expenditure. In view of the pending report by the Committee reviewing the original scheme, the suggestion put forward by Sir Alexander Gibb in his Hinchley Lecture (reported by us last week) that chemical or metallurgical processes might be based upon unregulated tidal power, becomes of immediate moment.

IT is gratifying to hear Electrical from the Secretary to the Export Trade Department of Overseas Trade that the Government is alive to the possibilities offered by the electrical industry as a contributor to the increased export trade which is generally recognised as a post-war

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essential. There is also a strong case for immediate assistance in the meeting of the urgent need of undertakings in the Dominions for British power plant. In their present straits they are being forced to make inquiries elsewhere and it has been proved in the past that once foreign plant is installed the dice are heavily loaded against British manufacturers in the matter of subsequent contracts.

A STATEMENT by the Electric President of the Board **Cookers Too** of Trade last week that "he was taking steps in consultation with the Minister of Fuel and Power to increase the output of gas cookers and to ensure that they were of the most efficient types" does not imply that any special preference is being given to the gas industry in relation to electricity and solid fuel interests. Mr. Dalton was replying to a specific question relating to gas cookers and we are assured that the Board of Trade is equally concerned with the electric cooker position and is determined to do all in its power to make available at the earliest opportunity the large quantities of apparatus that will be required to meet the accumulated and growing demands.

### Competition tion betwee Prescribed electricity

THE view that competition between the gas and electricity industries is un-

desirable is not supported by Mr. Sylvester, managing director of the Gas, Light & Coke Company. Addressing the Fuel Luncheon Club recently he asserted that without competition the development of methods of using fuel would undoubtedly lose its impetus, and that it would be against the national interest to remove this spur. He made the qualification, however, that it should be possible to rid competition of its more objectionable features, and suggested that an independent authority should be charged with the responsibility of seeing that prices are reasonably related to cost of supply, taking into account all the circumstances.

Space Sylv Heating son

A later passage in Mr. Sylvester's address throws some light on where this policy leads. He said that

while space heating must remain an important item, he did not believe that the heavy peak loads which were thereby also provides coke."

ELECTRICAL REVIEW

Post-War Loans Loans RECENTLY the Treasury issued a memorandum upon post-war borrowing

by local authorities. In this a scheme was outlined by which, through the Public Works Loan Board, the requirements of authorities would be met from a central source at a low rate of The Institute of Municipal interest. Treasurers and Accountants recommends the acceptance of the proposals but considers that this surrender of independence should last only as long as is necessary. Consideration has been given to this matter by the London and Home Counties J.E.A. which is of the opinion that the Authority should have access at will to the Public Works Loan Board and be able to turn to the ordinary financial market if it could secure more favourable terms. It is thought that it would be difficult to justify rigid control of the Authority's borrowing resources not comparably applicable to company undertakings. Importance also attaches to the preservation of the Authority's existing powers to borrow temporarily in anticipation of capital funding, or pending accruing revenues.

WHEN the Corporation Meter Rents of West Ham claimed arrears from a consumer in respect of electricity supplied, the defendant wrote to Bow County Court stating that he was never informed that he had to pay a meter charge. Upon this the Registrar said that " he had never understood why the Corporation should charge electricity customers for a meter that was for the purpose of checking the quantity used." Supply authorities know the answer to this one; but when will all of them merge meter costs in the general standing or running charges? Until electricity is supplied " on tap " (if ever) meters will be necessary and must be paid for but, having regard to the consumer's feelings, it isn't necessary to make it so obvious.

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# **Factory Secondary Distribution**

Low-voltage System at a Large Aero-Engine Works

N the article "Factory Primary Distribution" we described last week the highvoltage system and the complete substations at one of the very large and modern Rolls-Royce aero-engine factories. Our purpose now is to present a picture of the system of low-voltage distribution at the same works from the various transformer substations to the numerous points of usage throughout the factory. Generally 0.3-sq. in., p.i., l.c., s.w.a. cables are run from the outgoing circuit-breakers for both the main lighting and main power supplies, but on the l.v. switchboards there is also provision for taking off supplies for pilot lighting in the factory buildings and the substations, as well as for other small supplies. In each case this



In each sub-distribution lighting board there is a busbar chamber at the bottom and a wiring chamber at the top

is effected by means of a combination switchfuse mounted just above and connected to the 1 v. busbars.

For the lighting supply for each block building a 0.3-sq. in., 4-core cable is run from the appropriate 1.v. feeder panel to a main lighting distribution board which consists of



In each main lighting board the busbar is served by a 300-A t.p. & n. switch-fuse which serves similar 150-A units

an English Electric 300-A t.p. & n. incoming combination switch-fuse mounted under and feeding a busbar chamber from which four outgoing supplies are taken through 150-A t.p. & n. switch-fuses. The main lighting distribution boards are, in general, situated at the most convenient place near the substation from which they are supplied. Each of these outgoing circuits provides the lighting supply for one-quarter of the block building, and in each case a 0 I-sq. in., 4-core cable is run to a sub-distribution lighting board situated in the appropriate quarter block. Each sub-distribution board consists of a busbar chamber fed from underneath by a 300-A t.p. & n. back-entry combination linkswitch, with outgoing switch-fuses mounted above the busbar chamber, and finally at the top a wiring chamber to and from which the switch-fuses and the outgoing circuits are tubed.

The outgoing switch-fuses feed lighting panels mounted on the factory stanchions,

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each of which houses the fuses, contactor and three condensers for a bay of lighting comprising sixteen 400-W Metropolitan-Vickers discharge fittings. In addition to the t.p. & n.

switch-fuses for the main lighting there are a number of d.p. switch-fuses which serve subsidiary circuits such as those to small distribution boards for switch - plugs for portable lighting fittings.

For the main power circuits from the I.v. switchboards in the transformer substations some of the outgoing cables are 3-core and some 4-core. The 3-core cables serve the overhead busbar workshop distribution scheme which predominates throughout the

On each power distribution board supply entry is to a t.p. insulator ; main board for process shops

ELECTRICAL REVIEW

factory on account of the large number of machine shops. In each case the 0.3-sq. in. cable is taken to a main power distribution board via a t.p. isolator centrally disposed at the top of the board. In some cases the cable runs solid through a current transformer chamber to permit individual workshop



Fuse-switch supplying a 60-A power fuse-board

supply metering. From the isolator there is a direct connection to the busbars in the chamber immediately below. Mounted on top of the busbar chamber there are two 150-A t.p. combination switch-fuses, one on either side of the incoming switch. These switches serve two lines of overhead distribu-

tion busbar of English Electric manufacture running the full length of the block, the cables being 0.3-sq. in., 3-core, p.i., l.c., s.w.a. terminating in a trifurcating box mounted on top of the overhead busbar chamber.

The power distribution boards for the process shops are similar to those

Associated with each distribution board is a local power-factor correction condenser; this board serves an overhead busbar system

for the overhead busbar distribution systems, except for the larger and varying capacities of the components. The outgoing feeders from the power distribution board are taken to suitable switches for the particular loads of the section. These switches are in some cases switch-fuse units which each serve an individual piece of equipment, while in other cases they are switches erected on a floor-mounted subdistribution board serving a number of motors or furnaces, etc. Wall-mounted subdistribution boards are also fed from main distribution boards, these being straight fuseboards which in some cases include an isolator on the incoming supply to facilitate maintenance and fuse replacement.

While the loads for the process-shop circuits vary considerably, say, from 80 to

250 A, the cables are generally standardised in two sizes of 0 1 sq. in. and 0 3 sq. in. For the smaller loaded circuits v.i.r. cable is used in conduits. Generally the paper-insulated cables are run up and down the factory walls and stanchions, and along the roof trusses in sheet-metal trays, drain-proof cables being used throughout. An additional safeguard to the drain-type cable is the special precautions taken in terminating the cable to ensure that there is no oil leakage into the power boards.

There are a number of exceptions to the general power scheme outlined above, and an outstanding example is to be found in the

heat-treatment department, where supplies are taken to the electric furnaces direct from the l.v. switchboards in the transformer substations to two 16-unit Mayor & Coulson circuitbreaker distribution boards. On one of these there are three incoming units, each of 800-A capacity, and two busbar section switches of similar capacity. The outunits are 400-A going circuit-breakers. Cabling from the substations to the above switchboard is carried out in one 0.4-sq. in., 4-core, p.i., l.c., s.w.a.



200-A board, which serves 55-kW nitriding furnaces, 19/0.064-sq. in. cable is used, in  $1\frac{1}{2}$ -in. conduit. In the case of two more recently installed furnaces with higher loadings, paper-insulated armoured cable is used.

For other main distribution loads use is made of "Pyrotenax" cable on account of fire hazard, and examples of this type of distribution are to be found associated with the gas-producer plant, the boiler house, and the test beds. In conjunction with each of the factory distribution boards and the main boards for the process shops is installed a 60-kVA B.I.C. static condenser for the local





cable and two 0.4-sq. in., 3-core, p.i., l.c., s.w.a. cables in parallel. The object of the 4-core cable is to provide a neutral for the controlling circuits.

The other heat-treatment distribution board is similar, except that there are only two incoming units of 400-A capacity each, one busbar section switch and 200-A outgoing circuit-breakers. From both of these boards supplies are taken to the furnace contactor panels by means of v.i.r. cables run in conduit. For the 400-A board, which serves 110-kW carburising furnaces, 37/0·072-sq. in. cable is used, in 22-in. conduit, while for the other Exceptions to the general power distribution scheme are locunit switchboards serving the heat - treatment plant (above). Another exception is the boiler house distribution board (left)

correction of power factor. Each condenser is connected to the board with a 150-A t.p. combination fuse - switch mounted directly on the board, with v.i.r.cabling in flexible conduit to an Ellison industrial circuit-breaker.

The main office lighting, plug circuits, etc.,

are supplied from a main distribution board which consists of an incoming 500-A isolator connected to a busbar chamber mounted on which and supplied through 300-A combination fuse-switches are the two main 60-A per way t.p. & n. distribution fuseboards. From these boards supplies are taken to sub-distribution boards in the various wings. The main distribution board for the offices is fed directly from the substation

Electrical Installations, Ltd., were responsible for all the cabling and wiring work and the erection of the equipment referred to in this article.

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By W. J. Jones,

M.Sc., M.I.E.E.

# Organisations of the Industry\_XVII Electric Lamp Manufacturers' Association

THE invention of the carbon lamp in 1878 was primarily responsible for the early development of the electrical industry as we know it to-day. Consequent on the "subdivision of the electric light" by Swan and Edison, electricity supply undertakings were founded and they relied almost entirely on the revenue obtained for lighting purposes to pay their way and to finance their future development. Then, as now, manufacturers sought ways and means of making more

efficient and better lamps and electric lamp makers were among the pioneers in appreciating the

the pioneers in appreciating the advantages of co-operation. The Electric Lamp Manufacturers' Association of Great Britain, Ltd., was formed in 1919 as a public company trading without profit. It embodied two of its predecessors, *i.e.*, the British Carbon Lamp Association, formed in 1905, and the Tungsten Lamp Association, formed in 1911. In 1933 its members formed a new association, which complies with the legal requirements of a trade union and is known as E.L.M.A. Its objects are " to formulate, regulate and secure uniformity of practice in the manufacture, sale

and purchase of electric lamps within the British Isles, in such a manner as to benefit both the trade and the public by the adoption of standard conditions of product and sale."

Certain critics of trade associations have suggested that members of such bodies hold up new inventions to suit their own selfish ends. There is certainly no foundation for any such fears as far as electric lamp

manufacturers are concerned, since, as will be seen, they have shown the utmost inventive genius in electric lamp development and have given the public a series of remarkably efficient lamps.

The carbon filament lamp was followed by lamps having filaments of tantalum and at a later stage tungsten. Then, as the result of brilliant investigations into the physics of heat conservation, the gas-filled lamp with the coiled filament was developed, to be followed by the coiled-coil lamp some five times more efficient than the old carbon lamp. By the coiled-coil lamp being developed the

public, at no extra cost, received extra light worth £3,000,000 per annum.

Then followed, about ten years ago, as the result of continuous research, a revolutionary change in the technique of producing electric light. Scientists in the research laboratories of E.L.M.A. members succeeded in producing light by exciting mercury and sodium vapours to luminescence, instead of heating a filament. Thus we were enabled to light our streets and

factories with mercury and sodium electric-discharge lamps having an efficiency some three times greater than that of the

times greater than that of the tungsten filament lamp. Shortly before the war came another invention, in which we are proud to know that British scientists were pioneers, whereby light is produced from fluorescent powders. These lamps also are some three times more efficient than the tungsten lamps, give a colour like that of daylight and offer tremendous possibilities for use in shops, offices, schools and, as time goes on, in homes. These lamps have already contributed greatly to the war effort by assisting production and conserving fuel.

From left to right: Mr. W. H. Williams, Chairman for the current year; Mr. W. J. Jones, Director of the Association; and Mr. E. B. Sawyer, Acting Manager, Lighting Service Bureau

> These developments have only been made possible by the co-operative effort among E.L.M.A. members, which, together with a balanced trading policy, has enabled them to spend large sums of money on research—for many years past over £200,000 per annum. They also equipped themselves to produce every lamp component : glass tubing and bubs from sand, filaments from tungsten ore and the rare gas argon from the atmosphere. Without such farsightedness this country would have been immeasurably handicapped in the national effort which the last five years has necessitated.





E.L.M.A. members have safeguarded the supplies of lamps required for productive effort in industry and for the many technical uses in the fighting services. The Air Force, the Army and the Navy depend on having millions of lamps available, some of great



**Relative efficiency of electric lamps** 

intricacy and involving the highest possible technical skill in their design and production.

The Association aims at a product of superlative quality; therefore manufacturing experience is interchanged between all members, not only as regards the lamps themselves, but concerning the process and

machinery for their production. The committees meet frequently and visit each others' factories so that all are familiar with the most up-to-date processes, and they have valuable liaison on world technical progress.

The quality of an electric lamp cannot be judged by eye, nor can it be gauged by mere superficial testing for efficiency. The inherent quality of lamps can only be judged after a cross-section of the product of a factory has been tested to destruction for life and efficiency. Manufacturers of E.L.M.A. brands of lamps keep a careful check on their own product, from the raw material of its constituent parts to the finished lamp, by tests at every stage, and in addition, samples of lamps are gathered from each factory and tested in an independent laboratory.

#### **Commercial Policy**

The members of the Association have always adopted a fixed price policy for the sale of their lamps to the public; a

customer in John o'Groats or Land's End pays the same for his lamps as a similar customer next door to an E.L.M.A. factory. The details of this policy are controlled by a committee consisting of the commercial representatives of the member firms which lays down terms of sale, and classifies both the customers and the very large variety of lamps manufactured. The latter are divided into such groups as general service lamps, electric discharge lamps, automobile lamps, miners' handlamps, etc., the former into users, trade users, retailers, factors or wholesale distributors. The demand for electric lamps is seasonal and so the practice of the Association has always been to base the terms on the customer's requirements over a full year rather than the size of each individual order.

Consistent with the primary requirements of maintaining a high standard of product, the Association has maintained reasonable prices to the public with a satisfactory margin for the constituent members of its distributing organisation. The accompanying diagrams indicate the drop in the price of the 60-W lamp over a period of years, comparing that fall with the corresponding reduction in the cost of electricity consumed by a 60-W lamp over its life of 1,000 hours, also the variations in the cost of living during the same period. It will be noted that reductions in list prices have kept pace with the cheapening of electricity and, if linked with improvements in lamp efficiency, the efforts of E.L.M.A. members surpass those so far made by all other sections of the industry in cheapening the cost of light.

The various committees are under the direct control of the Association's governing body



or Council which, as an important section of the electrical industry, wholeheartedly supports organised electrical trading and development. For this reason it continually seeks the advice of other trade associations within the industry such as the E.W.F., the E.C.A's N.F.I., I.M.E.A., I.A.E.P.C., etc., upon general-service lamps; M.F.A., S.M.M. & T., etc., in connection with automobile lamps 1

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and the M.E.L.M.A. with regard to miners' hand-lamp bulbs.

E.L.M.A. has gone further than having effective co-operation on research and manufacturing facilities, for the Association has as part of its organisation a Bureau to assist all electric lamp users. In this it was one of the first trade associations, if not the first, to operate such a neutral service.

#### Lighting Service Bureau

The Lighting Service Bureau, set up in 1924, acts as a centre for lighting demonstrations, propaganda and educational work. It was realised that there can be little use in providing an electric lamp of uniform quality and unrivalled excellence unless means are available to investigate its uses in all human activities, and to educate, prompt and direct both the trade and the public to an increased appreciation of the possibilities of " More and better lighting." Lighting campaigns, illumination design courses, liaison with the medical and architectural professions, preparation of lighting codes, conduct of an editorial Press bureau and submission of data to Government Departments-all form part of the Bureau's activities.

The Bureau has become the recognised centre for lighting development and takes part in many outside movements. Cooperation is particularly active with the following bodies :—Illuminating Engineering Society, National Illumination Committee, Association of Public Lighting Engineers, British Electrical Development Association. Electrical Association for Women, British Standards Institution and Electric Light Fittings Association.

A CCORDING to custom, the President, SIR HARRY RAILING, opened the proceedings at the first informal meeting of the session of the Institution of Electrical Engineers held on October 23rd. Dealing with "The Engineer's Part in Certain Post-War Problems" Sir Harry referred to some of the more controversial points in his presidential address and emphasised that the engineer should apply the methods of approach which he employed in his own work to the larger problems of the industry and the world.

The President said that he had been gratified to find corroboration of his views in the inaugural addresses of Mr. H. W. Grimmitt to the Transmission Section and of Mr. F. W. Lawton to the South Midland Centre. At a time like the present, when certain fundamentals were being challenged, there was the grave danger that generalisation and hasty conclusions might be applied to all problems instead of unemotional, impartial reasoning and detailed investigation. The engineering mind instinctively revolted and reacted from this unscientific approach.

In the discussion which followed, sixteen speakers took part representative of a very

To sum up, the manufacturers of lamps carrying E.L.M.A. brands have visualised their responsibilities to the electrical industry and the British public on the broadest and most progressive lines. They have combined their interest and activities, in the first place, to produce lamps of uniform excellence and dependability, and in the second place, to educate the public through the trade in the proper use of the product which they have been at such pains to perfect. The service thus rendered to the public is invaluable. E.L.M.A. manufacturers have not been content to produce a good article and leave it at that. They have said, in effect "Here is an article that is as near perfection as human ingenuity can attain ; permit us at the same time to tell you how to use it, so that you

may extract the utmost benefits from its use." It is indeed fortunate that the electrical industry is so well organised, as is shown by this series of articles, and indeed is it not natural that people or firms with an affinity of interests should get together, compare notes and plan for orderly progress and discuss problems among themselves and other interested associations, always provided that in the scheme of things the interests of the great public are held as paramount in importance?

In the place of heterogeneous units developing with little or no regard for their neighbours or their place in the national scheme of things, the trade association provides an opportunity for greater efficiency, a basis for financing research laboratories and an approach to scientific distribution which to-day represents one of our dominant problems—each capable of contributing materially to our national welfare and economy.

### **Engineers and the State**

fair cross-section of the membership, among them more than one past-president of the Institution. A plea for unchecked and unregulated private enterprise was countered by a reasoned argument for the benefits and stability of intelligent State control, not in the minute details of industrial practice, but by the laying down of broad governing principles to be followed in the policies of those who would be concerned with the administrative details. A strong point was made of the vital influence of over-all efficiency of production on the average standard of living of the country, and it was held that if an improvement of 2½ per cent. in this efficiency could be attained, it would permit a doubling of the standard of living after a period of 28 years.

I.E.E. North-Western Centre.—The arrangements for the next three meetings have been revised as follows:—December 2nd: "Standardisation and Design of AC Turbo-Type Generators," by G. A. Juhlin. January meeting on 16th (instead of 20th). February 13th: "Thermoplastic Cables," by Dr. H. Barron, J. N. Dean and T. R. Scott, D.F.C.

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# **Hire and Maintenance**

### Discussions at E.D.A. Area Sales Conference

VISITING Chester recently, forty-three sales representatives from the E.D.A. North-West England and North Wales Area spent a full and interesting day. They were welcomed by Mr. S. E. BRITTON, engineer and manager of the Corporation Electricity Department, and in the morning attended a preview of the E.D.A. films "Too Easy" and "Cooking for the Million." The audience included the Mayor and members of the City Council, representatives of the hotel and catering industry and 300 students from Chester High School for Girls, where, incidentally, part of the latter film was "shot."

The afternoon was devoted to a discussion on "Post-War Terms and Conditions," and papers were submitted by Mr. N. H. BRIDGE (Lancashire Electric Power Co.) and Mr. F. BIRCH (Salford Electricity Department).

Mr. Bridge, dealing with the relative merits of hire and hire-purchase, explained that his conclusions did not necessarily represent

those of his company. He said it was clear that the bulk of postwar business would be from small-wage earners who, according to Government statements, would have to be mobile. For such people simple hire arrangements were singularly suitable. On the cost side, he considered it questionable whether 15s. a quarter, on 1939 figures, would cover



Mr. N. H. Bridge

the cooker, utensils, electric kettle, wiring, installation, transport, maintenance and establishment charges, including office work, part of salesman's and demonstrator's time, and part of showroom and publicity expenses. There was no doubt that the cost of operating such schemes must be reduced.

