

# ELECTRICAL REVIEW

FOUNDED  
1872

Vol. CXXXIX. No. 3590

SEPTEMBER 13, 1946

9d. WEEKLY

## ELLISON LIGHTING FITTINGS IN A 700 YARD LONG DRIFT IN A COLLIERY



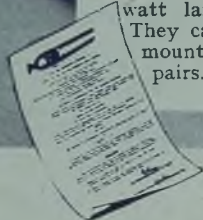
*128*

*Moss*

2

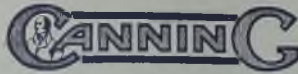


Lanterns are made in two sizes, for 60 and 100 watt lamps. They can be mounted singly or in pairs.



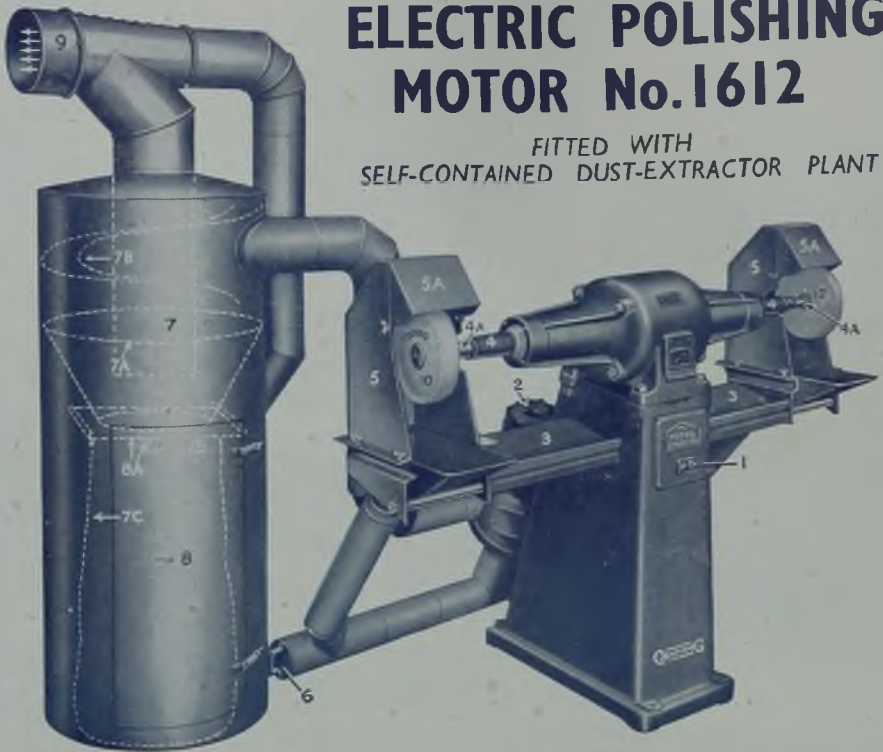
TRADE MARK

**GEORGE ELLISON**  
LIMITED  
BIRMINGHAM 22B ENGLAND



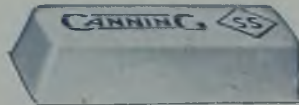
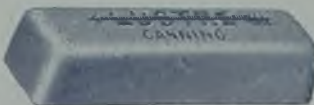
# ELECTRIC POLISHING MOTOR No.1612

FITTED WITH  
SELF-CONTAINED DUST-EXTRACTOR PLANT



Canning polishing equipment covers polishing motors, wheels, bobs, mops, brushes and polishing compositions for every purpose.

"Satene" Greaseless Polishing Composition removes burrs, tool and grinding marks and gives a satin finish to most metals. Other well-known compositions include "Lustre," "Peerless," "S.S.," etc. Let us solve your particular polishing problem.



GREAT HAMPTON ST., BIRMINGHAM.18.

# WHO'S been looking through my eyes?



"As one who has to select the most suitable types of Electrical Apparatus for simple hire or hire-purchase, my principal worry was to 'forecast' the future expense of maintenance and repairs.

"But 'Heatrae' seems to have anticipated this problem as I see it—that simplicity at the start obviously avoids subsequent 'complications.'"

## HEATRAE

leaders in electric water heaters

HEATRAE LTD., NORWICH

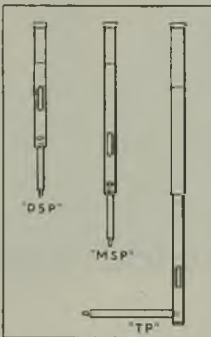
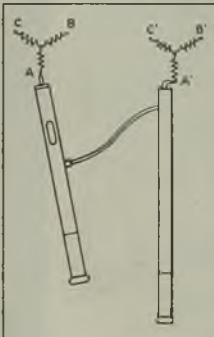
PHONE : NORWICH 25131

GRAMS : HEATRAE, NORWICH

## IS IT ALIVE?

**PHASING RODS**  
to locate interconnections  
between two A.C. systems

**VACUUM TUBE  
DETECTORS**  
Range 6,600 to 36,000 V.



Sole Makers of:—

"WESTMINSTER" PATENT  
"PARTRIDGE" DETECTORS } No Earth  
VACUUM TUBE DETECTORS } Connection  
EARTHING RODS } required

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

Victoria Road, Willosden Junction, N. W.10  
Telephone : Elgar 7579 (2 lines).      Telegrams : "Regency, Phons, London."

## TAG TERMINALS



FOR WIRELESS  
AND SIMILAR  
CONNECTIONS

A WIDE RANGE OF  
SIZES IN STOCK

**ROSS COURTNEY & CO  
LTD.**  
ASHBROOK ROAD, LONDON N.19

## BOSSSES



to the specific  
requirements of our  
customers

Makers of all  
types of repetition  
products from  
the bar in  
all metals



DO YOU GUYS  
EVEN TAKE SUGAR?