As a basis for discussion he suggested that those undertakings likely to have to face the needs envisaged should operate simple hire schemes for available cookers primarily for the small-wage earner and mobile worker. All undertakings should operate hire-purchase schemes (3-5 years) for models appealing to the higher-income classes, and also h.p. schemes for a cheaper model, if available, to meet the needs of stationary small-wage earners, with payments over a longer period, perhaps 6-8 years, with maintenance up to 10 years. Alternatively, maintenance facilities could be offered at a few shillings a quarter after the last h.p. payment. If necessary, in the transition period both hire and h.p. schemes must continue to be run at a substantial loss rather than withhold electric cooking from the masses.

Manufacturers should be pressed for the early introduction of interchangeable parts and a low-priced cooker.

If the transition period necessitated simple hire for cookers, the same was true of water heaters and wash boilers, and he would like the case of washing machines investigated in spite of the cost of maintenance. Refrigerators should be sold on 3-5 years' hirepurchase.

In the discussion several speakers stressed that undertakings should not sell 1938-39 models which would quickly become obsolete.

### **Improved Service Advocated**

Mr. Birch dealt with the maintenance and reconditioning of appliances and installations. He considered that it should be the aim of every supply authority to improve upon its pre-war standard of service by dealing directly with complaints concerning every form of consuming device and electrical installation.

The introduction of a standard service record card was proposed, superseding the complaint sheet, and the author submitted a draft of such a card. This would enable expenses incurred on hired and h.p. consuming devices and wiring to be periodically reviewed and compared with those of other undertakings with a view to the adjustment of the quarterly charge where necessary. It would also provide for a periodical review of expenses which consumers had incurred through requesting the supply authority to rectify defects on their installations and consuming devices, and it would thus be possible to consider which of them could be placed on a quarterly charge basis. He hoped it would be possible for the Sales Committee to recommend to the Area Committee such a standard service record card which, if approved, all chief engineers in the Area could be asked to adopt.

If these proposals were adopted the Area Committee should be asked to appoint a Service Sub-Committee to call for a summary each year of the number of faults in each category, with expenses incurred, to be forwarded to chief engineers in each group working under fairly similar conditions.

There was general agreement that the scheme suggested by Mr. Birch, while perhaps not covering every contingency, offered a very good basis for discussion, and several members gave information regarding the systems adopted by their undertakings

Further discussion on the papers was adjourned to a subsequent meeting.

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ELECTRICAL REVIEW

# I.M.E.A. South-West Centre

### Annual Meeting at Bristol

BETWEEN forty and fifty members of the South-West England and South Wales Centre of the I.M.E.A. attended the Centre's annual meeting at Bristol on November 2nd and evinced a lively interest in the Association's affairs. The chairman of the Centre (MR. E. JONES, Cardiff) presided and the president of the I.M.E.A., MR. W. P. LILWALL, accompanied by the secretary, MR. J. W. SIMPSON, was present. The Committee had been asked to consider

The president then addressed the meeting at some length upon the subject of reorganisation of electricity supply and surveyed the steps which led to the preparation of the "Brown Memorandum" by the Association and the "White Memorandum" by the Joint Committee of Electricity Supply Organisations. The Association held that everybody should have electricity (the first essential for the amenities of life) at a price which they could afford to pay. Rural



From left to right : Alderman W. J. Lewis (Portsmouth), Mr. W. P. Lilwall (president), Mr. E. Jones (Centre chairman), Mr. T. R. Evans (Centre secretary) and Mr. J. W. Simpson (secretary, I.M.E.A.)

the raising of undertakings' subscriptions to the Electrical Research Association but it decided that the matter was one which should be dealt with by the I.M.E.A. Council and the members agreed. During the discussion on the subject the opinion was expressed that before subscriptions were increased those members who were not contributing on the full scale should do so. Some members also considered that E.R.A.

should provide evidence of the benefits accruing to undertakings from its work and with this the president agreed.

Mr. Lilwall was pressed by COUN-CILLOR JOHN and other South Wales members for an account of the proceedings at the meeting between electricity supply organisations and the Minister of Fuel and Power but he replied that it would obviously be wrong to make public a discussion which was on a confidential basis. Asked if he would assure the members that any proposals for reorganisation would first be submitted

to the members, Mr. Lilwall said that it was very difficult to give such an undertaking. He had no idea when any proposals would be made. MR. R. W. STEEL (Cheltenham) mentioned, to the amusement of the meeting, that he and others had received a circular from a printing concern advising them to order at once, in advance, copies of a new Electricity Bill. development was a question of capital and in this direction there would have to be assistance. The control of public services by public authorities was considered to be the ideal method and the essence of democracy.

Mr. Lilwall contended that in becoming parties to the White Memorandum most of the companies had practically accepted the I.M.E.A.'s 1939 proposals. They had agreed that profits and prices should be



Group including Mr. Midgley (Plymouth), Mr. L. V. Turner (Taunton), Mr. R. W. Steel (Cheitenham) and Mr. A. J. Newman (Bristol)

linked and the municipal authorities had agreed that the question of rate relief from electricity department funds should be dealt with. Some members did not like the proposal in the memorandum that the exercise of purchase rights should be suspended until the suggested area committees had been set up, but the Government's White Paper on the McGowan Report had proposed their

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claim by the chair-

man (Mr. Jones)

that consumers of

the larger author-

ities were entitled

to the protection afforded by Clause

13, Mr. Lilwall said that the in-

crease in charges to

them would not be

more than 5 or 10

per cent. But MR. A. J. NEWMAN

(Bristol)pointed out

that in his case, if

abolition altogether. He took it as a tribute to the soundness of the memorandum that

undertakings had put forward similar proposals.

As the engineer of one of the smaller undertakings, Mr. Lilwall refuted the idea that size and efficiency were synonymous and quoted figures from his own undertaking aimed at proving that little would be gained amalgamafrom tion. He said that before any author-

since it was prepared both the gas and water

charges and provide for them in its tariff. By this means the Board would secure the advantages of diversity now enjoyed by the large undertakings.



**Delegates from South Wales** 

ity gave its undertaking away it should be sure that it would be in as good a position afterwards. An over-riding authority was necessary but the Association considered that there should be local-not Whitehall-control.

there were a 10 per cent. increase in charges, his consumers would have to find a further £80,000 a year. Mr. Newman also objected to any differentiation of acquisition terms as between company and municipal undertakings.



Another section of the meeting

With regard to Section 13 of the 1926 Act, the president maintained that the position was becoming more unreal every year. He was of the opinion that a properly graded national tariff would cure all the evils and considered that the Central Electricity Board should bear all transmission Responding to a vote of thanks proposed by ALDERMAN W. J. LEWIS (Portsmouth), Mr. Lilwall expressed his appreciation of the frank exchange of views which had taken place and complimented the secretary of the Centre, MR. T. R. EVANS (Rhondda), on the arrangements for the meeting.

### **Packing Military Supplies**

THE day when armies could "live on the country" is past and the supplying of the necessities of an army in the field is probably the greatest problem of modern warfare. When of supply and in extremely difficult terrain the problem is magnified to alarming proportions. It is stated that of six packages destined for our men fighting in the jungles of South East Asia often only one arrives. The others have been lost from various causes-distance, climate, terrain, jungle pests and environment (a case

may be too heavy to move). From this it is clear that proper packing is imperative and this forms the subject of an exhibition arranged at the Central Ordnance

Depot, Feltham, Middlesex, by the Anglo-American Packaging Committee. It is strongly recommended that those responsible for the packing of supplies for the Forces pay a visit to this exhibition where they may see what happens to goods which are inadequately packed. To assist them further to appreciate the

importance of the subject there are available an illustrated brochure depicting proper and illustrated brochure depicting proper and improper methods and a collection of specifications for the treatment of various classes of supplies. Applications for visits to the exhibi-tion should be made to the Commandant (Anglo-American Service Exhibition), Central Ordnance Depot, Feltham, Middlesex (Feltham 2821, Extensions 13 or 200). 644

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# PARLIAMENTARY NEWS

By our Special Reporter

### Domestic Fuel Efficiency

N the House of Commons on October of Sist Mr. Linstead asked the Minister of Fuel and Power whether he could arrange for practical demonstrations throughout the country as to how the efficient use of coal could be ensured in connection with domestic lighting, heating and power both now and in connection with post-war reconstruction.

Major Lloyd George replied that during the war, exhibitions on domestic fuel economy had been held and he detailed some of them. He said that demonstrations on both wartime and post-war aspects of domestic fuel efficiency would be continued, but in present conditions these were limited by the shortage of manpower and of appliances.

#### **Rural Electricity**

Colonel Ropner asked the Minister of Fuel and Power what steps were being. taken by his department to popularise and extend the use of electricity in agricultural districts generally.

Major Lloyd George said that during the war it had been necessary owing to shortage of labour and materials to restrict the development of electricity supplies to cases of hardship and the requirements of the war effort which had, of course, included those of agriculture.

### Exports After the War

On November 2nd Mr. Hogg asked the Secretary to the Department of Overseas Trade what steps he had taken and what consultations he had held with a view to promoting British electrical exports after the war.

Mr. Harcourt Johnstone said that his Department maintained constant touch with the British Electrical and Allied Manufacturers' Association as well as with a number of leading individual manufacturers for export. Contacts with the industry made it clear that the electrical industry was planning all possible efforts to resume and expand its export trade as soon as war conditions permitted.

Mr. Hogg.—" Is my right honourable friend aware that the British electrical industry is one which was able to compete in the world market immediately before the war: and will he therefore pay particular attention to the development of this industry in the export world after the war?"

Mr. Johnstone.—"Yes. I have stated in this House that the hopes of the Board of Trade and my Department rest very largely on the development of the electrical industry, which is one of the most promising we have in the country. We are taking all steps to maintain the closest possible contact with them."

Mr. De la Bere.—" Why not electrify the Board of Trade?"

#### **Improving Generating Efficiency**

Sir Robert Gower asked the Minister of Fuel and Power, what were the present arrangements for and expenditure on research into the efficiency of electrical generation in the United Kingdom; and whether he would take steps to erect a power station which, in addition to supplying electricity, could be devoted mainly to research into problems of electrical generation.

Mr. Tom Smith, who replied, said that research directed to the improvement of thermal efficiency of electrical generation was being carried on continuously both by the electricity supply industry and the manufacturers of generating plant in consultation with the Central Electricity Board. He regretted that he could not estimate the expenditure incurred on this research because it was carried out by many persons in numerous directions. As regarded the last part of the question, he was afraid that in present wartime conditions such a project was impracticable.

### Aids for the Deaf

Sir Ian Fraser asked the Lord President of the Council whether the War Research Council was undertaking inquiries as to deaf-aids with a view to obtaining the best for deafened ex-Service men.

Mr. Attlee said that the Medical Research Council had recently appointed a special committee to advise and assist them in promoting research into electro-acoustical problems relating to the design and application of instruments used in the investigation and alleviation of deafness. The primary object of the programme of work which had been initiated under the auspices of that committee was the design of forms of hearing aid which would give the best possible performance and at the same time be capable of production at a reasonable cost.

#### **District** Heating

Major Lloyd George in a written reply to Capt. Plugge says that he understands that several local authorities are considering schemes for district heating in connection with their post-war reconstruction programmes. His Department will be glad to discuss such schemes with local authorities when they are ready to put forward detailed proposals.

# **Domestic Wiring Accessories**

### Critical Review of Present Practice

THE design and installation of wiring accessories for household circuits are reviewed by MR. F. C. FUKE (British Mechanical Productions, Ltd.) in a paper prepared for the Installations Section of the Institution of Electrical Engineers.

Requirements that must be fulfilled are summarised, with indications of how the designer may satisfy them. Contacts and switching are dealt with at some length because of their effects on the performance and life of most accessories. The fundamentals of fuse design and operation are outlined.

Some parts of the paper may seem to be elementary, but the author declares that many of the wiring accessories installed and marketed reveal a lack of rudimentary engineering knowledge on the part of those responsible for their design and production as well as installation. His plea for a breakaway from some time-honoured practices, with particular reference to tumbler switches and plug-socket outlets, is based on both theoretical and practical aspects. For instance, consideration of fuse protection against short-circuiting indicates that current-carrying parts should be capable of momentarily withstanding 500 A. Also, the use of countersunk fixing screws should be discontinued as they impose a bursting stress round the hole, a common cause of cracked porcelain.

### **Possibility of Improved Switches**

Switches have made little technical advance for some years although the standardisation of AC at 230 V for domestic installations has provided designers with the opportunity of dispensing with long breaks and the complications they cause. Not all the designers of the few AC switches that appeared on the market just before the war seem to have fully appreciated the theory, which the present author outlines and goes on to explain, that the utilisation of micro-breaks permits complete departure from old tumbler switch practice. It should materially reduce manufacturing cost and, apart from electrical advantages, would also eliminate much of the inertia of the moving parts; hence there would be less wear and tear.

A design of tumbler switch (patent applied for) based on these lines enables the length of break to be easily and accurately adjusted during production with the aid of a simple gauge when the fixed contacts are being assembled. An important feature is that, when once fixed in the factory, the length of break remains unaltered in service in spite of wear and tear of the operating mechanism. The switch is neat in appearance and free from all projections, having large butt-type contacts and an automatic wiping action combined with unusually high contact pressure, which will withstand the straightthrough short-circuit currents likely to occur in domestic circuits.

The range of available types and combinations of switches is considered to be too wide; the author tabulates a reduced range which he believes will satisfy the needs of the ordinary market without loss of technical performance, indicating the reasons why some types and arrangements should be superseded.

The elimination from domestic service of metal lampholders is demanded but conformity with BS.52 is considered to restrict designers to dimensions which, while satisfactory for metal parts, is not suitable for plastic moulded parts.

### Shortcomings of Plugs and Sockets

The increased loading of household appliances has revealed the shortcomings of plug-socket outlets. BS.546 and 372 have caused production difficulties that have not helped to reduce manufacturing costs. All the troubles they were supposed to overcome (but did not) would have vanished if, instead of trying to maintain a construction which was wrong in principle, purely mechanical aspects were studied. If each of the prongs of a round pin is regarded as a loaded cantilever beam, then no great skill is required to determine by calculation the correct section of metal and appropriate size. Switched-socket outlets installed near the floor invite foot operation; the author consequently illustrates a moulded pattern specially designed for foot actuation by depressing a single button-plunger.

The final remarks on fuse design show the author to be strongly in favour of the cartridge type throughout domestic installations. But he realises that it will not be possible until replacement cartridges can be purchased for Id. or 2d. each up to 10 A rating. BS.88 is regarded as a specialists' document, resulting in too high a standard for general domestic purposes.

The object of the paper is to raise the standard of the accessories section of the industry to its proper level, but it declares that progress will be delayed so long as contractors persist in considering only the first cost and ignoring the cost of installation and maintenance. The author strongly supports and recommends British Standard Specifications, but feels that they should be confined to performance, with interchangeability when required, omitting constructional and dimensional details so as to permit freedom for development. 94

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## PERSONAL and SOCIAL

### News of Men and Women of the Industry

THE Ministries of Production and Supply announce that, following his appointment as head of the Economic Division of the British element of the Control Commission for Germany. Sir Percy Mills has relinquished the position of Controller-General of Machine Tools, in which capacity he was jointly responsible to the Ministers. He is being succeeded by Mr. S. F. Steward, Director of Industrial Electrical Equipment, Ministry of Supply. As head of the Production Division of the Ministry of Production, Sir Percy is succeeded by Mr. H. S. Barn.

Mr. C. T. Westlake is retiring from the position of borough electrical engineer of Chepping Wycombe (High Wycombe) and is going to live at Eastbourne. At a dinner arranged by the staff of the undertaking last week he was presented with an inscribed silver cigarette box and tributes were paid to his work for the borough by Alderman W. S. Toms. chairman of the Electricity Committee, Mr. A. C. Brake, deputy engineer, and members of the staff. Mr. Westlake has been at Wycombe since 1922. He remained with the undertaking when it was acounted by the Comparison in 1938 from

Mr. Westlake has been at Wycombe since 1922. He remained with the undertaking when it was acquired by the Corporation in 1938 from the Wycombe (Borough) Electric Light & Power Co. He was born at Swindon in 1878 and after education at the Merchant Venturers' Technical College, Bristol, became successively junior assistant engineer and chief assistant at the Guernsey electricity works. In 1919 he was appointed engineer and manager of the Newbury electricity undertaking, leaving there in 1922 to take un his Wycombe position.

electricity undertaking, leaving there in 1922 to take up his Wycombe position. Mr. Henry Robson, B.Sc., at present borough electrical engineer of Brentford and Chiswick, is recommended as Mr. Westlake's successor by the Electricity Committee.

Mr. G. L. Bailey has been appointed director of the British Non-Ferrous Metals Research Association in succession to Dr. H. Moore, who has retired.

Sir Holberry Mensforth is relinquishing some of his business responsibilities and has retired from the boards of Thos. Firth & John Brown, Ltd., Dalton Main Collieries, and Markham & Co. Sir Holberry is a vice-president of B.E.A.M.A.

Mr. B. St. John Sadler, who recently retired from the post of commercial manager with Marconi's Wireless Telegraph Co., Ltd., has been appointed managing director of Rediffusion Ltd.

Mr. H. Orgel has resigned his directorship of Superlamp. Ltd. His present address is 35, Allerton Road, N.16 (telephone: Stamford Hill 1823).

Mr. W. J. Thompson, of Cardiff. has been appointed works superintendent of Newcastleon-Type Corporation transport and electricity undertaking in succession to Mr. Cox, who has been promoted rolling stock engineer.

The Glacier Metal Co., Ltd., informs us that Mr. Colim A. Samuels has been appointed commercial division manager in charge of home and export sales. Mr. Phillip T. Holligan, B.Sc., D.F.C. is to act as technical adviser to the commercial division. Mr. T. Rumble, assistant service manager, has been appointed regional manager for the Western Area and Messrs. W. H. Clarke and E. Francis Gale have been appointed technical representatives.

Mr. H. H. Mullens, B.Sc., M.I.E.E., has been appointed assistant general manager to the North-Eastern Electric Supply Co., Ltd. He will remain at the Middlesbrough office of the company.

Mr. F. Fisher has been appointed chief transformer designer at the Witton Works of the General Electric Co., Ltd., in succession to the late Mr. E. P. Roper, whose death was recently announced. Mr. Fisher has been with the company for twenty years, and as deputy to Mr. Roper was associated with the design of large transformers for the grid, while he has devoted considerable attention to the development of rectifier transformers.

Mr. Henry G. Gale, chief chemist at Henley's Rubber Cable Works, retired on September 30th at the age of 65 years having completed more than forty-two years' continuous service as a chemist. A presentation of Savings Certificates subscribed for by his numerous friends and colleagues was made on their behalf by the works manager, Mr. A. W. McArthur.

Lient.-Col. O. H. C. Balfour has been appointed a director of the Electrical Finance & Securities Co., Ltd., in place of Sir James Devonshire, who has resigned.

In his presidential address to the North of England Institute of Mining and Mechanical Engineers at Newcastle-on-Tyne Major R. W. Anderson spoke of the need for research in the coal industry. He referred to recent advances in the use of gas turbines and jet propulsion, and said the possibility of generating electricity in underground power stations, using powdered coal, should not be overlooked.

At the annual meeting of Erinoid, Ltd., it was stated that Mr. A. Sadler had resigned his position as general manager to take up farming, and he had also recently resigned his directorship. He had been succeeded as general manager by Mr. J. Harvey, who would shortly be joining the board. Mr. P. C. Chaumeton, who was already associated with the company as a consultant and had extensive experience in the development of thermoplastics, had also accepted a seat on the board.

Mr. J. S. Graham. A.M.I.E.E., who has just retired from the position of electrical engineer with the Great Northern Railway (Ireland), was presented with an address and a wallet of notes from the electrical, locomotive and other departments at a luncheon given in his honour. Mr. Graham has been with the G.N.R. for

Mr. Graham has been with the G.N.R. for thirty-two years, during which he has been responsible for the preparation of estimates and plans for numerous electrical schemes, workshop extensions, and a new works to deal with the combined locomotives, carriages and wagons of a group of railways, the supervision of developments and maintenance of all the company's electrical installations in stations, hotels, Hill of Howth Tramway, rail and road vehicles, and latterly also of the electrical and hydraulic installations of the L.M. & S.R. at Dublin and Greenore.

Mr. V. W. Dale has been somewhat overwhelmed by the congratulations of his many friends in the industry upon his appointment as general manager and secretary of E.D.A. He thanks them all collectively and hopes to be able to do this individually at an early date.

Mr. T. Scott delivered his presidential address at the opening meeting of the new session of Paisley Association of Electrical Engineers, his subject being "Modern Factory Installations."

Mr. J. D. Green, M.I.E.E., chairman and joint managing director of Green & Smith, Ltd., Leeds, has been elected a vice-president of the Electrical Contractors' Association. The other vice-presidents are Messrs. E. A. Reynolds and J. Walsh.

**Councillor W. A. Boulting,** a member of the Electrical Contractors' Association, has been chosen as the next mayor of Warrington.

Mr. E. Grime, chief engineer to the Thurrock Urban District Council electricity undertaking since 1919, is to retire at the end of the year. A native of Wigan, Mr. Grime was apprenticed to a Midland electrical firm and has held positions at Paisley, Ealing, Southwark, Hackney and Barking.

Sir Edward Wilshaw, chairman of Cable & Wireless, Ltd., with senior officials of the company, last week commenced a tour of the Mediterranean theatre of war with a view to the further development of communications with the Far East and the Empire network of civil communications.

Appointments Vacant.—The British Internal Combustion Engine Research Association is advertising for a director for its Slough laboratory, at a salary of £1,500 to £2,000 per annum. Applications must be made by December 31st. Among vacancies advertised in this issue are the following:—Radiological engineer, Liverpool (£650, plus bonus); assistant combustion engineer, Cardiff (£459); assistant distribution engineer, Luton (£506); and engineers for the Nigerian Posts and Telegraphs Department (£475-£840, plus allowances.)

### Obituary

Mr. H. O. Clark.—We regret to record the death on November 1st, at his home at Earl's Colne, of Mr. H. O. Clark, for many years chief mechanical engineer to Laurence, Scott & Electromotors, Ltd., who retired only a few months ago on account of ill-health, at the age of sixty-seven. A brief account of his career was given, at the time of his retirement, in our issue of April 7th last.

Mr. A. R. Hoare.—We learn with regret of the death on November 3rd of Mr. Arthur Richard Hoare, chairman of the Isle of Thanet Electric Supply Co., Ltd., and the Kalgoorlie Electric Lighting & Power Corporation, Ltd., and a director of other companies. Mr. Hoare was born at Croydon in 1876 and was educated at Uppingham and the Crystal Palace School of Engineering. He served articles with the borough engineer and surveyor and waterworks engineer, Dover, and subsequently held an appointment

as assistant engineer with the British Electric Traction Co., under its chief engineer, the late Mr. Stephen Sellon, with whom he was engaged in the promotion, construction and equipment of tramway systems in many parts of the country. Subsequently he was associated with Mr. Sellon in his consulting practice.

Mr. Sellon in his consulting practice. During the last war Mr. Hoare served in France with the Queen's Westminster Rifles and the Royal Engineers. Upon Mr. Sellon's death he returned to carry on private practice as senior member of the firm and had since been engaged in advising local authorities and companies, mainly in connection with transport and electricity undertakings.

Mr. Hoare was a member of the three principal engineering institutions and of other bodies and took part in the work of the B.S.I.

Major John Martin, who has died at the age of seventy, carried on business at Dover as an electrical contractor. He had been a member of the Town Council since 1929, having become associated with municipal affairs at the time when terms were being negotiated for the change-over of the electricity undertaking from local generation to bulk supply from the grid. An ex-regular soldier, he was able to give valuable advice in matters concerned with Civil Defence, and the observation post system adopted for watching for cross-Channel shelling originated with him.

Mr. H. Morgan.—We regret to announce the death on November 3rd of Mr. Henry Morgan, F.S.A.A., who was chairman of the Plessey Co., Ltd., and of Siemens-Schuckert (Gt. Britain), Ltd., and had at various times been chairman or director of many other companies well known in the electrical industry. He was a past-president of the Incorporated Society of Accountants and Auditors, past president of the Association of British Chambers of Commerce and past chairman of the London Chamber of Commerce.

Mr. Robert Merry.—The death has occurred in Toronto, after a long illness, of Mr. Robert Merry, a director of the Barcelona Traction Light & Power Co., Ltd., Mexican Electric Light Co., Ltd., Mexican Light & Power Co., Ltd., Mexico Electric Tramways, Ltd., and vicepresident of Mexico Tramways Co., Ltd.

Mr. F. Walker.—The death occurred at his home at Sale, Cheshire, on October 31st, of Mr. Frank Walker, M.I.E.E.

Mr. Albert Truswell, of Sheffield House, Newcastle-under-Lyme, has died at the age of eightytwo. He was the senior partner in the firm of William Truswell & Son, electrical engineers.

### I.E.E. Installations Section

A N additional meeting of the Installations Section of the Institution of Electrical Engineers will be held on Thursday, November 30th, at 5.30 p.m., when Mr. W. N. C. Clinch will open a discussion on (a) the installation part of the report on "Electricity Supply, Distribution and Installation" prepared by Sub-Committee No. 3 of the Post-War Planning Committee of the Institution and (b) the report of the Electrical Installations Committee convened by the Institution on behalf of the Ministry of Works (Post-War Building Studies No. 11). 1

November 10, 1944

## CORRESPONDENCE

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

### **Electric Heaters**

TTH reference to Mr. R. D. Reynolds' article upon electric heaters in the Electrical Review of October 27th, I should like to support the claims for the advantage under many conditions of portable electric heaters. I have had to deal largely with electric heating requirements during the prolonged war period of fuel shortage and in many cases have been able to curtail what would otherwise have been much heavier demands, by arranging for the use of portable electric heaters on the lines indicated by Mr. Reynolds in his interesting article.

I should also observe that my own experience in an office of well over 3,000 cu. ft. capacity, and without the use of any other type of heating, has been very similar to that described by Mr. Reynolds with a portable 600-W radiator. In my case I have checked by means of a thermometer which I have upon my desk.

Chatham.

H. MARTIN, M.I.E.E.

### **Portable Tools**

R. BENNETT'S article advocating low operating voltages for portable tools is excellent but for one point; few users will agree that a switch in the handle of a drill is not necessary. Surely it is almost essential for the majority of jobs. One hand is generally used for steadying the body of the drill, the other grasping the handle or grip, and hence, not being blessed with three hands, there will be no means of switching on with Mr. Bennett's arrangement.

No, let us keep one switch in the handle, and if in some cases it does not stand up to the job, let us design and produce one that will.

Broxbourne, Herts. T. L. FRANKLIN.

WAS interested in Mr. R. S. Bennett's short article on the protection of portable tools, but wonder why he confined his comments to portable tools alone. In the post-war electrical world we hope for a large increase in portable equipment of all kinds, especially in the home, where a large proportion will be installed in kitchens and laundries. The conditions will be equally vulnerable as those found in factories, and in addition the users will be unskilled in the handling of portable electrical equipment. Mr. Bennett's arguments should therefore apply with greater force to domestic installations, but it immediately becomes obvious that his palliatives cannot be applied.

Why should it be necessary to suggest special patented protective systems, when the I.E.E. Regulations contain all necessary provisions for securing safety ? If, however, Mr. Bennett distrusts these, now is the time to examine the whole question of leakage protection for portable equipment, and not concentrate upon one type alone. In my view, the ordinary earth-leakage circuitbreaker will do all that some much-publicised patent systems will do, and at lower cost.

Mundford, Norfolk. T. C. GILBERT.

### **Electric Vehicle Fuel Consumption**

N the October 15th issue of a motor paper I note a resume of a report by "I.A.E." on "Home Made Fuels," where it is suggested that whilst 50 lb. of petrol will, in an internal combustion vehicle, move 5 tons 50 miles, a considerably greater quantity of coal would be needed for this duty were the vehicle electrically operated.

I agree that a greater weight of fuel would be required and in conjunction with my electricity suppliers have worked out the quantity of coal to be just over one hundredweight if few stops are allowed for, which apparently has been the case with regard to the 50 lb. of petrol. I do not think 112 lb. of coal costs our country as much as 50 lb. of petrol; but I do know that the rate of increase of consumption of fuel as the number of stops grows (until, say, stops are as numerous as town delivery work calls for) places the electric in a very favourable position. This position is doubly secured by the fact that repairs to internal combustion vehicles go up in an even greater crescendo than fuel consumption as stops increase. Ormskirk. H. N. OUTRAM

(Victor Electrics, Ltd.)

### Freedom of Choice

ALTHOUGH dated January, 1944, the Report on Solid Fuel Installations has apparently only been recently released, possibly to avoid criticism before its conclusions were embodied in the "Housing Manual, 1944," to which I referred in a recent communication. The report is, as could be imagined, out-and-out advocacy of solid fuel for all cooking, space and water heating. Electricity and gas are only slightingly referred to as raising serious peak-load questions.

To my mind, the report appears to indicate an underlying fear that, with a continued expansion in the use of electricity and gas, the sale of coal will fall, so this must be stopped. The report admits that the type of solid fuel apparatus for the immediate post-war years would consume only slightly less than the pre-

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war equipment. No attempt is made to show that the displacement of coal by electricity or gas would increase the national consumption of coal. The principal change envisaged is continuous instead of intermittent burning.

Again we have the statement that it is highly desirable that the domestic householder should be given freedom of choice between solid fuel, gas and electricity, but this is promptly qualified by a note that certain national considerations may tend to restrict this freedom of choice. These national considerations are—

(1) The need for low-cost housing, which I have persistently pressed; (2) Smoke abatement: the report only indicates some improvement as regards solid fuel, but admits that it can be achieved by greatly extended use of electricity or gas; (3) The question of peak load, one that we can adequately look after.

The report is studded with such phrases as "experimental evidence," "long-term programme," "economies to be expected," "new types to be produced," "substantial measure of improvement;" all are hopes for the future, complacently ignoring that electricity and gas will not stand still. I must not omit the tit-bit of the report that the use of electric pokers (for igniting the coal) appears to have possibilities.

The report admits that the new appliances will be more costly, and to obtain the desired results the manufacturer, architect and builder will all have to co-operate, and there should be a properly organised service for instructing the housewife in the use of solid fuel appliances. Proper storage for coal and ashes has to be provided; coal of certain sizes and qualities is necessary for the various appliances. The damage from atmospheric pollution with improved appliances is estimated to still cost 3s. 6d. per ton of coal used per annum. The running costs of improved appliances given range from £4 7s. 7d. to £19 16s. 0d. per annum. No wonder that the coal interests wish to keep the business to themselves on these figures.

Let me try to sum up how the unfortunate householder of the future will be placed when the planners have finished with him. The Gas Installation report recommends that a normal dwelling house should be provided with a complete installation of gas pipes and points, with flues and ventilators for the removal of odours. The Electrical Installations report recommends the provision for electric lighting, cooking, water heating, refrigeration and laundering, with socket-outlets in every room. The Solid Fuel Installations report recommends the adoption of continuous burning appliances for cooking, water and space heating, and other matters which I have briefly referred to above. The Design of Dwellings report sets out all the desirable features which should be incorporated in the proposed new houses. The lastnamed report is therefore compelled to emphasise that the Government's programme of three to four million houses will never be completed unless building costs (which includes the formidable programme of freedom of choice) bears a reasonable relationship to the general cost of living.

London, W.C.2. F. W. PURSE.

Y letter on this subject published in your issue of October 13th has called forth quite a number of replies, the major portion of which seem chiefly concerned with my remarks regarding electric cookers. I would like to point out that the subject was "freedom of choice" and my own outspoken views on cookers, the desirability of one coal fire, etc., were given to emphasise that in my opinion not everyone wanted "all-electric." In this way I wished to draw attention to proposals advanced in previous articles and letters in the *Electrical Review* advocating the exclusion of all other forms of heat in future homes.

I would like to assure all readers that my remarks were in no way directed against the Guildford electricity undertaking whose good name is well known.

Wonersh, Surrey. D. MURPHY.

### Power Cable Design

THE design and manufacture of impregnated paper-insulated power cables are the subject of an address by Mr. C. C. BARNES as chairman of the I.E.E. London Students' Section.

Following an historical introduction, belted versus H-type cables are discussed and basic design requirements are outlined with the aid of dielectric stress formulæ. While 5,000 V per mile has been suggested as the maximum stress for "solid" type paper-insulated cable, no definite figure can be stated. The magnitude of dielectric stresses in three-core cable cannot be determined by formulæ, making it necessary to resort to experimental data (Emanueli, Atkinson, etc.) although such data are applicable only to round conductor cable. No comprehensive evidence regarding the maximum has ever been published.

Insulating papers, impregnating oils and compounds are commented on and manufacturing operations are described in detail.

### **Boiler Blow-down**

WHILE the importance of a periodic blowing down of boilers to remove sediment and lessen scale is generally recognised, less is known about the safe limits of concentration of salts in relation to priming. Guidance on this subject is given in Fuel Efficiency Bulletin No. 35, which also deals at length with the hydrometer as a most useful means of ascertaining the amount of dissolved solids in the water. Heat recovery from continuous blowdown is discussed and clear directions are given for calculating the amount of blow-down required and on the best time for it to be done. The Bulletin is obtainable, free of charge, from de.

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### Forthcoming Events

Friday, November 10th.—London.—39, Vic-toria Street, S.W.1, 6.30 p.m. Junior Institution of Engineers. Informal meeting. "Electric Traction in Great Britain," by H. K. Hewett. Birmingham.—Market Hotel, Station Street, 6.30 p.m. I.E.E. South Midland Students' Section. Informal dance.

Manchester.—Engineers' Club, 6 p.m. I.E.E. North-Western Centre Radio Group. "Develop-ment of Polythene as a High-frequency Di-electric," by Prof. Willis Jackson and J. A. S. Forsyth.

Manchester.—Engineers' Club, 6.30 p.m. Manchester Association of Engineers. "Sur-face Finish Measurement," by C. Timms. Newcastle-on-Tyne.—Neville Hall, 6.30 p.m. I.E.E. North-Eastern Students' Section, "Direct-Current Machine Design," by L. B. Knowles.

Bath.—Royal Baths Lounge, 7.15 p.m. I.E.E. Bristol Students' Section. "Telephone Engineering; the Development of Apparatus and Circuits," by E. Lerpiniere.

Saturday, November 11th.—London.—Magnet House, W.C.2, 2.15 p.m. Institution of Engineers-in-Charge and Association of Super-

Figure 1: Some Applications of Super-vising Electrical Engineers. "Some Applications of Electronics," by F. E. Henderson. *Leeds.*—Griffin Hotel, Boar Lane, 2.30 p.m. I.E.E. North Midland Students' Section. "High-frequency Induction Furnace," by J. H. H. Teece.

Monday, November 13th.—Manchester.— Engineers' Club, 6.30 p.m. I.E.E. North-Western Students' Section. "Recent American Hydro-electric Schemes with special reference to the Boulder Dam" (illustrated by films and

to the Boulder Dam" (Inustrated by hims and Sides), by W. A. Hatch. *Cardiff.*—At South Wales Institute of En-gineers, 5 p.m. I.E.E. Western Centre. "Elec-trostatic Precipitation of Dust from Boiler-Plant Flue Gases," by J. Bruce. *Newcastle-on-Tyne.*—Neville Hall, 6.15 p.m. I.E.E. North-Eastern Centre. "Organisation of Industrial Electrical Maintenance," by J. C. B.

Nicol.

Tuesday, November 14th.—London.—Lighting Service Bureau, 2, Savoy Hill, W.C.2, 5.30 p.m. Illuminating Engineering Society. "Bright Light Sources," by J. N. Aldington. London.—At Institution of Mechanical Engineers, 2 p.m. Chemical Engineering and Agriculture Groups, Institution of Chemical Engineers. Conference on "Grass Drying." Glasgow.—Royal Technical College, 6.15 p.m. I.E.E. Scottish Centre. "An Analysis of the Load on a Modern Electricity Supply System," by P. Schiller.

Wednesday, November 15th.—London.— Royal Society of Arts, John Adam Street, Adelphi, W.C.2, 1.45 p.m. "High-frequency Heating," by Dr. L. Hartshorn. 15th.-London.-

Thursday, November 16th.—London.—At In-stitution at Civil Engineers, 5 p.m. Last of four lectures on planning : "Services (Electricity, Water, Gas and Post Office)," by J. Paton Watson.

Friday, November 17th.—London.—Institu-tion of Electrical Engineers, 5.30 p.m. Measure-ments Section. "Planning the Future Electricity Meter," by G. E. Moore.

London.—Institution of Mechanical En-gineers, 5.30 p.m. Thomas Hawksley Lecture, "Research and Development in Aeronautics," by Dr. H. E. Wimperis.

Birmingham.—At Society of Arts Gallery, New Street, 6 p.m. Illuminating Engineering Society (Birmingham Centre). Papers on "Recent Development" by an illuminating engineer and an architect.

Saturday, November 18th.—Manchester.— Association of Supervising Electrical Engineers (Manchester Branch). "Modern Protective (Manchester Branch). "Mo Equipment," by M. Kaufmann.

Monday, November 20th.—London.—Institu-tion of Electrical Engineers, 5.30 p.m. Informal discussion on "The Effect of Welding on Electricity Supply," to be opened by Dr. H. G. Taylor Taylor.

Birmingham.—Birmingham Electric Club. "Electricity for Domestic Uses in the Post-War Era," by E. G. Batt.

Nottingham.-Corporation Gas Showrooms, 6 p.m. Notingham Society of Engineers, "Modern Applications of Mercury-Arc Rectifier Valves and Metal Plate Rectifiers," by J. C. Milne.

### **Ottawa River Power**

#### Ambitious Post-War Plan

THE Premier of Ontario has announced that negotiations are to be opened immediately with the Quebec Government for the development of six power sites on the Ottawa River, from Des Joachims on the Upper Ottawa River above Pembroke to the Carillon on the lower river below Hawkesbury, these will provide more than a million horse-power. Construction is to start as soon as demobilisation begins. This new fountain of electrical power, the Premier declared, would transform Eastern Ontario into what would become known as the "Golden Triangle," one of the greatest industrial sections of Canada. He anticipated no difficulty in reaching an understanding with the Quebec Government on a mutually satisfactory basis.

on a mutually satisfactory basis. The old Ottawa River power arrangements between Quebec and Ontario have been can-celled because they would have been detrimental to the industrial development of the Ottawa Valley by requiring the export of the power to industrial centres in the south—Windsor, Hamilton and Toronto. It is now considered preferable that industries should be developed

preferable that industries should be developed close to the source of the power. The Ontario Government is prepared to proceed immediately at the end of the war with the St. Lawrence River development, which it is believed will provide employment for more than 1,000,000 people for years to come. This and the Ottawa River scheme will give Eastern Ontario great attraction for new industry-power, raw materials and sea-soing transport. going transport.

going transport. The six Ottawa River sites to be developed as soon as labour becomes available through demobilisation are Des Joachims, Paquette Rapids, Cave and Fourneaux Rapids, Roche Fendue and the Carillon. The first four sites are on the Upper Ottawa River. The Cave and Fourneaux Rapids are in close proximity and would be developed as one project.

# **COMMERCE** and **INDUSTRY**

Boys' Expensive Escapade.

### Damage at Substation

Two boys, aged twelve and thirteen respecttively, were charged at Lytham St. Annes last week with causing malicious damage to electrical equipment. When the supply in part of the town failed, an investigation revealed that damage had been done to substation equipment by water, which evidently had been sprayed from a stirrup pump over the instruments and switchgear. Water covered the floor to a depth of four inches and was in contact with "live" cables. Tumbler switches had been broken and tripping lever switches put on open circuit. The cost of remedying the damage was £100. Mr. W. C. R. Lindley, deputy borough electrical engineer, said it was amazing that the boys were not killed. The boys were sent to a remand home for fourteen days.

### Electricity in the Home

Mr. W. E. Swale, sales manager and engineer, Manchester Corporation Electricity Department, in a talk on "Electric Kitchen Planning" to Manchester and Salford branch of E.A.W. on

October 31st, said that much as he would like to advocate the "all-electric" house as the ultimate ideal, facts had to be faced both in regard to cost and popular desire. His own view was that low cost post-war homes would have at least one coal-fired grate, probably in the living room. This fireplace could be fitted with a fire-back boiler for connection to an approved type of electric water heater, so that electricity was needed only for "boosting" or in warm weather when the living room fire was not in use.

room fire was not in use. Special B It was hoped that standardisation of appliances would result in an appreciable reduction in first cost and maintenance charges. Mr. Swale said that it was hoped that early next year a regular Kitchen Planning Service would be established by which domestic science experts could place the experience of the industry at the disposal of the housewife.

### **Ceylon's Import Duties**

The Board af Trade Journal reports that by an Order made by the Government of Ceylon under the Revenue Protection Ordinance new import duties are imposed on a number of classes of goods including refrigerators; selfcontained air-conditioning machines comprising elements for cooling and controlling humidity, cleaning and circulating air; and wireless goods and apparatus, on all of which the new preferential rate is 25 per cent. and the general rate 30 per cent. ad valorem.

The same Order provides for a general increase of 10 per cent. in the duty on all goods

### The Domestic Fireplace.

with the exception of certain classes which include the three classes mentioned above and addition electric motors, transformers and convertors; electric lighting accessories; washing machines; and other electrical goods and apparatus (except batteries and accumulators, wires and cables, lamp bulbs, and telegraph and telephone apparatus, other than wireless).

### List of E.W.F. Members

The Electrical Wholesalers' Federation has published a revised "List of Members." This is divided into two sections, one alphabetical and the other geographical. The wartime address of the Federation is 5, Vicarage Road, Henley-on-Thames.

### **Electric Vehicle Bodywork**

The possibilities of an attractive and modern design in the bodywork of electric vehicles are clearly shown in a special model built on a standard 8-cwt. Wilson electric commercial van chassis. This has been converted to accommodate the Wilson fluid four-speed controller, giving four forward and reverse



Special body fitted to a standard Wilson 8-cwt. van

speeds, automatically controlled by the Wilson master controller. The motor used is a "W.T.6" ventilated traction type, and the batteries consist of thirty-six Exide "T.J.L.9" cells having a capacity of 191 Ah, and giving a range of 60 miles per charge.

The conversion has been carried out by Hindle, Smart & Co., Ltd. (main service agents in Manchester and the North-West area for Partridge, Wilson & Co., Ltd., makers of the vehicle who are using the vehicle as a service van for the transport of service and replacement parts, and also for the transport of personnel in their area. The body is built of panel beaten metal and the forward driving position gives excellent road vision, especially in bad weather. On each side, immediately to the rear of the fully upholstered, full-width driving and passenger seats, is fitted a hinged door giving access to the forward end of the body to enable the easy loading of small component parts, tool kits, etc. A drop-down panel is fitted at the rear for the loading of larger components and long loads. The fitting 51

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of front doors and the rear panel has the additional advantage of obviating the un-necessary disturbance of loads when several jobs are to be covered on one journey. No effort has been made to attain excessive speed, as this is considered unnecessary in the comparatively congested area in which the vehicle is being operated. The balancing road speed with the gear ratio now fitted is 25/30 MPH. but experiments with alternative ratios are being made.

### **A Plywood House**

Layers of plywood bonded to an insulating core with synthetic resin form the material used to construct a new type of prefabricated house, the "Weybridge House," which Jicwood, Ltd., propose to manufacture as an alternative to the Portal house. Covering an area of the constructed in aight constructed 600 sq. ft., it is constructed in eight sections in the factory and takes only a day to erect. Its anticipated life is twenty-five years. The building is designed for either electricity, gas or solid fuel. In the prototype, besides heating and cooking apparatus and power points, an opportunity is given for comparing a postwar type of refrigerator with the new Frigidaire " larder conditioner."

### **Insecure Manhole Cover**

More than three-and-a-half years ago, on March 3rd, 1941, Mr. V. E. Tucker, of Liskeard, was riding his motor-cycle along the main road when his machine passed over a manhole; the cover wobbled, and he was thrown into the hedge, sustaining injuries. At Cornwall Assizes at Bodmin last week he brought an action for damages against Pirelli-General Cable Works, Ltd., of Southampton, He alleged that while the defendants were engaged in working for the General Post Office the man-hole cover had been replaced negligently. The defence was a denial of negligence and an allegation of negligence on plaintiff's part. Mr. Justice Macnaghten gave judgment by consent for £350 damages, with costs on the poor persons scale not exceeding £10.

#### Standard Aircraft Wiring

A new system of electrical wiring developed by the Technical Board of the Society of British Aircraft Constructors, though primarily in-tended for aircraft, is applicable to ships, tanks, motor-cars and even houses.

Many previous aircraft wiring systems, some including a complicated series of multi-plugs and multi-sockets and others multi-core cable, have not given full satisfaction, being rigid and not suitable for adaptation to extra requirements. The new system circumvents these troubles. It consists essentially of a series of connector blocks with direct connection to the main power source (generator or accumulator). From the con-nector block extend simplified plug-in leads. The block is made of lightweight, strong plastic material of high electrical efficiency, and so far is available in 2-, 3-, 5-, and 15-way units, either single or double-tiered. Thus, a 2-way unit can offer four pick-up points. An idea of the com-pactness of the block can be gained from the dimensions of the 5-way pattern which is only 24 in. wide, 14 in. high and 13 in. deep. Besides simplifying and standardising main-

tenance practice, the system enables wiring lengths and cables to be supplied " tailor-made to measure," fitted at both ends with universal plug-in ferrules. Wiring leads of the correct length can be made in the factory and there bonded together in a similar manner to the lacing on a firework cracker or squib, thus ensuring the correct sequence for plugging-in and mating with the sockets in the connector block.

The chief cause of failure in wiring systems has been traced to moisture, which starts special "honeycomb" wiring pattern for moisture drainage and ventilation. In aircraft which are brought into close contact with salt atmosphere (Fleet Air Arm, Air Sea Rescue and Control Commend) a consider some content Coastal Command) a special spray-proof enclosed cover houses the connector block. The first aircraft to incorporate the new system is a large new British civil air liner. The system will be adopted for all succeeding aircraft and is covered by patents.

### "Fortisan" Insulation

It is claimed by British Celanese, Ltd., that its "Fortisan" fibre is the strongest in the world. Its applications include parachute canopies and cords for dropping supplies from aircraft but it is also said to be of value for electrical uses. As it combines strength with extreme thinness and good insulating properties it is suitable for covering wires. It was at first used as a subcovering wires. It was at first used as a sub-stitute for silk but is now said to have been adopted on its own merits. For electrical purposes it is supplied in a range of yarn sizes from 30 denier upwards and in a range of fabrics weighing from as little as 0.85 oz. per sq. yard. Among other virtues claimed for the material

are that its heat-resistant qualities are better than those of cotton and that it has a low moisture content (9 per cent.).

### Street Lamp Adaptation

No street lighting of any kind was used in the area of the Rhondda U.D.C. until the recent Order was made allowing lighting of 02 ft.-candle, with no illumination visible above the horizontal.

Painting of the lamps below the filaments was tried, but found to be unsatisfactory because it was not easy to obtain a complete black-out and the police objected to the reflection of the filament in the base of the bulb which could be seen above the horizontal. A tin shade of conical shape was made, into which a 15- or 25-W lamp was fitted, the top end of the shade being notched to allow for the bayonet pins. The bottom end was about  $\frac{1}{2}$  in below the bulb. A template of the shade was cut, a piece of

hard wood turned to suitable shape and fitted in a vice, 80 sheets of tin each about 20 in. by  $28\frac{1}{2}$  in. were obtained from local firms, and an electric soldering iron was used for soldering. The template was used to mark off about 18 shades per sheet, each piece being cut out by hand shears with a minimum of waste and then placed on the former, bent and slightly tapped into shape, then soldered, notched and painted on the outside only. Two improvers and a labourer made up to 150 per day at the cost of about 4d. each. The shades were then passed on to a lorry driver and one assistant. The lamp together with shade were easily inserted into any type of fitting suitable for ordinary lamps and without removing the reflector or making any other alteration. "Dim out" lighting was restored at 900 points at the rate of 100 points per day. Practically all the fittings had been inspected and repaired in readiness.

inspected and repaired in readiness. The Council will soon be examining a scheme to change over many of the 2,800 gas lamps to electricity.

### **Radio Training**

Proposals for the formation of a British Radio Research Institute announced by the British Institution of Radio Engineers were followed by the issue of a Post-War Development Report, of which Part I dealt with the present state and anticipated development of radio science. Part II, which has now also been issued, is concerned with education in relation to the technical training of radio workers. It advocates college courses leading up to the award of National Certificates in radio engineering, additional subjects for certificate endorsement to include engineering economics, factory organisation and management.

### **Boiler-house Auxiliaries**

A well-produced illustrated booklet of 38 pages issued by G. & J. Weir, Ltd., Cathcart, Glasgow, S.4, is a reprint (No. 12) of some notes read by Mr. J. Sim before station engineers of Edmundsons Electricity Corporation, Ltd., earlier this year. It is concerned with motor and steam driven feed pumps, de-aerators, feed-water regulators, regenerative condensers, and low-pressure horizontal and high-pressure vertical evaporators.

### **Unexplained Fatality**

At an inquest at Swansea on Glynfor Thomas (20), a collier, of Brynamman, it was stated that he left home at 10.15 p.m. on October 11th and was later found sitting at the edge of a pool against a barbed wire fence in a stupefied condition. He had burns on his back and forearms. Evidence was given that a short-circuit had occurred through something touching a high-voltage line, and an electrical engineer said he could only assume that somebody had climbed one of the poles; there was clay on some of the insulators. The house surgeon at Swansea Hospital said he could find no evidence that deceased had fallen from a height. An open verdict was returned.

#### **Three Anniversaries**

Three firms well known in the electrical industry have just celebrated important milestones in their history. It is sixty years ago since Messrs. John T. and Tom W. Rubery established in Darlaston the business which has since become Rubery, Owen & Co., Ltd. After the withdrawal of Mr. Tom Rubery in 1888, Mr. John Rubery was joined in 1893 by Mr. A. E. Owen, of Wrexham. From a small factory engaged in the manufacture of light steel constructions, the organisation has steadily expanded to cover production to-day of chassis, wheels, and other components for automobiles and aircraft, constructional steelwork for all types of buildings, and steel equipment for offices and works. Just before the war the company also introduced an electric cooker of somewhat revolutionary design. Associated firms now include Brooke Tool Mfg., Ltd.; A. G. Sutherland & Co., Ltd.; Nuts & Bolts (Darlaston), Ltd.; Chains, Ltd.; and the Easiclean Porcelain Enamel Co., Ltd. On October 14th, the Anglo-Swiss Screw Co.

On October 14th, the Anglo-Swiss Screw Co. Ltd., Yiewsley, celebrated its twenty-fifth birthday. Sir Stafford Cripps, the Minister of Aircraft Production, who was present with Lady Cripps, congratulated the company on its proud record and thanked staff and employees for their valuable contribution to the war effort. Presentations were made to twelve employees who had been with the firm for over twenty years, all the 350 or so employees receiving gifts on the basis of £1 per year of service. A gold watch was also presented to Mr. O. Frey, founder and managing director, with a compact and a bouquet for Mrs. Frey. Later there was a variety concert and in the evening a dance and cabaret.

and in the evening a dance and cabaret. This month, Dewhurst & Partner, Ltd., of Inverness Works, Hounslow, Middlesex, manufacturers of electric control equipment (including "Dupar" productions) celebrate their silver jubilee. The business was commenced on November 5th, 1919, and since then has grown to large dimensions. The company has played its part in war production, and is now looking forward to contributing to peacetime reconstruction and development.

### **Cost of Alterations**

Bon-Accord Electric Repairs, Ltd., Little Chapel Street, Aberdeen, pleaded guilty at Aberdeen recently to carrying out alterations to its premises at a cost of £1,405 above the amount authorised in a licence granted by the Ministry of Works (£350). Mr. F. Ramsay, defending, said it was not a case of deliberately flouting the regulations; when the work had been done the Ministry was informed and every assistance was given in assessing the cost of the extra work. A fine of £50 was imposed.

### City and Guilds Institute

The dependence of London for its wealth on fourishing and efficient national industries and these in their turn on the education and training of craftsmen and administrative leaders was stressed by Professor R. S. Hutton, chairman, at the yearly meeting of the City and Guilds of London Institute, whose annual report we have just received. He suggested that something might be done to secure renewed support from the City Corporation and the various companies which had ceased to be active subscribers to their funds.

#### **Trade Announcements**

The Rheostatic Co., Ltd., has re-opened its offices and showrooms at Cavendish House, Waterloo Street, Birmingham, 2 (telephone: Birmingham Central 1044). The office will be in the charge of Mr. T. Jackman, who has been employed in the contracts department at the head office of the company for many years.

De la Rue Plastics, Ltd., and De la Rue Insulation, Ltd., have removed their sales offices to their new showrooms at Imperial House, 84, Regent Street, W.1.

### Change of Name

Ruths Arca Accumulators, Ltd., have changed their name to Ruths Accumulators (Cochran).

# **Bolton's Jubilee**

### Growing Industrial and Domestic Loads

**R**<sup>IFTY</sup> years progress of the Bolton electricity undertaking was reviewed at a jubilee celebration luncheon held in the Town Hall, Bolton, on October 31st. Guests included representatives of the Central Electricity Board, electrical engineers of neighbouring supply authorities, members of the Corporation, the regional fuel controller and six workmen employed by the department. Large extensions were sanctioned just before the war and recently a further direction has been received from the Central Board to install another 31,250-kW turboalternator set, steam raising and ancillary plant, switchgear and a cooling tower to be completed in 1946.

The importance of this latest development was stressed by Mr. C. T. S. Arnett, manager of the North-West England and North Wales Area, C.E.B., at the jubilee luncheon. After paying a tribute to those who had planned and developed the Bolton undertaking, he said that electricity had made a big contribution towards winning the war and would be needed just as much, if not more so, when the war was over, to create employment in our factories and workshops.

### **Prospects of Big Developments**

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Councillor T. P. Longworth (chairman of the Electricity Committee) said it was a far cry from the days of small rope-driven generating sets and carbon filament lamps to these days of large direct coupled turboalternator sets, fluorescent lighting and the hundred-and-one electrical appliances now available. The development during recent years of domestic appliances was rapidly extending the demand for electricity before the war, and, when the restrictions imposed during the war period were removed, he foresaw a greatly increased use by the public of many other labour-saving devices. He gave figures demonstrating the enormous growth of the undertaking in the fifty years of its existence.

Dr. D. Gray remarked that owing to the smoke nuisance and its deleterious effect on public health it would appear high time that the Government considered the sponsoring of one of the proposed satellite towns as an all-electric one. Thus definite data could be obtained as to the saving effected by the absence of dirt and as to the health of the inhabitants living under improved conditions.

Mr. H. E. Annett said he was the fifth engineer and manager of the undertaking and he was delighted that two of his predecessors, Mr. A. Ellis (1896-1900) and Mr. W. J. H. Wood (1913-1927) had found it possible to be present. Many men from the Department had joined the Forces, and the training of substitutes for 40 per cent. of the pre-war personnel had much increased the work and responsibility of those remaining, especially in view of the greatly increased output.

The public during recent years had become more electrically minded and the number of people who thought of electricity only as electric light was rapidly decreasing. Actually only 5 per cent. of the energy sold was for lighting, 66 per cent. being for industrial purposes, 5 per cent. for traction and 24 per cent. for heating, cooking and other domestic and business purposes apart from lighting.

Mr. Gordon Macdonald (Regional Controller of Fuel and Power) said that despite complaints respecting the quantity and quality of fuel, power stations had been enabled to supply the people with electricity. Bolton was fortunate in having such goahead consumers. Lack of enterprise and co-operation on the part of consumers hindered the activities of progressive undertakings.

After the luncheon speeches in which compliments were generously bestowed on those responsible for the direction of the Bolton undertaking, the company of nearly 200 inspected the Back-o'-th'-Bank station. Bolton has had five electrical engineers and managers:--Mr. J. H. Rider (1893-96); Mr. A. Ellis (1896-1900); Mr. A. A. Day (1900-1913); Mr. W. J. H. Wood (1913-27); and Mr. H. E. Annett.

### Lincoln Extension

### Alternative to Cooling Towers

FOLLOWING upon the Electricity Commissioners' decision that the Lincoln Corporation should substitute 90-ft. high wooden cooling towers for the 230-ft. concrete towers proposed in the extension of the St. Swithin's station, an alternative scheme has been submitted to the Corporation by Sir Robert Pattinson, chairman of the Witham and Steeping Rivers Catchment Board.

and Steeping Rivers Catchment Board. This envisages the pumping of water from the Trent at Torksey, seven miles distant from the station, into the Foss Dyke, from which it would flow into the River Witham at Lincoln, thus providing a sufficient supply of water for cooling purposes without the use of towers. (Mr. F. Newey, city electrical engineer, is said to have stated that twenty wooden towers would be necessary.) According to a correspondent of *The Times* Sir Robert Pattinson is strongly of the belief that this scheme will be adopted; he estimates that its adoption will save about £100,000.

# RECENTRATIONS

Notes on New Electrical and Allied Products

### Magnetic Sorter

HEN ferrous metal parts are manufactured in large quantities it is usually necessary to test the hardness, temper, carbon content, etc., of the finished component parts as well as the raw materials of which they are made. Conveniently quick means of comparison with a

standard sample, which does not harm the test specimen, is the magnetic sorting "bridge " introduced by SALFORD ELEC-TRICAL INSTRUMENTS, LTD., Peel Works, Silk

Oscillographic "bridge" for magnetic sorting with typical cathode-ray loop patterns

Road, Ardwick, Manchester, 12. It is ad-visable to secure the device to a wall in an accessible position, although a handle is fitted for portability. The tester is energised from 110 to 250 V mains, and it is necessary for the apparatus to be properly earthed before it is put into use.

The illustration indicates how the earthing



Street, Salford, Lancs (a subsidiary of the General Electric Co., Ltd.). The instrument's dimensions are 16 by 11

by 11 in.; it houses a valve amplifier and cathoderay tube assembly, functioning on the basic principle that changes in the physical condition and chemical composition of the ferro-magnetic substance being tested alter the shape of the hysteresis loop made visible on the cathode screen.

equipment consists Associated of two balanced coils into which the standard sample and test specimen are respectively placed. If the latter do not differ the cathode-ray trace will approximate to a curved line, otherwise characteristic loops will be observed on the oscillograph screen.

A built-in attenuator is included to take care of amplitude differences when testing materials of different sizes, coils of appropriate dimensions being supplied to suit requirements. All controls are behind a hinged panel that may be locked to prevent unauthorised interference, which would upset the calibration of the instru-ment. Thus, once the equipment has been set up for a particular type of sample, the routine testing may safely be left to some unskilled operator.

### Universal Tester

A universal testing device that can be used by A universal testing device that can be used by anyone without special skill for checking the continuity of earthing, or leakage, of tools and appliances is announced under the trade name of the "Pyrobit" tester by the ACRU ELECTRIC TOOL MANUFACTURING CO., LTD., 123, Hyde

continuity of a hand drill may be tested by making contact with a metal fin while the earthsing pin of the plug connector is inserted in a single socket. A sound circuit will cause a neon lamp to glow through the right-hand slot in the top of the casing. Similarly, the amount of leakage is indicated by the degree of brightness of the neon lamp when one live lead of the circuit is inserted in the socket instead of the earthing pin.

Two sockets (5 and 15 A) are provided for use when the appliance to be tested has three-pin



Method of employing the " Pyrobit " universal tool earthing tester

plugs. Alternatively, an adaptor may be accommodated in a lampholder which can be connected to appropriate terminals, or testing spikes can be used.

In addition to indicating earthing continuity the device can also be employed as a circuit tester and for indicating polarity if the live connection is withdrawn and the two openings are bridged.

# **Cable Current Ratings**

## New C.M.A. Tables for Modern Types

33-kV sing

cables with or

**ROM** time to time the accepted current ratings of 33- and 66-kV mass-impregnated cables have varied slightly with developments in construction, changes of permissible maximum temperature, etc.

TABLE 1.

Supply undertakings and others have been kept informed of any such modifications by the Cable Makers' Association. Lately the whole subject has been reviewed and, owing to a more general demand for cables at these

33-kV th served cab	les with	screene oval (O)	ed lead-co and circ	ular (C)	rmoured and conductors.	
Area	Laid 65	direct, °C.	In air,	65° C.	Single-way duct, 65° C.	
Area sq. in.	О.	C.	0.	C.	O. and C.	
0.06	150	150	150	145	125	

200 250 290 195 240 285 325 200 200 230 260 0 15 245 240 285 280 0.20 320 355 330 0.25 370 360 0.30 435 425 0.40 410 400 465 440 480 0.50

TABLE 2.

33-kV three-core screened S.L. lead-covered armoured and served cables with circular conductors.

	Area sq. in.	Laid direct, 60° C.	In air, 60° C.	Single-way duct, 60° C.
BURDER BURG	0 06	150	150	125
	0·10	195	200	160
	0 15	240	245	200
	0·20	280	290	230
	0·25	315	330	255
	0·30	345	365	280
	0·40	395	420	315
	0·50	430	460	340

TABLE 3. 33-kV three-core screened lead-covered and served a ba cables with oval (O) and circular (C) conductors.

Area	Laid 65°	direct, C.	In air,	65° C.	Single-way duct. 50° C.
sų, m.	0.	C.	Ο.	C.	O. and C.
0.06 0.10 0.15 0.20 0.25 0.30 0.40 0.50	155 205 255 295 335 370 435 480	150 200 245 290 325 365 425 475	155 210 265 315 360 405 485 545	155 205 260 305 350 395 470 530	110 145 175 205 255 300 335

		TABLE	4.		
33-kV	single-core	screened	lead-covered	and	served
bles wit	th oval (O)	and circula	ar (C) conduct	ors.	

1	-	Laid	direct	In	air	Trefoilducts
DINES	sq. in.	0. 65° C.	C. 60° C.	0. 65° C.	С. 60 <sup>°</sup> С.	O. and C. 50° C.
	0 06 0·10 0·15 0·20 0·25 0·30 0·40 0·50 0·60 0·75 1·00	155 210 255 300 340 375 435 435 480 525 575 645	150 200 245 285 325 360 415 460 500 545 615	170 230 290 340 390 440 520 590 650 725 850	160 215 270 320 370 415 490 555 615 685 800	130 175 215 280 305 350 380 410 440 485

	1	ABLE	э.		
le-core	SCL	eened	lead	-covered	and
al (O)	and	circula	r (C	) conduc	ctors.

A.co.o.	Laid	direct	In	air	Trefoilducts
sq, in.	O.	C.	O,	C.	O. and C.
	65° C.	60° C.	65° C.	60° C.	50° C.
0.20	290	275	335	320	240
0.25	325	310	385	365	270
0.30	360	345	435	410	300
0.40	420	400	515	485	340
0.50	460	440	575	540	360
0.60	505	480	635	595	390
0.75	545	520	705	665	415

voltages, tables have been drawn up by the C.M.A. of the carrying capacity in amperes applicable to modern solid-type paperinsulated cables laid direct or in air or drawn into ducts. Formulæ and data used for the calculations are those published by the

TABLE A, Variation in ground or ambient temperature.

Final	Ground Temp. deg. C			Air Temp. deg. C.			
Temp.deg.C.	20	25	30	30	35	40	
50 60 65	-92 -94 -95	-84 -88 -89	·76 ·82 ·84	·92 ·93	-83 -85	·74 ·77	

TABLE B. Variation in thermal resistivity of soil.

	Va	ue of g	, deg. C	./watt/c	m. <sup>3</sup>
Туре	50	100	150	200	300
1. (a) (b)	1·25 1·14	1-05 1·03	0·93 0·95	0.85 0.89	0·73 0·79
(a) (b)	1·34 1·20	1.07 1.05	0·92 0·94	0.82 0.85	0 69 0 74

1. 3-core screened and 3-core S.L. for 33 kV; 2. Single-core screened for 33 and 66 kV; (a) Buried direct; (b) In ducts.

British Electrical and Allied Industries Research Association and other authorities and are well established.

The basic conditions taken are:—Ground temperature, 15 deg. C; ambient temperature, 25 deg. C; thermal resistivity of soil,  $g_1 = 120$  (*in situ*); depth of laying, 42 in. to top surface of cable or duct. Three-core cables are assumed to be laid singly or drawn into single-way ducts and single-core cables to be

and served

laid in trefoil formation with outer servings in contact or drawn into trefoil ducts.

Ducts are of three sizes, having internal diameters of 4, 5 and 6 in. respectively for cables with external diameters up to and including 21 in., above 21 in. up to 31 in., and above 31 in.

Correction factors are employed where there are departures from the basic conditions. These are given in tables A, B and C.

#### TABLE C

Grouping for cables laid direct and drawn into ducts. The spacing given is the distance between centres of cables or centres of trefoil groups in horizontal formation and the vertical distance between centres of layers in tier formation.

		Spacing, in.					
Type of cable and group.	Cables or circuits	Laid direct			In ducts		
		12	18	24	12	18	24
Multicore (all types) tier formation	2 3 4	0-89 0-81 0-74	0·91 0·84 0·77	- 0-93 0-86 0-80			
Multicore (all types), horizontal for- mation.	2 3 4	0.89 0.81 0.77	0.91 0.84 0.79	0-93 0-86 0-82	0-90 0-85 0-81	0-92 0-88 0-85	0-94 0-90 0-88
Single-core (all types), trefoil groups in horizontal formation.	2 3 4	0.83 0.73 0.67	0.87 0.78 0.73	0-90 0-82 0-78	0.89 0.80 0.76	0-90 0-82 0-78	0-92 0-85 0-81

# **Cable Terminations**

Performance and Trend of Design

WELVE years' performance of the cable terminations in service on the grid system at between 3.3 and 132 kV is reviewed in a paper prepared by Mr. D. B. IRVING (Central Electricity Board) for the Transmission Section of the Institution of Electrical Engineers.

Features of construction that have contributed to failure are analysed and measures adopted to improve security in service are indicated. Consideration is given to the fundamental characteristics required of terminations and to the tests called for by C.E.B. specifications. Recent types of terminations are described, including outdoor sealing-ends for the latest kinds of 132-kV pressure cables.

#### Stabilising Principle

One of the most marked developments of recent years has been the introduction of the Marshall-Forrest stabilising principle (British patent 527,357), which has been applied with success to overhead line insulators and is now to be tried for 132-kV sealing-ends. The provision of controlled conducting glaze on the outer conducting surface of porcelain should render unnecessary the heavy overhanging sheds associated with present types of anti-dirt insulators.

It also appears to be possible to extend the principle to facilitate stress control within a sealing-end and, incidentally, to render the internal electrical state capable of more exact calculation. Thus it may permit the bodies and external surfaces of controlled sealing-end insulators to be designed in closer conformity

with the configuration and the equipotential to an surfaces of the electric field. Also the author of R suggests that instead of tapered or cylindrical time a bodies, use should be made of inverted min porcelain of tapered or exponential shape El Ro with suitably controlled surfaces. This might dowlin permit the radial dimensions of terminations and to approximate more closely to the size of factor associated cables and, further, lend itself the more readily to direct plumbing of the lead sheath.

### Glass and Plastics

Glass is again coming into prominence a set of 11-kV sealing-ends with toughened glass insulators in the form of plain cylindrical make 1 tubes (it was not then possible to make make shedded glass types) have been in operationin a clean locality since 1939 without needing maintenance. Also three 33-kV outdoor JWar sealing-ends fitted with moulded stress cones have been in service since 1937 and the suge author states that the possibility of extended the use of certain kinds of thermoplastic substances for this purpose is worthy of the fullest investigation.

There is every prospect that radical improvements in the design of cable terminations will be effected, and the judicious introduction of new materials may play an important part. At this stage when so many fresh materials are making their appearance it is desirable with that more exactitude in nomenclature should well that more exactly the information of the indiscrim-be observed. For example, the indiscrim-inate use of the term "compound" for the indi-different filling and impregnating media has been applied on the indiscriment different filling and impregnating media has been applied on the indiscriment of the ind caused numerous misunderstandings.

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### ELECTRICAL REVIEW

# **Boiler-Flue Gases**

### **Electrostatic Cleaning Methods**

N opening the discussion on the use of electrostatic precipitators for cleaning boiler-flue gases at the Institution of Electrical Engineers, MR. F. W. LAWTON (Birmingham) said that Mr. John Bruce's paper (which was reviewed in last week's issue) contained the most reliable data so far published on the subject. The first electric precipitation plant installed in Birmingham in 1927 on the outlet from the fuel driers dealt entirely with coal dust, with satisfactory results. As far back as 1935 precipitators were installed at the Hams Hall "A" power station on six p.f. fired boilers having a total normal steam output of 1,700,000 lb. of steam per hour. Burning bituminous coals, the carbon content in the precipitation dust was generally below 10 per cent. On this plant the cost of repairs and maintenance did not exceed £50 per annum, and the annual operating costs, including attendance and cleaning, were not more than £350. In 1942 a further filter plant was installed at Hams Hall "B" power station and, so far, there was no reason to expect higher costs than those mentioned. The chimneys were 350 to 110 400 ft. high and there was no appreciable

DR. E. J. BUSH (Lodge-Cotterell, Ltd.) said he would not like to subscribe to the statement in the paper that the efficiency of precipitation was a function of the total dust burden. In practice it was not possible to have adjustable gear for controlling the flow of gases, and the remedy was to so dimension the electrofilter that it would give the required efficiency even if the gas flow were not uniform.

### **Possible Tightening-up of Restrictions**

able 11 M The amount of investigatory work done on find another of investigatory work done on inconsiderable, though all of it might not find its way into the technical literature. He found it a little difficult to agree with the [find support of a suggestion that particles of 20 micron size and under were likely to be carried away and dispersed by the effluent gas so as not to constitute a nuisance. In this country even the smallest particles could cause an appreciable nuisance as well as damage through becoming nuclei of adsorption for the acid constituents of the stack gases and settling immediate neighbourhood. He the believed that the restrictions on dust emission were likely to be tightened up in the near future.

The Americans had been using electrofilters on their p.f. plants for many years and by the end of 1938 the total volume of such gases undergoing electrostatic cleaning was over 9 million cu. ft. per minute. The standard was lower than ours.

MR. W. N. C. CLINCH (Northmet Power Co.) said that it was very difficult to justify any conclusions from field scale models because they were not able fairly to take a sample of the dust in all its different sizes due to the kinetic energy and the way in which dust often went just where it was not expected to. Personally he opposed any use of the fan for the purpose of handling dust because there were means whereby the heavier particles of dust could be extracted before they entered the filter ; so the filter dimensions could be made easier and the velocities would not be of such great moment. He recalled an instance in which the makers of the electrostatic precipitation plant were strongly opposed to putting the fan after the filter. He had argued the other way and the makers won, as usual, but erosion of the fan blades was experienced.

#### **Differences** in Particles

DR. R. LESSING said that while the author had stressed the influence of the carbon content of flue dust on the efficiency of extraction by electrical precipitation, his test results did not go quite far enough. He had found that there were wide differences in composition of the particles of the pulverised fuel, not only between the size fractions but also between the coal components of different specific gravities. One aspect which appeared to have escaped attention so far was that the acid constituents of flue gas might have a profound influence on the mechanism of the process, in particular on the degree of back-ionisation and the ease of collection. The liability to the formation of deposits on the collecting surfaces, not unlike those experienced on superheaters, air heaters and fans, had been traced to the influence of acids.

MR. F. W. TAYLOR (Ferranti, Ltd.) said that unless the milliamperes were kept constant throughout a test, it was quite possible for the precipitation efficiency to vary sufficiently to mask the effects. Wave form could have a very important effect on the size of precipitator installed and over-all cost. If the number of discharge points on the h.v. electrode were increased, there would be a considerable increase in efficiency.

MR. W. WILDE (London Power Co.) said that the development of electricity supply was the biggest single contribution that could be made to the reduction of atmospheric pollution and it would be scant justice if that industry were to be called upon to maintain a higher standard of emission prevention than other industries. In view of the

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practical difficulties with low gas temperature, non-uniform distribution and high moisture, could it be said that electrostatic precipitation could be operated at high efficiency without serious choking troubles below 300 deg. F.?

**PROFESSOR BRUNT** said, as a meteorologist, that it was the very fine dust which people objected to because it went a long way and became a nuisance.

MR. E. L. PAWLEY (B.B.C.) pointed out that certain types of electrostatic precipitation equipment caused interference with radio reception over a large area. In certain cases it had been simple to suppress by the insertion of choke coils in the mechanical rectifiers that were incorporated in the equipment, which was done by co-operation between the B.B.C., the G.P.O. and the makers of the equipment. Interference should be considered when plant was being designed and installed.

DR. G. LUBSZYNSKI inquired about the efficiency of cleaning by electrostatic precipitation compared with a filter bag plant, and also what amount of ozone was generated in the process.

MR. G. W. CARTER said that in the diagrammatic arrangement of the electrical connections chokes were shown in the h.v. circuit; were they intended to limit the current in case of a short-circuit and should not some provision be made to limit the current in the event of a flash-over? If the precipitator took more current at a given voltage than was expected, then the electrical equipment would prove to be inadequate. He had found as much as 25 per cent. variation in the current taken, sufficient in one case to cause the precipitation to be very efficient and in another to cause the efficiency to be seriously impaired.

 $M_R$ , J. F. MATTHEW asked for information on how the dielectric constant of the material affected the efficiency of electrostatic precipitation and the quantity of nitrogen oxide produced as well as ozone. He was specially interested in the precipitation of particles of less than 5 $\mu$ .

 $M_R$ , C. S. T. PAUL remarked that while the author gave a warning against using gas temperatures below 300 deg. F., no mention had been made of an upper limit. He suggested that an endeavour should be made to collect grit before it passed through the air pre-heater or, if possible, the economiser. It seemed to him it would be better to collect in a cyclone and pass the finer particles through a smaller precipitator. There seemed no reason why a small preheater should not be put in the path of the 15 to 20 per cent. of small particles and so obtain the high temperature for the secondary air.

MR. BRUCE reserved his detailed reply for the *Journal*, but said he felt that the precipitator as designed to-day could be half its present size. He did not favour cycloning. With regard to interference with radio reception, users took care to cover themselves by a clause in the specification.

## **Dover's War Record**

### Maintaining Supply under Fire

**F**ROM the outbreak of war until last month 1,145 shells, 697 high explosive bombs, seven flying bombs, three parachute mines and hundreds of incendiaries fell in the Dover area. Considerable damage to the electricity distribution system was inevitable, and repair work had to be carried out by the staff of the borough electrical engineer (Mr. R. G. Widgery) at great risk to themselves. To give only one example, after a shell had fractured a 6,600-V trunk feeder a jointer and his mate were working in the crater when another shell dropped about 50 yards ahead of them, causing injuries to personnel. The two men gave assistance to the injured and then resumed their work of making good the damage to the electricity main.

Altogether 94 major incidents were recorded, involving damage to fifteen e.h.v., eighteen h.v., and thirty-three l.v. cables, twelve overhead lines, eight DC cables, seven steel kiosks and substations and two underground substations. One substation was damaged by shells on four occasions. In each case of damage to substations temporary arrangements in cabling and switching were necessary while the main installation was being restored.

In July, 1940, two months before the opening of the "Battle of Britain," a savage attack

was made causing an intense fire and damage to h.v. and l.v. mains. These had to be proved "dead" to enable the fire brigade to operate without additional risk, and then had to be repaired immediately. Probably the most serious incident occurred in March of this year when a shell severed a vital c.h.v. and two h.v. cables at the electricity works, disrupting about 25 per cent. of the town's supplies, including important naval and military services. This took place at 11.10 p.m. By various switching operations and jumping of feeders the whole supply was restored by 12.15 a.m., and this feat was accomplished while shelling was still in progress.

During September this year the area was subjected to long periods of heavy shelling, each type of shell causing a different kind of damage. Thus the air-burst type would bring down overhead lines and cause splinter damage: the contact type would sever cables and throw splinters damaging any plant at ground level; while the armour-piercing shells would make a deep crater, cut out a length of cable and damage underground plant. Apart from the men engaged in restoring supplies, special mention should be made of the switchboard attendants who throughout this ordeal remained at their posts in the centre of the target area er 10, 196 November 10, 1944

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## BLEC'NRICINY SUPPLY

#### ufficient Cheltenham Demonstration Houses. Rebate for Fulham Consumers.

Belfast. -SAFEGUARDING THE SUPPLY. -At a meeting of the Electricity Committee on November 2nd the city electrical engineer (Mr. W. J. McC. Girvan) submitted proposals for the replacement and modification of certain electron electric start at a cost of about £50,000. The suggested cking plant at a cost of about £50,000. The suggested improvements are intended to obviate the He use possibility of supply interruptions such as occurred some weeks ago when a wide area of the city was affected. The Committee markes approved the recommendations.

Bolton.—POWER STATION EXTENSIONS.—The Electricity Committee has decided that, subject to the Electricity Commissioners' consent being given to the extensions directed by the C.E.B. at the Back-o'-th'-Bank generating station, L. G. Mouchel & Partners, Ltd., shall be L. G. Mouchel & Partners, Etc., shall be engaged as consulting engineers under the direction of the borough engineer, in respect of the cooling plant required. The C.E.B. has instructed the Committee to install a new 30,000-kW generator with ancillary plant, at a cost of between £500,000 and £700,000. The water cooling tower is included in the scheme make of extensions for the programme year 1946.

Chelmsford.—STREET LIGHTING.—Reversing a previous decision, the Town Council has agreed to carry out a limited programme of street e fei 🐜 🗧 lighting.

Chesterfield.---OVERHEAD LINE.---The Derby & and the new Goit Side Road substation.

Cheltenham.—DEMONSTRATION HOUSES.—Reelectrical equipment for two demonstration houses the borough electrical engineer (Mr. R. W. Steel) said that the local E.D.A. Circle had drawn up a wiring specification and dis-cussed the apparatus to be installed. The wiring would be considerably in advance of pre-war practice, providing many additional heating points. He recommended that the electrical where appliances which would normally be the electrical points. He recommended that the electrical phanes which would normally be hired from the Electricity Department should be provided on a rent-free basis for a period of seven years.
Wirdd The estimated cost of the apparatus involved for the "A" type house was £85 (normal hire charges 3s. 3d. per week) and for the "B" type on the cost of the additional wiring for these houses should be borne by the E.D.A. Circle their contribution might be made by carrying out the work on a non-profit basis and fore stimated cost of the inverted charges. The estimated cost of the wiring and lighting fittings to be contributed by the Electricity Department Was approximately. to be contributed by the Electricity Department was approximately £55 per house. The Committee agreed to these recommendations.

bles all **Durham.**—POWER STATION INQUIRY.—The t grouts plan of the North-Eastern Electric Supply Co., would m Ltd., to build a £3,500,000 power station at lead du Kepier, just outside the boundary of Durham on the City, is to be the subject of a public inquiry cial me on December 5th. It is announced that Sir Cyril d attemt Hurcomb, chairman of the Electricity Com-missioners, will preside. Opponents of the plan are the Durham Preservation Society, the Bishop Durham .--- POWER STATION INQUIRY .--- The

of Durham and Durham University. Several organisations have expressed themselves in favour of the project.

**Glasgow.**—ALTERNATIVE SITE.—It was recently reported that the Clyde Navigation Trustees had offered the Corporation an alternative site for its power station after refusing to grant an application for one at Shieldhall. The alternative site is at Braehead, adjoining Shieldhall to the west.

Guildford. — FIXED-CHARGE REBATE. — The Electricity Committee recommends a rebate for the December quarter of 50 per cent. of the fixed charge under the "all-in" rate for domestic, office, shop and business premises.

London.—FULHAM'S PROPOSED REBATE.-Operating conditions of the Fulham electricity undertaking have improved so much during the past year that, although the time is not thought to be opportune for a revision of tariffs, it is felt that part of the benefit might justifiably be passed on to consumers, and a temporary dis-count of 10 per cent. on all electricity accounts (except those for supplies under special agreements) is recommended. The rebate, which it is proposed to start this quarter, is estimated to cost £30,000 in a full year.

HACKNEY UNDERTAKING'S FINANCES.—Since the year ended March 31st, 1939, the average net price per kWh sold by the Hackney Borough Council Electricity Department has increased by only 17 per cent. although there has been a 25 per cent. increase in charges, and since October last year, further increases in unit charges of about  $\frac{1}{2}d$ . This has been due to the fact that increased sales under the domestic two-part tariff have lowered the average cost to the consumer. It is pointed out that the average cost of energy purchased per kWh sold has risen by 52 per cent., so that the relative additional burden being carried by the consumer is not large. Increases in coal costs since January are likely to do much to counteract the benefit from reduced loan charges and increased tariffs, as they will add approximately £20,000 to the cost of electricity purchased. Through the enforced "holiday" on capital expenditure, loan charges have dropped by £13,000 since 1939-40, and a further decrease of about £15,000 is expected during the next two financial years.

With regard to war damage, it is stated that, in the continued absence of any guidance, no pro-vision has been made to meet any contributions which might become payable when the scheme applicable to public utilities is produced.

Manchester.—LOAN.—The Electricity Com-mittee is seeking sanction to borrow £109,000 for railway viaduct, etc., and £78,600 for ash disposal plant.

Rotherham.—CHOICE OF SERVICE.—The Corporation Housing Committee is considering its policy regarding the use of either gas or elec-tricity in Council houses.

Sheffield .- ELECTRICITY CHARGES .- The Electricity Committee is to send a deputation to the Ministry of Fuel and Power to explain and amplify the case for an increase in charges.

# FINANCIAL SECTION

Company News. Stock Exchange Activities.

### **Reports and Dividends**

The Jerusalem · Electric & Public Service Corporation, Ltd.—A steady growth in the company's business was reported by Mr. William Shearer, the chairman, at the annual general meeting on October 31st. A particularly satisfactory feature, he said, was the increased sale of electricity for industrial purposes, despite the fact that a number of emergency supplies arising out of the war were discontinued or reduced, following the improvement of the Middle East military outlook.

Electricity generated showed an increase of 11 per cent. over last year, while gross revenue was about 13 per cent. more, all of which, however, was absorbed by very considerable expansion in operating expenses, mainly brought about by an increase in the cost-of-living allowances made to staff and employees. These allowances now represented approximately 1.6 mils per kWh sold and the company was now being forced to shoulder burdens which, despite rigorous economies in operation expenses, might necessitate some increase in charges to consumers.

They had been able to forward to Palestine a reasonable quantity of spares for plant and other materials which were in short supply during the closure of the Mediterranean. Despite a thorough overhaul of generating plant it was clear that further extensions were required and substantial orders had already been placed to this end.

**Calcutta Electric Supply Corporation**, Ltd.— The Bengal Government has announced its intention of acquiring the company's undertaking in 1958 instead of 1948 and stipulates that the company shall train Indians for at least half of the superior posts by the time of the transfer. A committee appointed to consider the nationalisation of the undertaking had recommended that acquisition should be deferred until 1968.

The Calcutta Tramways Co., Ltd.—The Corporation of Calcutta having, as already announced, notified the company of its intention to take over the undertaking on January 1st next, has invited tenders, to be received by November 22nd, for the purchase of the undertaking and its operation by an agent on behalf of the Corporation and it is said that more than twenty offers have already been received.

According to a *Reuter* despatch, the Corporation has told the company that it is expected to transfer to the Corporation such benefits as accrue from parts of the track outside the municipal limits so that the whole of the present system will remain intact and no inconvenience will be caused to the public.

The Madras Electric Tramways (1904), Ltd., reports a net profit of £17,095 for 1943 as compared with £3,127 for the previous year. After paying off five years' arrears of preference dividends, the company now proposes to pay a dividend of 5 per cent. (nil) tax free on its ordinary shares, leaving £11,393 (£18,343) to be carried forward. Atlas Electric & General Trust, Ltd.—Dealing with the operations of the Montevideo tramways at the annual meeting last week, Mr. D. M. Touche (chairman) said that an exhaustive report was made to the municipality and other authorities by a wages board tribunal, the findings of which inspired confidence that the Uruguayan authorities would find a satisfactory solution to the company's problems in appreciation of, and as a just reward for, the sacrifices made by the British capital concerned, and of the great losses incurred through efforts to comply with the many obligations additional to those assumed under the original tramway concessions.

A resolution moved by a shareholder for the appointment of a committee of shareholders to consider whether a revision of the capital structure of the company could be brought about was lost. At a subsequent extraordinary general meeting resolutions were passed approving the conversion of the shares into stock.

Holophane, Ltd., reports that after providing for directors' fees  $\pm 500$  (same) and taxation  $\pm 15,000$  ( $\pm 24,000$ ), the profit for the year ended June 30th last amounted to  $\pm 8,318$ , as against  $\pm 14,865$  in the previous year. Reserve receives  $\pm 5,000$  ( $\pm 15,000$ ) and  $\pm 170$  is written off goodwill, leaving  $\pm 9,799$  ( $\pm 6,51$ ) to be carried for ward. South American rights have been sold for  $\pm 10,000$  to the Holophane Co., Inc., of New York, the proceeds being written off the book valuation of the goodwill and patent rights.

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Erinoid, Ltd.—Reviewing the company's activities at its annual meeting last week, Mr. W. G. Waldron (chairman) said that the research and development programme had been intensified. Much of this work was of a long-term nature, but some benefit had already been derived. A post-war policy had been formulated and wherever possible work of a post-war nature had been carried out, much of it at the suggestion of customers.

The Britannia Electric Lamp Works, Ltd., reports a net profit of £8,433 for the year ended April 30th last, as compared with £10,809 for the preceding year. A sum of £2,500 is again written off goodwill and trade-marks and the dividend is maintained at 7 per cent. The carry-forward is £192 lower at £13,213.

Yarrow & Co., Ltd., report a profit for the year ended June 30th last of £61,091, against £58,816 in 1942-43. The dividend is 10 per cent. plus a bonus of 5 per cent., free of tax, the same as last year.

Metal Industries, Ltd., is increasing the interim dividend on its "A" and "B" ordinary stock from  $2\frac{1}{2}$  to 3 per cent.

Aron Electricity Meter, Ltd., proposes to pay a dividend on the ordinary stock of 15 per cent. (same).

Drake & Gorham, Ltd., are again paying a first and final dividend of 5 per cent.

Ward & Goldstone, Ltd., are maintaining their interim ordinary dividend at 10 per cent.

Interim ordinary dividend at 10 per cent. Meters, Ltd., is again paying an interim dividend of 4 per cent.
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Oil Immersed Rotor and Stator Starter

Up to 90 H.P., 400 440 VOLTS

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ASTON, BIRMINGHAM 6

Sales Headquarters : BRETTENHAM HOUSE, LANCASTER PLACE, W.C.2

## MARTINDALE



• The most efficient lightweight portable blowers ever put on the market. Precision-built on interchangeable lines, carefully balanced to eliminate vibration. Armatures and coils impregnated to withstand all conditions of service all over the world

Write for literature

MARTINDALE ELECTRIC Co. Ltd. Westmorland Road, London, N.W.9 Phone: Colindale 8642-3 Grams: Commstones, Hyde, Landon



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### THREE MODELS:

1. "MILL TYPE" 2. "STANDARD" 3. "BLOW-ER GLEAN" All models can be instantly converted into powerful industrial vacuum cleaners

November 10, 1944

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ESIGNERS need no longer be limited by the poor mechanical strength of copper castings nor by the low conductivities of the brasses and bronzes. The development of Mallory high conductivity copper alloys makes available cast materials that retain the high current-carrying capacity of copper and combine it with the strength and hardness of steel. Lighter yet stronger castings are thus possible for the currentcarrying parts of switchgear, arc-and induction furnaces, resistance welding machines, transformers and other electrical equipment.



#### PHYSICAL PROPERTIES OF MALLORY 3 CASTINGS

Maximum stress, tons/sq.in22	
Proof stress (0.1% extension), tons sq. in	
Limit of proportionality, tons/sq. in	
Elongation	
Brinell hardness	
Electrical conductivity 80%	

Fuller details of Mallory 3 and other Mallory alloys are given in our technical booklets which will be sent on request.

PRODUCTS METALLURGICAL MALLORY LIMITED An Associate Company of Johnson, Matthey & Co. Ltd. Telephone : HOLborn 5027 78 Hatton Garden, London, E.C.I. GD 50

### New Companies

Ham ns Industries (1944), Ltd.—Private compan. Registered October 24th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, materials of manufacturers of, and dealers in, materials for electrical insulation components, parts and materials for the radio and electrical industries and wire and cable, moulded goods, electrical goods, etc. Subscribers: L. Cunningham, 72a, Warwick Avenue, W.9; and J. A. Reinthaler, 56, Ferme Park Road, N.4. Registered office: Imperial House, 84-86, Regent Street, W.1.

W. Newey, Ltd.—Private company. Regis-tered October 27th. Capital, £1,000. Objects: To carry on the business of electrical engineers. manufacturers of, and dealers in, electrical engineers, conduit, street lighting and waterlight fittings and electrical goods generally. Directors: W. Newey, 214, Boldmere Road, Wylde Green, Birmingham; and C. H. Hoskins, 27, Beacon Road, Sutton Coldfield. Registered office: 109, Colmore Row, Birmingham.

Electric & Radio Appliances (Export), Ltd.— Private company. Registered October 27th. Capital, £500. Objects: To carry on the business capita, £500. Objects: To carry on the business of electric lighting and equipment specialists, radio, motor, heating and general engineers, etc. Subscribers: Grace Fell, 34, Chatsworth Way, S.E.17; and Myrtle A. Clements, 78, Capel Road, East Barnet. Registered office: 4, Pump Court, Temple, E.C.4.

H. Romer (London), Ltd.—Private company. Registered September 13th. Capital, £1,000. Objects: To carry on the business of electrical, mechanical, heating and general engineers, metal workers, merchants, etc. Subscribers: — A. H. D. Fairbarns and Eleanor M. Cattell, both of 11, Sheffield Street, W.C.2. Solicitors: E.C.2.

H. Hyde & Co. (Hull), Ltd.—Private company. Registered October 23rd. Capital, £1,500. Objects: To acquire the business of an electrical engineer, contractor, etc., carried on by H. F. Bertholini at 48, Spring Bank, Hull, as H. Hyde & Co. Directors: H. F., E. A., P., Lucy and Margaret F. Bertholini, all of 661, Marfleet Registered office: 48, Spring \_|| Lane, Hull. Bank, Hull.

Pemlec, Ltd.—Private company. Registered October 28th. Capital, £5,100. Objects: To carry on the business of electrical con-tractors and engineers, etc. Directors: K. I Julian, 6, Barrowford Lodge, Hove, and five others. Solicitors: Linklaters & Paines, E.C.

#### **Companies'** Returns Statements of Capital

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Capital, Ltd. Cables & Wireless, Return dated July £30,000,000 in £1 shares. 13th. All shares taken up. £1,266,493 paid. £28,733,507 considered as paid. Mortgages and charges : Nil.

Wandsworth Electrical Manufacturing Co., Ltd.—Capital, £25,000 in £1 shares. No subdivision stated. Return dated July 4th. 15,780 ordinary and 2,700 preference shares taken up. £15,615 paid. £2,865 considered as naid. Morteward of house and observe t Nil paid. Mortgages and charges : Nil.

Dunoon & District Electricity Supply Co., Ltd.-Capital, £200,000, in £1 shares. Return dated May 3rd (filed June 15th). 160,000 shares taken up. £160,000 paid. Mortgages and charges : Nil.

Tramways Syndicate, Ltd.—Capital, £2,500 in £1 shares. Return dated June 26th. 1,507 shares taken up. £7 paid. £1,500 considered as paid. Mortgages and charges : Nil.

Continental Hydro-Electric Co., Ltd .-- Capital, £20,000 in £1 shares. Return dated June 30th. 5,000 shares taken up. £5,000 paid. Mortgages and charges : Nil.

#### Increases of Capital

Lowestoft Electrical Co., Ltd.—The nominal capital has been increased by the addition of  $\pounds 9,000$  in  $\pounds 1$  ordinary shares beyond the registered capital of  $\pounds 1,000$ .

Eastern Electrical Co., Ltd.—The nominal capital has been increased by the addition of  $\pounds 9,000$  in  $\pounds 1$  ordinary shares beyond the registered capital of  $\pounds 1,000$ .

#### Mortgages and Charges

Instanta Electric, Ltd.-Particulars filed of debentures to secure not more than £10,000, authorised by resolutions of August 17th and October 3rd, 1944, charged on the company's undertaking and property, present and future, the amount of the present issue being £8,500.

Stamford Electrical, Ltd.—Satisfaction in full on October 16th, of mortgage or charge by way of transfer, dated November 22nd, 1938, and registered December 6th, 1938, securing £4,000.

#### **Bankruptcies**

B. J. Wainwright, electrician, lately carrying on business as the Wells Road Garage, at 197-202, Wells Road, Shepherds Bush, W.12, and as Wainwright Neon Displays, at 197, Wells Road, W.12, and previously at 14, St. Thomas' Road, Harlesden, N.W.10—Application for discharge to be heard on November 14th, at Bankruptcy Puilding: Corou Street London W C 2 Buildings, Carey Street, London, W.C.2.

John Gibbons, 176, Abbey Street, Derby, radio dealer, etc.—This debtor's application for dis-charge herein was heard at Derby recently. He filed his petition in August, 1939. His liabilities amounted to £1,099 and his assets had realised £20; no dividend had been paid to the unse-cured creditors. The Judge granted the dis-charge, subject to twelve months' suspension.

G. A. Weston, electrical contractor and en-gineer, 5-6 Roman Wall House, Crutched Friars, London, E.C.3.—Proofs for dividends by November 15th, to the trustee, Mr. L. A. West, Bankruptcy Buildings, Carey Street, London, W.C.2, Senior Official Receiver.

H. W. Blythe, radio dealer, 64, High Street, Bognor Regis.—Application for discharge to be heard on November 23rd, at the Court House, Church Street, Brighton.

H. J. Gill, electrical engineer and radio dealer, 10, High Street, Keynsham, Somerset.-Application for discharge to be heard on December 15th, at the Guildhall, Bristol.

#### Liquidations

Claybury Electrical Supplies, Ltd., 8B, Claybury Broadway, Woodford Avenue, Ilford.—First meetings November 14th, at Columbia House, Aldwych, London, W.C.2.

. www.

#### **STOCKS AND SHARES**

#### TUESDAY EVENING.

HIS week the Government placed "on tap" a new issue known as  $1\frac{3}{4}$  per cent. Exchequer Bonds, 1950. These are offered at 100 and will be repayable at the same price on February 15th, 1950. The  $2\frac{1}{2}$  per cent. National War "B" Bonds, 1952–1954, hitherto "on tap," were suspended from Monday. The new stock affords the lowest rate of interest which the Government has offered on a Stock Exchange security during the war. The effect has been to bring about a rise in most Stock Exchange securities. The lowering of the interest rate offered to lenders by the Government is, of course, a bull-point for existing stocks and shares which give a higher return. Home Railway stocks, elec-tricity supply shares, the equipment and manufacturing group and practically all industrial dividend-paying securities are feeling a favourable effect from the new issue. It has also served to stimulate Stock Exchange business, and to unloose money which had been waiting for an opportunity to enter the markets on better terms than have prevailed recently. Any hope of this has been dissipated by the issue of the new bonds.

#### Equipment and Manufacturing

Amongst more than a score of advances in the price-lists of equipment and manufacturing shares, the average is about 1s. Babcock & Wilcox are 2s. 6d. higher at 52s. 6d. British Insulated at  $5\frac{1}{16}$  and Murex at 98s. 9d. are both  $\frac{1}{3}$  up. Gains of  $\frac{1}{16}$  have made De la Rue 9 $\frac{3}{4}$ , Lancashire Dynamo £5, and Telegraph Constructions 23s. 9d. Strand Electric also are the higher at 12s. on the recent increase in the dividend from 10 per cent. to 12<sup>1</sup>/<sub>2</sub> per cent. Demand persists for telegraph and telephone shares. Automatic Telephones are 1s. harder at 64s. General Electrics show a rise of 1s. at 94s.: the preference are 6d. up at 33s. 3d. Associated Electrical ordinary are better at 53s. 6d., English Electric at 52s., Greenwood & Batley at 45s. 9d., and Mather & Platt at 55s. 9d. Johnson & Phillips, British Aluminium, British Vacuum Cleaner, Siemens and Walsall Conduits are amongst those which have gained 6d. Ruston & Hornsby are better at 47s. 9d. Peto Scott Electrical Instruments (Holdings) at 5s. 3d. have also improved.

#### **Price Fluctuations**

Lancashire Transport are a good market, showing 2s. rise at 47s. 6d. on vague talk of a possible increase in the present 10 per cent. dividend. British Electric Traction deferred has been changing hands around 1200. Home Railways took a turn upwards: the Southern Railway stocks have hardened. A mild boomlet in Argentine rails led to sympathetic improvement in Anglo-Argentine Trams; Brazilian Tractions went ba to 264. Cable & Wireless ordinary is 10s. lov at 804. The recent issue of Reyrolle new of Shary shares was taken up as to about 90 per cent. by the shareholders. The price of the old shares remains unchanged at 67s. 6d. Atlas Electric at 7s. 3d. are unchanged on the defeat of the resolution proposed at last week's meeting for reorganisation of the company's capital structure.

#### **Calcutta Trams**

The price of Calcutta Tramways shares has in rison to 73s., upon the Calcutta Corporation calling in the Calcutta newspapers for tenders for the purchase of the company's undertaking, and the working of it by an agent on behalf of the Calcutta Corporation. Tenders will be received up to November 22nd. Speculation has arisen as to the implications part of this advertisement. One view is that the Calcutta Corporation has not been able to arrange the expected finance with the Bengal-Government. Another opinion hints at the possibility of a private tender having already been received, and suggests that the advertisement calling for tenders is no more than a is formality. The latter view appears the more is a set of the more is formality. The latter view appears the title probable. The issue of the affair is awaited with lively interest, not only by shareholders alway but by others who may be indirectly affected.

#### **Radio and Electricity**

In radio shares there is little of interest to report. Business has gone softly in the popular descriptions and a violent rise in Decca Records has failed, for once, to exercise any pronounced effect upon E.M.I. The latter are 6d. harder at 35s. Philco have lost an equal amount at 12s. 6d. Home electricity supply shares are disposed to dullness, more particularly in the London group, where small falls have occurred in County, Metropolitan in the and Northmets. Electrical Finance & Securities gained 1s. at 60s. ex the increased dividend. West Devons are better at 24s.

#### Strand Electric

The meeting of Strand Electric Holdings. Ltd., will be held next Monday, November 13th, and the report then to be presented is the best since the company made its appearance eight years ago. The net income of £15,186 is £2,300 up on the previous year and the 10 per cent. dividend, already announced, is used supplemented by an additional 2½ per cent. in the shape of bonus, against 10 per cent. and no bonus in the previous year. The price of the shares was down to 6d. in 1940 ; the present 10s. 9d. is about the highest that the shares have yet reached. The issued capital is £115,000 in 5s. ordinary shares. The company have able Signs, Ltd., together with other sub-

(Continued on page 682)

### **ELECTRICAL INVESTMENTS** Prices, Dividends and Yields

	1)1710	dend	Middle	12.1					Divi	dend	Middle	-			
Commony	Dro		Price	Rise		Yiel	d				Price	Rise		Yie	1 Cł
Combany	Pione	Loct	NOV.	OF		p.c	-	Сошрану	Pre-	<b>T</b> ł	Nov.	OF		p.c	24
	VIOLIS	Last	(	Fall					vious	Last	7	Fall			
He	me Ele	etricity (	Ordinary									_			
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Doolo	101	191	ente	7.7	:L	S	α,				1171		2	10	14.
FUOIE	172	128	02/0	1/	4	0	0	Aron Elec. Ord.	10	19	61/-		4	18	4
British Power and	-	_						Assoc. Brit. Eng.	6	7	57/6		2	8	9
Light	1	7	33/-	- Gd.	4	11	10	Assoc. Elec. :							
City of London	7	51	30/-	1.0	3	13	4	Ord	10	.10	53/G	+1/-	3	11	Ð
Clyde Valley	8	8	-42/-	1.2	3	16	0	Pref	В	8	39/6		4	1	0
County of London	8	8	43/-	-6d.	3	11	5	Automatic Tel.&El.	121	123	64/-	+1/-	3	18	4
Edmundsons	6	6	31/-		3	17	5	Babenek & Wilcox	11	11	52/6	+2/6	4	3	10
Elec.Dis.Yorkshire	9	9	45/6		3	19	6	British Aluminium	10	10	47/6	+6d.	4	4	1
Elec. Fin. and Se-			,-	1.	Ŭ	10		British Insul Ord	20	20	52	++	3	12	0
curities	191	131	60/6×-d	+1/	A	0	0	Pritish Tharmostat	<i>2</i> 0		0 16	1 8			
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Miec. Supply Cor-	10	10	401						193	102	20/-		7	12	0
poration	10	10	49/-	1.0	4	T	8	British vac. Cleane	r		0.010		~	1	0
Lancs. Light and								(9/-)	30	30	29/0	-t- 612.	9	T	0
Power	73	15	37/-		4	1	1	Brush Ord. $(5/-)$	8	9	10/9		4	3	9
Llanelly Elec	6	6	26/6		4.	10	7	Burco (5/-)	15	175	17/-		5	3	0
Lond.Assoc.Electr	ic 3	4	26/-	10	3	1	6	Callender's	15	20	54		3	15	6
London Electric	6	6	30/6		3	18	8	ChlorideElec.Storag	e 15	15	85/-		3	10	7
Metropolitan E.S.	S	8	43/-	-6d.	3	14	5	Christy Bros	121	173	75/-		4	13	4
Midland Counties	8	S	41/6		3	17	0	Cole, E. K. (5/-).	10	15	33/6		2	4	10
Mid Elec. Power	9	9	41/-		4	1 1	in l	Consolidated Signa	24	271	Gå		4	3	6
Namostle Flee	7	7	32/-	1.6.1	Â	7	6	Cossor A. (). (5/-)	71*	10*	25/6		1	19	4
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North Eastern Ele	10	10	0/20	- ou.	4	1	2	Crompton Borking	T12	112	±0/0	-	1	~	
Northampton	10	10	-\Ue		4	0	4	Ord (51)	а0 Ш	001	2.37	4	0	7	2
Northmet Power	7	7	41/-	-1/-	3	8	4	Urd. (a/-)	20	225	32/-	· · ·	0		a
Richmond Elec.	6	6	26/-		4	12	4	De La Rue	35	40	91	- 1g	4	z	0
Scottish Power	8	8	40/6	3.4	3	19	0	E.M.I. (10/-)	6	8	30/-	+6d.	2	Ð	9
Southern Areas	5	5	23/-		4	7	0	Elec. Construction	10	121	57/-		4	7	9
_ South London	7	7	29/6		4	15	0	Enfield Cable Ord.	$12\frac{1}{2}$	121	61/-	4.1	4	2	0
West Devon	5	5	24/-	+6d.	4	3	4	English Electric	10	10	52/-	+9d.	3	17	0
West Glos	41	31	25/-		2	16	0	Ensign Lamps (5/-)	25	15	21/3		3	10	8
Yorkshire Elec	8	8	43/_		จ	14	5	Ericsson Tel. (5/-)	22*	20*	50/-		2	0	0
TURBUIC DICL	0	0	x0/-		6	T.E	0	Ever Boody (5/-)	40	40	411-	+3d	4	17	7
	Pul	blic Boa	rds					Ever ficady (07-)	71	71	34/6	1 bui	1	7	0
Sentral Electricity	r :							Park Stagernam	15	12	23/2		A		2
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1963-93	24	31	104 xd	11	3	2	4	Pref	61	· 6±	33/3	+60.	3	18	4
1071_01	11	31	100	1.3	3	5	0	Ord	171	171	91/-	+1/-	3	14	6
London Eles Tron	- E1	01	0.01		۰ ۵	10	0	General Cable (5/-)	15	15	15/-		5	0	0
London & TT-	13. 42	48	203		4	10	5	Greenwood&Batley	15	15	45/9	+ 9d.	6	11	-0
London & Home	× 13	13	110		4	0		HallTelephone(10/-	$)12\frac{1}{2}$	121	31/-		4	0	8
Counties 1955-7	5 4 <u>5</u>	-1.4	112		4	0	4	Henley's (5/-)	20	20	26/-	-61.	3	17	0
Lond.Pass.Trans.]	Bd.		1001			14	-	41% Pref	43	41	24/-		3	15	0
A	43	41	1201	* 5-1	3	14	8	Hopkinsons	15	171	71/3xd	+6d.	4	18	2
в	5	5	1213	17.00	4	2	4	India Rubber Pref.	5%	51	23/-		4	15	9
0	3	31	68		4	15	7	Intl. Combustion	30	30	61		4	12	4
WestMidlandsJ.E.	Δ.							Tohnson & Phillins	15	15	75/-	+6d	4	0	0
1948-68	5	3	1061	1.0	4	14	0	Langashire Dynam	1221	201	100/-	1.1	Â	10	ŏ
								Lawrange Scott(5/	1791	191	13/_	18	1	16	9
K Ove	rseas El	ectricity	Compan	ies				Laurence, Scott(b)-	71	142	27/0		4	10	-
Atlas Elec	Nil	Nil	7/3	6.4		_		London Elec. Wire	10	10	5510	1.0.2	4	11	0
Calcutta Elec	6*	6.0	46/-	-1/-	2	12	1	Mather & Platt.	10	10	20/9	+9a.	٥ ٥	11	6
Cawnpore Elec.	10	7	39/9		3	10	4	Metal Industries (E	5) 8	24	50/6		3	7	6
East African Pow	er 7	7	34/6		4	1	4	Met.Elec.CablePref	, 5 <del>8</del>	51	21/3	- +	5	3	6
Jerusalem Elec	7	5	29/-	· · · ·	3	9	0	Mid. Elec. Mfg.	25	25	18		3	10	3
Kalgoorlie (10/)	5	5	11/6		4	7	0	Murex	20	20	98/9	+ #	4	1	0
(Madrag Flog	NU	4	29/-		2	15	4	Newman Ind. (2/-)	20	20	6/3	+3d.	6	8	0
Montreal Der	11	11	201					Philco (2/-)	-	_	12/6	-6d		-	
montreat Power	12	10	2010		5	19	5	Power Securities	6	6	29/		4	2	9
Migenan Elec.	8	10	20/0		0	11	2	Pve Deferred (5/-)	25	25	32/6		3	17	0
Palestine Elec."A'	5.0	5.0	39/-		2	TI	D	Bansome & Marles	20	20	86/3		4	12	10
Perak Hydro-elec	. 6	7	13/6	-1 B				Revo (10/-)	171	171	41/-		4	5	6
Tokyo Elec. 6%	6	6	27	- 4		10	-	Revrolle	121	191	67/6		3	14	5
VictoriaFallsPow	er 15	15	41	2.5	3	10	0	Indyroue	Galler	102	and manach		0		0
WhitehallInv.Pre	f. —	6	25/6	4.5	4	14	0	(0	- wanter	a on ne	err page)				

\* Dividends are paid free of Income Tax.

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Compony	Divi	dend	Middle Price	Rise		Yie	ld	Composy	Divide	end	Middle Price Nov.	Rise		Yiel p.c	đ	
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Stemens Ord.	12	72	36/-	+60.	4	3	4	Cape Elec. Trams	3	10	1716		4	4	2	" enj
Strand Elec. (5/-)	10	122	12/-	+ 11	9	4	2	Lancs, Transport	10	10	#1/0	-1-21-	Ŧ		0	1123
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ans (5/-)	20	20	18/6	11	5	8	1	5% Prefd	0	2	1161	11	0	5	9	mi i
<b>T.O.O.</b> (10/)	5	71	23/9	+ 18	3	3	2	5% Pref.	0	10	1102	±1	3	5	10	EN. F
Т.С. & М.	10	10	56/	1.4	3	11	6	T. Tilling	10	10	02/-		~	-	0	1.11
TelephoneMig.(5/-	) 9	9	12/-		3	15	0	West Riding	10	10	40/-		2		0	See B
Thorn Elec. (5/-)	20	20	26/3		3	16	0	T	leasab	and T	lenhone					1US
Tube Investments	20	20	96/9	+9d.	4	2	8	Amelo Ame (Gol )	anglahn	anu	stephone					9
$\nabla$ actric (5/-)	Nil	22妻	17/3	11	6	10	- 6,	Angio-Am, 1ei. :	~	c	1991 vd	<b>1</b>	4	18	0	Lie
Veritys (5/-)	71	7불	8/	1.1	4	13	9	Prei.	11.1	11	20		5	0	0	101
Walsall Conduits(4	/-)55	55	50/6	+6d.	4	7	0	Der	12	12	27/-	- 63	5	10	-	a se
Ward & Goldstone								Anglo-Portuguese	8		211-		0	10	10	12
(5/-)	20	20	30/-		3	6	8	Cable & wireless :	~ 1	<b>F1</b>	1741			1.0	1	- 10
WestinghouseBrak	e 12 <del>]</del>	14	75/-	1.1	3	14	8	b <sub>2</sub> % PreL	02	全日	1142	· · ·	4	10	1	- 1041
West, Allen (5/-)	71	71	7/6	1.1	5	0	0	Urd	4	4	802	-1	4	19	9	in St?
								CanadianMarconis	INU	4cts.	9/-	11		-		10101-21
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Pref. Ord.	8	- 8	180			9	Ū.	Marconi-Marine.	$7\frac{1}{2}$	71	36/6xd	+6d.	4	2	4	111 (564
Bristol Trams	10	10	57/-	4.4	2	10	2	Oriental Tel. Ord.	16	10	49/6	2.5	-			Isson-
Brazil Traction.	12	2	267	-1	7	9	.7	Telephone Props.	Nil	6	21/3		0	13	0	or with
Calcutta Trams	61	71	72/6	+3/-	2	1	2	Tele. Rentals (5/-)	10	10	12/-		4	3	4	1 3 - 141
			* T	ividend	ls a	are	paic	i free of Income Tax	c .							BESTIC

#### Stocks and Shares(Continued from page 680)

sidiaries which carry on the business of manufacturing and installing electric lighting equipment. At the present price the shares give a return of  $5\frac{3}{4}$  per cent. on the money.

#### **M.E.M.** Shares

Midland Electric Manufacturing shares at the present price of  $7\frac{1}{4}$  give the comparatively meagre yield of  $3\frac{1}{2}$  per cent. on the money, calculated on the basis of the 25 per cent dividend paid annually for the past seven years. The company's year ends with December and the accounts usually appear in the following April. Of the 25 per cent. just mentioned, 10 per cent. is declared as dividend and 15 per cent. as bonus. These have been paid out of earnings substantially higher, last year's, for instance, having been just over 58 per cent., comparing with 55 per cent. in the previous year, and 52 per cent. in 1941. The present price of the shares is the highest reached since 1938, having in the meantime dipped to a little under 5. The high price indicates the anticipation that distribution may be increased when conditions permit.

#### Jerusalem Electric

Jerusalem Electric ordinary shares are unchanged at 29s., at which the yield on the money is a modest £3 9s. per cent., subject, however, to Dominion income tax relief on the dividend payments. The chairman said at the meeting the other day that the company

was doing well, but that the rise in costs had The become an important feature. He warned customers that it might become necessary to The company has paid put up the charges. annual 5 per cent. dividends from 1941, with h before which there was 7 per cent. per annum the for three years. Distributions have been on a Burne a conservative basis throughout the company's existence, and from the balance sheet a constant point of view the company occupies a strong [ Ok ] position. Its concession gives the company the sole right to supply electricity in data Jerusalem, Bethlehem and other areas, with a population of over 100,000.

#### **Preference Shares on Offer**

The general run of preference shares in the M. M. best class of the Home electricity supply al Bon companies stands on a basis of a yield rather ILung. 1 less than 4 per cent. on the money. By way L Gordo of illustration, Metropolitan Electric  $4\frac{1}{2}$  per cent. preference at 24s. pay £3 15s. per cent. while Midland Counties sixes at 30s. 6d. give light £3 18s. 6d. Yorkshire sixes are offered at 11 1544 31s. 3d. as to 5,000 shares, giving at that price £3 16s. 9d. The "Three Counties" (Shropshire, Worcester and Stafford) 6 per cents. can be bought at 30s. 9d., yielding £3 18s. per cent., and there are 10,000 Electrical Distribution of Yorkshire sixes on the offer at 30s. 3d., these returning £3 19s. 3d. 1-" Ele The level 4 per cent. is available from the controlli 5,000 North Eastern Electric sevens at 35s. (56492) In each of these cases the amount of dividend is well covered by the last-published profits.

An en



#### Electrical Specifications Recently Published

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

ACTON Bolt & Fine Threads, Ltd., and G. F. Chellis.—" Electrical forging processes." 12070. July 24th, 1943. (564879.) Akt.-Ges. Brown, Boveri & Cie.—" Bushing for electrical conductors passing through the metal casing of high-voltage apparatus." 12536/43. July 2nd, 1942. (564952.) Akt.-Ges. für Technische Studien.—" Thermal power plants." 6861/43. May 9th, 1942. (564941.) " Thermal power plant." 9098/43. June 26th, 1942. (564947.) Allmänna Svenska Elektriska Aktiebolaget.—

Armania Sousa Flow-out circuit-breakers." 5518/43. May 29th, 1942. (564950.) Arrow Electric Switches, Ltd.—" Push-pull switches." 14173/43. April 9th, 1943. (564887.)

C. J. Beaver, N. Dixon and W. T. Glover & Co., Ltd.--"Electric cables." 12432. July 30th, 1943. (564882.)

R. Besson.—" Multi-circuit electrical con-nectors or switches." 5982. April 14th, 1943. (564912.)

K. E. Beswick.— Electric cartridge fuses." 1743. February 18th, 1943. (564897.)

743. February 18th, 1943. (564897.) British Thomson-Houston Co., Ltd.— Washing machines." 5807/43. April 17th, 1942. (564907.) "Electric-discharge devices." 8115/43.' May 22nd, 1942. (564945.)
\* Resinous condensation products." 15613/42. November 14th, 1941. (564999.)
\* British Thomson-Houston Co., Ltd. General Electric Co.).—"Centrifugal com-ressors." 12140. July 26th, 1943. (564918.) "Electric converting apparatus." 15992. Sep-tember 29th, 1943. (564972.)
E. K. Cole, Ltd., and J. N. I. Evans.— Fluorescent low-pressure mercury-vapour dectric-discharge lamps." 8889. June 3rd, 1943. (564946.)

1943. (564946.)

Dubilier Condenser Co. (1925), Ltd. (W. Dubilier).— Casings for electrical condensers or other electrical devices." 15942. September

 Bother electrical devices. 19942. September 28th, 19943. (564971.)
 General Electric Co., Ltd., and D. C. Espley.
 "Switches for high-frequency electrical oscillations." 10609. June 20th, 1940. (564988.)
 H. H. Gordon (Allmänna Svenska Elektriska Aktiebolaget).—" Arrangement for pneumatic operation of electrical circuit-breakers. uska Aktiebolaget).—" Arrangement for pneumatic operation of electrical circuit-breakers.
§516. June 15th, 1943. (Convention date not granted.) (564949.)
S. I. Hitchcock.—" Permanent or electromagnet motor or generator structures." 6370.
April 21st, 1943. (564865.)
Landis & Gyr Soc. Anon.—" Short period press-button switch." 12239/43. August 13th, 1942. (564962.)

1942. (564962.)

Limit Engineering Co., Ltd., and A. L. Collins.—"Electric motors having automatic speed controlling means." 4536. March 19th,

 speed controlling means. 4536. March 1916.
 1943. (564922.)
 A. Love.—" Moving coil electrical measuring instruments." 5845. April 12th, 1943. d p1 (565017.)

J. Lucas, Ltd., and A. J. Bailey.—" Electrical connections." 4946. March 26th, 1943. (564862.)

(564862.) Marconi's Wireless Telegraph Co., Ltd.— "Radio receivers of the superheterodyne type." 5954/43. April 14th, 1942. (564911.) "Radio apparatus and tuning mechanism therefor." 6021/43. May 30th, 1942. (564930.) "Receivers for receiving modulated carrier wave signals operating with noise reduction." 6177/43. April 17th, 1942. (564957.)

Marconi's Wireless Telegraph Co., Ltd., E. Green and N. H. Clough.—" Radio trans-mitters." 6072. April 15th, 1943. (564934.) Micro Switch Corporation.—" Snap-action electric switches." 16387/43. December 21st,

1942. (564975.)

Philips Lamps, Ltd., and E. S. Waddington.
—"Electric welding heads." 6154. April 16th, 1943. (564939.)
M. P. Rubert.—"Electric resistance heating elements." 7228. May 7th, 1943. (564869.)
J. Wardley-Smith.—"Gain-control systems of radio receivers." 11903. July 21st, 1943.

(564917.)

Standard Telephones & Cables, Ltd.-"Electro-discharge apparatus for generating electro-magnetic waves." 5724/41. June 5th, 1940. (564858.) "Telegraph systems." electro-inaguete of the systems. 1940. (564858.) "Telegraph systems. 11931/42. August 28th, 1941. (564893.) "Electric dry surface-contact rectifiers." 16114/43. October 3rd, 1942. (564973.) "Electric rectifiers of the junction layer type." 16957/43. October 17th, 1942. (564977.) "Methods of improving rectification ratio in selenium elements." 17422/43. March 15th, 1943. (564980.) "Methods of making selenium elements such as for electric rectifiers." 17893/43.

elements such as for electric rectifiers." 17893/43. November 5th, 1942. (564981.) Standard Telephones & Cables, Ltd. (Inter-national Standard Electric Corporation).— "Mechanical commutators suitable for rectifying alternating currents." 14865. Sep-tember 10th, 1943. (564888.) Standard Telephones & Cables, Ltd., and W. H. D. Yule.—"Electrical overload and like cut-out arrangements." 6109. April 16th, 1943. (564935.)

1943. (564935.)

Stratton & Co., Ltd., and H. N. Cox.— "Radio components such as variable con-densers." 15380. September 20th, 1943. (564970.)

Wardle Engineering Co., Ltd., and D. H. Ogley.—" Reflector fittings for electric lamps." 10264. June 25th, 1943. (564951.)

## TRADE MARK APPLICATION

A PPLICATION has been made for the registration of the following trade mark.

### 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.

Australia.—Western Australian Government Electricity Supply, Perth. Boilers, pulverised coal equipment, economisers, feed pumps, air heaters, mechanical draught plant, pipework, buildings, etc.; two 25,000-kW turbo-alternators and condensing plant, etc.; and one 25,000-kW frequency changer. (October 27th.)

Blackpool. — November 27th. Borough Council. Supply and installation of three vertical-spindle axial-flow pumps of 20 c.f.s. capacity each, together with electric motors, starting gear and accessories. Forms of tender from the borough surveyor, Municipal Offices, Talbot Square (deposit, £3 3s.).

Bridgwater.—November 14th. Town Council. Supply and fitting of a 15-BHP electric motor. Particulars from borough engineer, Town Hall.

Chichester.—November 23rd. City Council. Underground cables. (November 3rd.)

Dundee. — November 16th. Corporation Education Committee. Alterations and additions to electric lighting installation at Balfour Street School. Particulars from city quantity surveyor, 21, City Square.

Edinburgh.—November 13th. Corporation. Supply and delivery to Granton Gas Works, Edinburgh, of an electrically driven centrifugal submersible pump, complete with automatic switchgear, etc. Specifications, etc., from engineer and manager, Corporation Gas Department, 15, Calton Hill.

North West Midlands. — Joint Electricity Authority. November 27th. Outdoor transformers. (See this issue.)

Tredegar.—November 30th. Urban District Council. Two kiosks, complete with e.h.v. and l.v. control gear, transformers and accessories; e.h.v. 3-core and l.v. cable. (November 3rd.)

#### **Orders Placed**

Barrow-in-Furness.—Electricity Committee. Accepted. Borehole pump (£229).—Mather & Platt.

Mansfield.—Electricity Committee. Accepted. Switchboard (£598).—Ferguson, Pailin.

Sheffield.—Electricity Committee. Accepted. Cooling tower at Neepsend power station (£69,448).—Mitchell Engineering.

#### **Contracts in Prospect**

Particulars of new works and building schemes forthe 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.

Accrington.—Maternity home; H. Sanderson, borough surveyor, Town Hall.

Cardiff.—Rolling mills, East Moors; Guest, Keen & Nettlefolds.

Cheltenham.—Factory extension, Swindon Road; John Such & Sons, Ltd. Cornwall.-Farm institute; county architect, County Hall, Truro.

Croydon.—Conversions at 450 large houses and provision of 1,000 huts for bombed out persons; E. Taberner, town clerk.

Cumberland.—Additions to the Garland Mental Hospital; county architect, 4, Alfred Street North, Carlisle.

Falkirk.—Alterations and extensions at bus station to provide canteens; W. Alexander & Sons, Ltd.

Gateshead.—Extensions and alterations to the central transport depot; F. H. Patterson, borough engineer.

Inverness.—Garages and store for North of Scotland Milk Marketing Board; manager.

Kent.—Repair workshops, College Avenue, Maidstone (£2,000); Kent Rivers Catchment Board.

Manchester.—Rebuilding portion of motor body works: T. Campion & Sons, Ltd., building contractors, Devonshire Street, Ardwick, Manchester.

Montrose.—Buildings in Commerce Street for Chivers & Sons, Ltd.; J. R. Anderson, manager.

Northampton.—Additions to Barratt Maternity Home (£16,000); borough engineer.

Norfolk.—Canteen, kitchen and stores, at Council School, Thornham; H. Moore, Director of Education, Education Offices, Stracey Road, Norwich.

Nuneaton.—Senior school, Stockingford: borough surveyor; Council House, Cotton Road.

Saffron Walden.—Joint crematorium; borough engineer, Hill Street.

Sheffield.—Garage, Duchess Road (£4,750): M. J. Gleeson, Ltd.

Classroom blocks at Southey Green, Abbeydale and Gleadless Council Schools; W. G. Davies, city architect, Town Hall.

South Shields.—Timber and joinery works. Templetown, for W. Clunie & Sons, Chichester Joinery Works.

Alterations to offices for the Middle Dock Co.,

Ltd.; J. H. Morton & Son, architects, Fowler Street, South Shields.

Stoke Prior.—Factory, L. C. Harris & Co., Stoke Prior Brush Works, near Bromsgrove.

Stoke-on-Trent.—Extensions (£6,989), to City Maternity Hospital; A. Burton, city engineer, Town Hall.

Stretford.—Works additions, Westinghouse Road: Rubber Regenerating Co., Ltd.

Surrey.—Buildings for kitchen and dining room at Tiffin Boys' School, Kingston-on-Thames ( $\pounds$ 2,750); county architect, County Hall, Kingston-on-Thames.

Wallsend — Rebuilding two workshops for R. Hood Haggie & Sons; Alnwick Construction & Engineering Co., Ltd., Alnwick, Northumberland.

Additional maternity home accommodation; horough engineer.

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245	G.E.C.	490	Slipring	Brush lifting and short circuiting gear
90	B.T.H.	975	Slipring	Starter and Circuit Breaker
85		720	Slipring	Oil immersed Starter
50	Crompton	580	Squir. Cage	
50	G.E.C.	1450	Squir. Cage	New
30	Bruce Peebles	720	Slipring	Starter
25	G.E.C.	960	Slipring	

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**ELECTRICAL REVIEW** 

## alone in our sphere !

No, we're not one of those poor fish who wander about in aimless circles .... quite the reverse. Our aims are clearly defined; which is why we can take the direct route to the solution of each small stamping and pressing problem that comes our way, and also why our customers never leave us alone for long.

SMALL STAMPINGS AND PRESSINGS FOR ELECTRICAL, RADIO AND LIGHT ENGINEERING PURPOSES.





200, 100, 50, 25 watt. (All models can be supplied ganged)

# FOX TOROIDAL POTENTIOMETER

CERAMIC INSULATION ONLY — AND APPROVED FOR TROPICAL CONDITIONS (K.110). COMPLETE CERAMIC RINGS FOR STRENGTH. APPROVED BY ALL GOVERNMENT DEPARTMENTS EXCELLENT DELIVERY ON PRIORITY MINISTRY CONTRACTS

### ALL TYPES OF TOROIDAL WINDINGS

Telephone P. X. FOX LTD. Horsforth 2939 No. 2 FACTORY . HORSFORTH · YORKSHIRE

November 10, 1944

## METERING EQUIPMENT WITH A THREE-WAY SAVING •



TRANSFORMETER with terminal cover removed to show simplicity of connections

## TRANSFORMETERS

(COMBINED METER AND CURRENT TRANSFORMERS)

Consider the time, labour and space involved in fixing a meter with three separate transformers, as compared with the installation shown above.

TRANSFORMETERS ARE AVAILABLE in KWh, KVAh, KVAhr, TWO-RATE, MD I, Etc.

Manufacturers :

**CHAMBERLAIN & HOOKHAM LTD., BIRMINGHAM** 

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#### ELECTRICAL REVIEW

ADVERTISEMENTS for investion in the following Friday's issue are accepted up to First post on Monday, at Dorset House, Stamford Street, London,

THE CHARGE for advertisements in this section THE CHARGE for advertisements in this section is 21- per line (approx. 8 words) per insertion minimum line 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.

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

A D V BRANSIBINI BINA

Original testimonials should not be sent with applications for employment.

917

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#### OFFICIAL NOTICES TENDERS, ETC.

NORTH WEST MIDLANDS JOINT ELECTRICITY Authority

#### Contract No. A.272

#### **Outdoor Type Static Transformers**

TENDERS

TENDERS are invited for the supply of OUTDOOR A copy of the Specification and Form of Tender may be obtained from Mr. F. Favell, Chief Engineer and Manager, York Chambers, Kingsway, Stoke-on-Trent, on payment of \$2 (TWO POUNDS) in currency notes. Tenders must be delivered to the undersigned by the first post on MONDAY, 27th NOVEMBER, 1944, in the system surveiled

The Authority do not bind themselves to accept the lowest or any tender. E. B. SHARPLEY. Clerk.

York Chambers, Kingsway, Stoke-on-Trent, 27 October, 1944.

24

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#### CITY OF CHICHESTER

#### Cables, Laying and Roadwork

THE Council of the City of Chichester invite tenders from experienced firms for Underground Cables. Accessories and Roadwork in their area. The specifica-tion and forms of tender may be obtained on application to the Consulting Engineers, MacKness & Shipley. Parliament Mansions, Abbey Orchard Street, London. Parliament Mansions, Abbey Orchard Street. S.W.1.

Tenders, in plain scaled envelopes, endorsed "Tender for Cables," must be delivered to the undersigned not later than noon on the 23rd November, 1944. The Council do not bind themselves to accept the lowest

or any tender.

ERIC BANKS, Town Clerk. 881

#### SITUATIONS VACANT

26th October, 1944.

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

A PELICATIONS are invited for the position of Chief of the Electrical Design and Development Section of electronic design of the position of the position of the relevance of the electrical engineer relevancy with a degree in engineering. They should be hand design of small A.C. and D.C. motors and methanical design of small A.C. and D.C. an

#### CITY OF LIVERPOOL

Appointment of Radiological Engineer, Municipal Hospitals

A PPLICATIONS are invited for the appointment of Radiological Engineer to the Municipal Hermitels for Radiological Engineer to the Municipal Hospitals for whole-time service

whole-time service. Candidates must have an extensive practical knowledge of the design, construction and operation of X-ray Equip-ment of various types of manufacture and must be capable of exercising supervision over the purchase, maintenance and servicing of the whole of the Radiological apparatus and material at the various Municipal Hospitals, the value of which is estimated at approximately £30,000. It is essential that candidates must have had executive and administrative experience and be capable of assisting in the training of Radiography Students attached to the various X-Ray Units.

Preference will be given to candidates who hold a degree in Electrical Engineering or are Corporate Members of the Institution of Electrical Engineers. Salary at the rate of £650 per annum, together with cost of living bonus, at present amounting to £49 8s.

cost of living bonus, at present amounting to £49 8s. per annum. The post will be subject to the provisions of the Local Government Superannuation Act. 1937. Applications, stating age, nationality, qualifications, experience and details of previous appointments, and accompanied by copies of three recent testimonials, should be endorsed "Radiological Engineer." and sent to the undersigned not later than Wednesday, 22nd November. 1944.

unicipal Buildings.	~	44.	Π.	Town	Clerk.
Dale Street, Liverpool, October, 1944.	2.				907

COUNTY BOROUGH OF BURTON-UPON-TRENT

#### Electricity Department-Charge Engineer

A PPLICATIONS are invited for the above post. The

A PPLICATIONS are invited for the above post. The appointment will be in accordance with the National Joint Board Conditions of Service, Class G. Grade 8. The person appointed must have had experience in the operation and control of modern steam boiler plant and Turbo Alternators. The appointment will be terminable by one month's written notice on either side and will be subject to the Local Government Superannuation Act, 1937. The selected candidate will be required to pass satisfactorily a medical examination.

a medical examination. Applications, stating age, particulars of training and experience, and accompanied by three recent testimonials, should be forwarded in scaled envelopes endorsed "Charge Engineer" to the Borough Electrical Engineer, Church Croft, Horninglow Street, Burton-upon-Trent, not later than Friday, the 17th November, 1944.

disqualification.

H. BAILEY CHAPMAN, Town Clerk.

Town Hall. Burton-upon-Trent. 24th October, 1944.

867

AN experienced London Sales Representative required by small old-established motor manufacturers. A good connection amongst buyers of A.C. motors essential. State age, experience, salary.—Box 6465. c/o The Elec-trical Review.

#### CITY OF CARDIFF ELECTRICITY DEPARTMENT

#### **Roath Power Station**

A PPLICATIONS are invited for the position of Assis-tant Combustion Engineer at the above Power Station.

Applicants are required to have trained as mechanical engineers, received a good technical education, and had practical experience in the operation of modern high pressure, high temperature boiler plant in a power station. The terms and conditions of employment are those of the National Joint Council, and the position is graded as Grade 8, Class J, the present salary being £459 per annum.

Forms of application may be obtained from Edward Jones, Esq., M.I.E.E., M.I.Mech.E., City Electrical Engineer and Manager, The Hayes, Cardiff, and should be sent to me before November 27th, 1944, in an envelope endorsed "Assistant Combustion Engineer."

City Hall, Cardiff.

24th October, 1944.

S. TAPPER JONES. Town Clerk.

923

#### HERTFORDSHIRE COUNTY COUNCIL

#### County Accountant's Department

A PPLICATIONS are invited for an appointment in the A above department from persons who have had a wide practical experience in stocktaking and stores accounting and who are competent to introduce and con-trol modern systems in a wide variety of stores departments.

ments. The commencing salary will be £500, rising by two annual increments of £25 to £550, together with a cost of living bonus, which is at present £49. Whilst the office hours are extended an additional allowance will be made. Under the Council's regulations no appointments during the war are made on a permanent basis. Applications should be accompanied by two recent testi-monials and sent to the County Accountant, County Hall, Hertford, before 15th November, 1944.

ELTON LONGMORE. Clerk of the County Council 911

#### CITY AND COUNTY OF KINGSTON-UPON-HULL

A PPLICATIONS are invited for the post of Manager of the Hull Corporation Telephone Undertaking, at a salary of £1,000 per annum, rising by annual increments of £50 to £1,200 per annum. The post is superannuable. salary

The person appointed will be required (a) to pass a medical examination, (b) to reside within the City, and (c) to devote the whole of his time and attention to the duties of the office.

Forms of application and further particulars of the duties and conditions of service may be obtained from the undersigned.

Applications, endorsed "Telephone Manager," must reach the office of the Town Clerk, Hull, not later than noon on Monday, 1st January, 1945.

	ALEXANDER	PICKARD.
Guildhall, Hull.		Town Clerk.
October, 1944.		860

Arter the restrictions controlling the engagement of mechanical engineering firm of standing would consider the post war engagement of a Mechanical Designer with sound academic and practical qualifications, including Must possess good personality, initiative and creative ability. The post would be of a permanent nature with slary according qualifications. Write stating age, quali-cations, etc., to - Box 921, c/o The Electrical Review. ArtER the restrictions controlling the engagement of personnel are removed, old established manufacturers relation Engineer for post-war engagement, capable design-ing fittings, with sufficient electrical knowledge undertake design miscellaneous associated accessories. Applicant must have experience and possess initiative. Permanent sot suitable man. Salary according outlifeations and experience. Write, stating age, experience, etc., to—Box artTERY Manager required (London). State experi-ence, references.—Box 927, c/o The Electrical Review.

A SSISTANT Distribution Engineer (Development). Luton Corporation Electricity Undertaking. Appli-cants should have had a sound technical training and inst-class experience of distribution technique, and should give details of distribution work on which planning ex-perience has been obtained. The successful candidate will be required to specialise on development work in urban and rural areas and will work in close co-operation with the Assistant Distribution Engineer (Operation) under the Distribution and Mains Superintendent and in close haison with the Technical and Constructional Engineer, and will be responsible for the detailed layout, estimates and pro-gramming of schemes involving underground cables, over-of the remaining D.C. portion of the urban area. Salary will be in accordance with N.J.E., Class H. Grade 6 (commencing at 2506 p.a.). The appointment will be subject to the provisions of the Local Government Super-annuation Act, 1937. Applicates should wrife, quoting D.973XA, to the Ministry of Labour and National Service for the necessary forms, which should be returned com-pleted on or before 21st November, 1944. 937 A SSISTANT Distribution Engineer (Development).

BOOKKEPER with knowledge of s/hand typewiling for electrical contractors' office. Write, stating age. experience and salary required.—Box 6399, c/o The Elec-trical Review.

CHIEF Clerk (35-50) required to take charge of plant maintenance office in factory of 5,000 employees (S.W. London). Must be familiar with engineering and building terms (able to deal with W.R.O.'s, etc.) and work on own initiative, capable of controlling mixed staff. working knowledge of shorthand and typing an advan-tage. Salary £300 per annrum. Good post war prospects. Box No. 855, L.P.E., 110, St. Martin's Lane, W.C.2. 913 CCROMPTON Pachinger Limited have completed their

tage. Salary isou per annum. Good post war prospects. Box No. 855, L.P.E., 110, St. Martin's Lane, W.C.2. 913 CROMPTON Parkinson Limited have completed their plans for the maximum production and distribution of an extended range of electrical products both at home-and overseas in the post war period. They wish to have available for consideration a comprehensive list of poten-tial Sales Managers and Sales Engineers. The list will include employees at present serving with H.M. Forces. men still in the organisation, and suitably qualified men not previously employed by the company. These last may at present be employed elsewhere or in the Forces, but applications, experience and outflook. Some of the products to be dealt with are electric motors of all types-switchgear, transformers, cable, lamps, electric vehicles, electric trucks and accumulators. All correspondence, which will be treated in the strictest confidence, should be addressed to—The Chief Personnel Officer, Crompton Parkinson Lid., Electra House, Victoria Embankment, London, W.C.2. 911

London, W.C.Z. **D**LECTRICAL contractors, with head office in London. require Area Manager for Birmingham with know-ledge of all classes of power and lighting installations, preferably with a connection in the district. Details of experience, age and remuneration in confidence to—Box 916, c/o The Electrical Review.

experience, age and remuneration in confidence to-Box 916, c/o The Electrical Review. ENGINEER for electricity supply company with maxi-mum demand of 600 kW. Applicants should have had previous service with an electricity supply under-taking and experience in 11,000 volts E.H.T. and L.T. alternating current and direct current distribution. Is to be capable of taking charge under the general manager of electrical section of the undertaking. Applications, stating qualifications, experience, salary required and position as regards national service, to be addressed to-A. E. Scott, Secretary, Brixham Gas & Electricity Co., 0, Cannon Street, E.C.4. 909 ENGINEERS required by the Government of Nigeria for the Posts and Telegraphs Department ior one-between 284 and £204 according to dependants. Free passages and quarters. Conditates must hold a univer-sity degree in electrical engineering or have passed the hestsociate Membership examination of the Institution of Electrical Engineers, or hold certificates carrying exemp-tion for Part II of the Institution's examination, and have been definitely trained in telecommunication work. Applicants should write, quoting D.971A. to the Ministry of Labour and National Service, Room 432. Alexandre House, Kingswar, W.C.2, for the necessary forms, which should be returned completed on or before IIIh Decem-her, 1944. 912 which Decem-

**FXPERIENCED** Shorthand Typist-Bookkeeper required for electrical contractors' office in Hendon district. Permanent situation for suitable applicant.—Box 910, c/o interest in the second second

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THE directors of an established London firm of elec-trical contractors wish to engage a gentleman with wide experience and practical knowledge of Electrical Contracting in all its branches (including Underground Cable work) from the tendering stage to final completion. to take full charge and obtain and carry cut contracts. both Government and private. The prospects for a suit-able man are excellent, and a good salary would be offered. Apply in confidence to—Box 899, c/o The Electrical Review. WYORKS Manager required by well-known manufac-teries of electric fires and domestic appliances. Applicants must be under 40, with general technical and practical knowledge and experience in factory production and modern organisation. Salary commercing 3750 p.a., with excellent prospects.—Box 918, c/o The Electrical Review.

Review.

# SITUATIONS WANTED

SITUATIONS WANTED Mains Engineer (32), A.M.I.E.E., pub. ech. and univ., coy. and municipal experience all voltages up to 38 kv, seeks appointment as technical representative.-box 6457, c/o The Electrical Review. Young Engineer (24), desires contact progressive firm for responsible position with good post-war prospects. Inst-class education, electrical and mechanical, fluent Ger-man, incl. techn. terminology, and French. Two years' electrical research and drawing office. Good technical cor-respondent. Consider later appointment abroad.-Box 6468, c/o The Electrical Review. DVERTISER (45) desires position as Sales Repre-sentative or Assistant to Contracting Manager horough knowledge of planning and carying out instal-lations and of maintenance. Permanent position required, preferably in South.-Bex 6460, c/o The Electrical Engineer, dviers position in London and Southern Counties. The years in area contacting government departments, rem stating, heating equipment and installations, resist-ances, transformers. Representative or agent. Car.--Box 6412, c/o The Electrical Review. A Usenting the stating equipment and installations, resist-ances, transformers. Representative or agent. Car.--Box 6412, c/o The Electrical Review.

contracting, heating equipment and installations, resistances, transformers. Representative or agent. Car.—
Box 6412, c/o The Electrical Review.
A Li-round Engineer (42), organisation. design, layout, small scale production, also breakdown and repair work, very wide experience medium size electrical apparatives, seeks position scope, responsibility, for post-war. Transfer now under certain conditions.—Box 6401, c/o The Electrical Review.
ELECT. Eng. requires position end of war, 18 yrs. traction maintenance. includes trolley bus, Diesel exp., Grad. I.E.E., H.N. Cert. Mech. Eng.—Box 6398, c/o The Electrical Review.
ELECTRICAL Engineer (31), A.I.E.E., now serving with Forces, desires post-war situation with supply company as engineer or assistant. Experience of generation, transmission and administration. Similar position held, technical qualifications, excellent references.—Box 6409, c/o The Electrical Review.
PLECTRICAL Tester, female, experienced on all types

ELECTRICAL Tester, female, experienced on all types L. A.C., D.C. machines and equipment, either heavy or light current, desires position in North London area. Please send details to—Box 6443, c/o The Electrical Review

**T**LECTRICIAN seeks post, Supervisor, or charge of factory plant, A.C. or D.C. layouts, 20 years' experi-ence, excellent ref.—Box 6430, c/o The Electrical Review. **L**LECTRICIAN, 22 yrs.' experience inst. and maint. seeks supervisory post.—Box 6468, c/o The Electri-

cal Review

Seeks supervisory post. ---BOX 00005, 0/0 The Electric al Review.
TMTERPRISING Gentleman (36, exempt), seeks change. 20 years' experience power companies' administration, sales organization (domestic electrical appliances), electrical contractine. Would consider any reasonable proposition as sales executive, buyer or area representative. --Box 0416, c/o The Electrical Review.
TXECUTIVE Engineer desires change with post-war proposed by workshops manager, temporary war-time position. Expt. radio compt. manuf. electr. and mech. equipt. motors, switchgear, engines. Any area.--Box 6411, c/o The Electrical Review.
Motor Control Gear Technical Sales Engineer (32), desires post war representative position with progressive undertaking, manuacturers or consultants. Residence and connections in North Midlands.--Box 6470, c/o The Electrical Review.

and connections in Forth runatus. But other of the Electrical Review. G ENERAL Manager (41), with 20 years' experience in G light electrical mechanical and radio products, new available to join company in executive capacity. Specialist in all phases of factory organisation and administration, production, costing, purchasing and material control.—Box 6458, c/o The Electrical Review.

**INSULATING** Sleevings. Advertiser, extensive techni-cal and practical manufacturing experience in thermo-plastics, varnished and rolled silk sleevings, wishes to contact manufacturer: view expansion or initiate new production.—Box 6467, c/o The Electrical Review.

ELECTRICAL REVIEW

**DERSONNEL Manager desires permanent appointment.** Fully conversant with Ministry of Labour. Essential Work Orders. Trades Union procedure, experienced in engagement of labour, welfare, management, etc. Accus-tomed to controlling up to 6,000 male and female workers. - Date 6440, c/o The Electrical Review.

QUALIFIED Mechanical and Electrical Engineer desires change as Works Manager. Wide experience with meter, instrument and small electrical precision manufac-ture, capable organiser, experienced disciplinarian. Lon-don area.—Box 6446, c/o The Electrical Review.

YOUNG Man (19), taking Ord. Nat. Cert. Elec. Engine, seeks progressive situation in radio engineering.— Box 6471, c/o The Electrical Review.

# FOR SALE

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

GEORGE COHEN, SONS & CO. LTD.

GUARANTEED ELECTRICAL

#### PLANT.

MOTORS. GENERATORS.

#### SWITCHGEAR,

etc.

WOOD LANE, LONDON, W.12. Telephone : Shepherds Bush 2070

and STANNINGLEY, NEAR LEEDS. Telephone: Pudsey 2241.

Established 1834.

27

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# ENQUIRIES SOLICITED

BRASS & STEEL B. A. NUTS. BRASS & SIEL B. A. NOIS. Sizes stocked for immediate delivery: Brass: 0, 2, 4, 6, 8 and 10 B.A. Full and Lock. Steel: 0, 2, 4, 6, 8 and 10 B.A. Full 0, 2, 6, Lock. Also Stocked: Brass & Steel Washers, Brass & Steel Studium Studding. APEX SALES 6, Leaside Rd., London, E.5. STA. 7131.

#### 50-kVA TRANSFORMER

BRUSH. 3-phase. 50 cycle. 6.500/400. with Long & Crawford Switchfuse. Built in 1940 and little used.—Box 947. c/o The Electrical Review.

## **ALTERNATORS**

# Suitable for 400-3-50, in perfect condition. 65 kVA 1,000 r.p.m. with exciter

160	FA4	300	r.p.m.	for c	oupling	
170	EVA	1,000	r.p.m.	with	exciter	
235	kVA.	300	T.D.m.	for c	oupling	
600	LVA.	300	I.D.M.	for c	oupling	

J. GERBER & CO. LTD., Wembley, Middx

# METROPOLITAN BOROUGH OF WOOLWICH

November 10, 1944

## **Electricity Department**

THE Electricity Committee of the above Council invite tenders for the purchase and removal of one Peebles-La Cour Motor Converter, 1.000 kW, 3-phase, 50 crcles, 6,600 volt to 450/550 volt D.C., with D.C. switchgear and

This plant can be seen in running order and in general use at the Council's Generating Station at Bellwater Gate. Woolwich, S.E. 18.

Woolwich, S.E. 15. It is available for purchase immediately, and further information, if required, may be obtained prior to sub-mitting a tender, from the Borough Electrical Engineer. Electric House, Powis Street, Woolwich. Tenders, sealed and endorsed "Tender for Motor Con-verter." to be addressed to me at the Town Hall, Welling-ton Street, Woolwich, delivered not later than 12 noon on Tuesday, 14th November, 1944. The Committee do not bind themselves to accept the birbest or any tender.

highest or any tender.

20th October, 1944.

(By Order) DAVID JENKINS, Town Hall, Woolwich, S.E.18

Town Clerk.

875

# REBUILT MOTORS AND GENERATORS

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

SEND US YOUR ENQUIRIES.

OVER 1,000 RATINGS ACTUALLY IN STOCK HERE.

DYNAMO & MOTOR REPAIRS LTD., Wembley Park, Middlesex. Telephone : Wembley 3121 (4 lines).

Also at Phœnix Works. Belgrave Terrace, Soho Road, Handsworth, Birmingham, Telephone : Northern 0898.

# 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

For Sale or Hire. Send your enquiries to :---

BRITANNIA MANUFACTURING CO. LTD., 22-23, BRITANNIA STREET, CITY ROAD, LONDON, N.1.

Telephone: 5512-3 Clerkenwell.

MODINSTAL ELECTRIC COMPANY LIMITED INDUSTRIAL INFRA-RED APPARATUS FOR PANT DRYING. COMPLETE EQUIPMENTS OR SINGLE UNITS PROVIDED. GUARANTEED HEAT GENERATORS. OLDHAM WORKS. OLDHAM TERRACE, ACTON. W.3, LONDON.

# ARC WELDING MACHINES FROM STOCK

WE offer our latest type No. 2 Max-Arc Welder for immediate delivery, 15/250 amperes. Operates of any A.C. supply voltage. Send for details.

MAX-ARC WELDERS LTD., 190, THORNTON ROAD, CROYDON. THOrnton Heath 4276-8.

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Telephone: Acom 3504/5. M.E.C. APPARATUS, DULL EMITTER SYSTEM

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# WATER TUBE BOILERS IN STOCK

Four 25,000 lbs.	evaporation.	175 lbs	WP
Three 20,000 lbs_		1.5 100.	47.L .
One 15,000 lbs.		175 lbs.	- 13
One 12,000 lbs.		175 100	
One 12,000 lbs	F1.	113 15	1.1
One 12 000 lbs	**	200 Jhs.	
One 0/10 000 lbs		160 bs.	
One 9/10.000 1bs.	***	200 lbs.	
install complete, ind	cluding brick	Work	Francis
no Dimino Values	Clarke Street	WOLK.	Economise.

Piping Valves, Generating Sets and Motors in Please send us your enquiries; we can give immediate delivery. stock.

BURFORD, TAYLOR & CO. LTD Boiler Specialists, Middlesbrough, Telephone : Middlesbrough 2622.

RADIATORS FOR PETROL OR DIESEL ENGINES

WE have 28 radiators, new and of recent production (made by Spiral Tubes, of Derby), for disposal. These radiators are fitted with shutters, fan and pulley. fan cowil-ad complete with guards to fan and beil, etc. They are suitable for engines up to 35/45 b.h.p. continuous rating it 80/90° A. or 15/24 b.h.p. continuous rating for ambient ar temperature at 122° F. These radiators are in perfect condition, and being complete are ready for immediate use. A low price will be accepted for them in one lot. Isopaction by appointment only, or blue print of radiators can be had if required.

HARBOUR ARC MANUFACTURING CO. LTD.,

Lower Coombe Street, Croydon.

817

#### D.C. GENERATORS

kW.	Volts.	Maker.	Winding.	R.p.m.	Bearings.	
500	250	Crompton Park.	Shunt Int.	300	One Ped.	
200	230	Mather & Platt	Comp. Int.	500	Three Ped.	
200	220	B.T.H.	6.0	300	One Ped.	
150	500	Mather & Platt		375	** **	
135	235	Newton		300		
100	130	Mather & Platt	Shunt Int.	450		
60*	110	Sun Forge	Comp. Int.	300		
45	230	G. & B.		450		

GEORGE COHEN, SONS & CO. LTD., WOOD LANE, LONDON, W.12, and

STANNINGLEY, near LEEDS.

944

### ECONOMISERS IN STOCK

TWO Green's Economisers, 208 tubes, 250 lbs. W.P.

Guaranteed re-insurable and first-class condition only. low prices. Quotations per return. Installations delivered and erected complete.

#### BURFORD, TAYLOR & CO. LTD.,

7, Commercial Street, Middlesbrough. Telephone 2622.

A large stock of surplus A.I.D. Turnbuckles, etc., also searchlights (sale or hire). Mirrors, Lenses, Carbon Rods, Ebonite, Fibre, also Winches of our well-known elf-sustaining types. Hundreds of thousands supplied joins and traders. - London Electric Firm, Croydon. 42 A. C. and D.C. House Service Meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one year. Renaits and recalibrations.--The Victa Electrical Co. 47. Battersea High Street, S.W.11. Tel. Battersea 0780. 19 A.C. and D.C. Motors, all sizes, large stocks, fully and and D.C. Motors, all sizes, large stocks, fullo and D.C. Motors, all sizes, large stocks, fullo as to Julyich, S.E.22 (Forest Hill 4422). C. Motors, 1/50th h.p. to 3 h.p. from stock, for essential work only.--The Johnson Engeneerus, 5, Spencer Street, Learnington Spa. A.C. welder, petrol driven, 12 kW, 230/1/50, elf. contained, semi-nortable, as new.--J. 20 20 Matternationed States, 500 W, 500/440/3/50.

ALTERNATING Steam Set. 500 kW, 500/440/3/50, 300 r.p.m., ducet coupled with condinant, complete, Gener & Co. Ltd. Wembley, Middlesez.

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# 'Stand Easy' Black-out

BLACK-OUT CHART FOR NOVEMBER



Times shown are those for the London area.

Although black-out restrictions have been eased, it is still necessary at the time of going to press partially to black-out every day and carry out full black-out during alerts. Therefore you need Reproduced from the Nautical Almanac by permission of the Controller of H.M. Stationery Office

to know the black-out times. Nevertheless we hope by the time this announcement is published that the black-out will have been completely abolished then we can all Light up and Smile with Osram.



Adul. of The General Electric Co. Lid., Magnes House, Kingsway, London, W.C.2