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

# **Fry's Solder**

**for every industrial purpose**

**TINMAN'S SOLDER**

**BLOWPIPE SOLDER**

**SOLDER PAINT**

**SOLID SOLDER WIRE**

**CORED SOLDER WIRE**

**SOLDER RINGS AND WASHERS**

**SOLDER TAPE AND STRIP**

# **Alcho-Re**

**Special Flux for electrical work**

*Write for samples and prices*

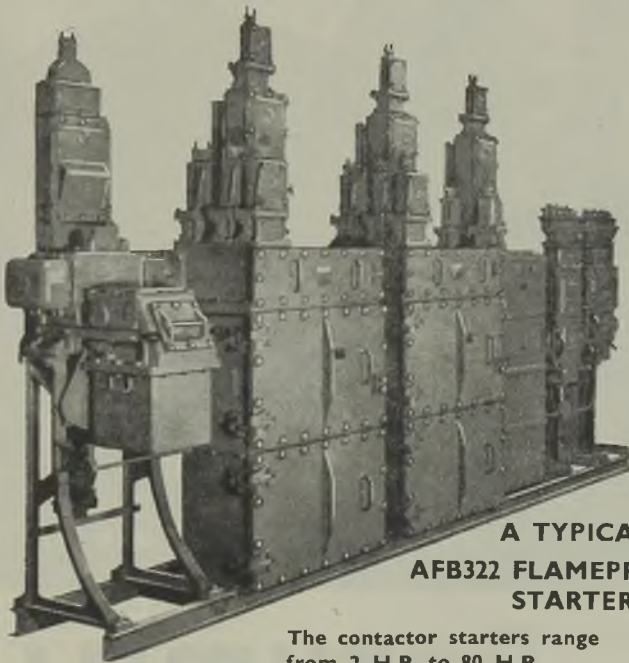
**FRY'S METAL FOUNDRIES LIMITED**

TANDEM WORKS MERTON ABBEY LONDON S.W.19

# INSPIRE CONFIDENCE BY INSTALLING



SWITCH AND  
CONTROL GEAR



A TYPICAL EXAMPLE—  
AFB322 FLAMEPROOF  
STARTER BOARD

The contactor starters range  
from 2 H.P. to 80 H.P.

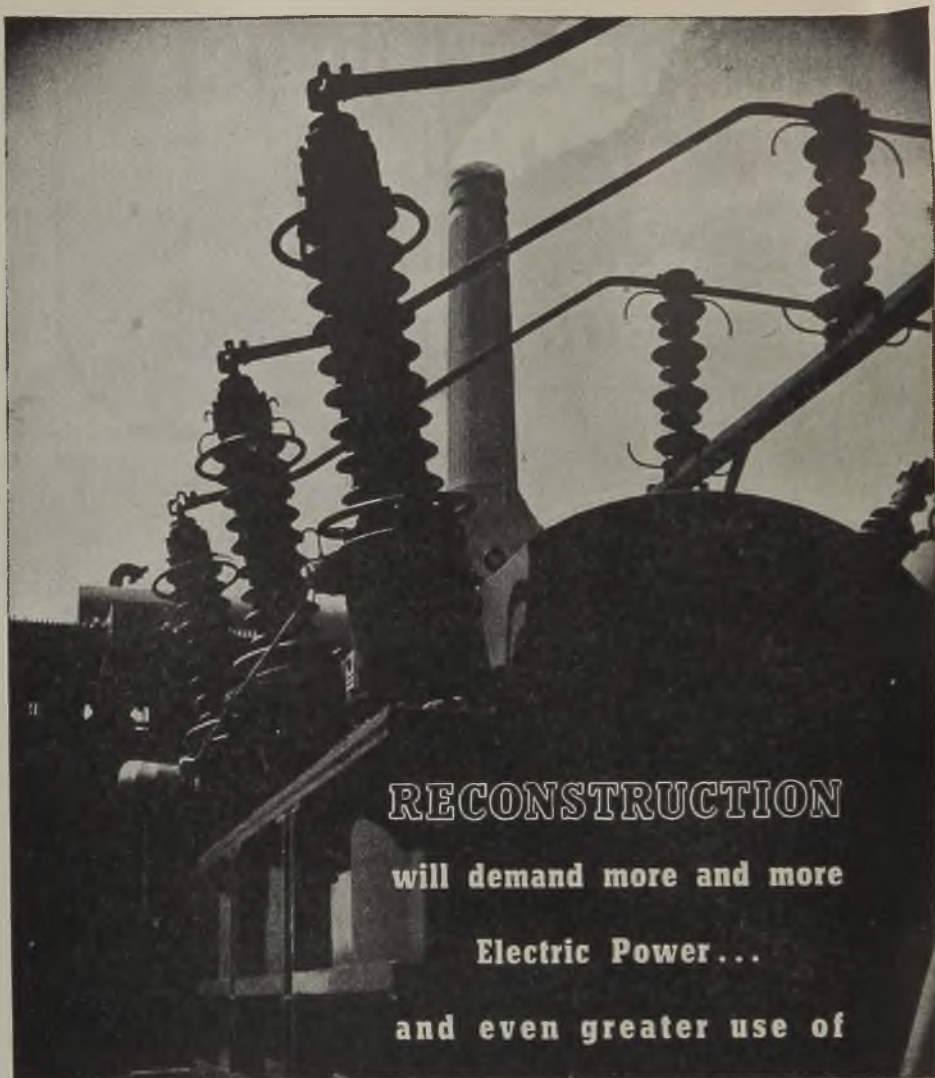


## M. & C. SWITCHGEAR LTD.

KELVINSIDE WORKS, KIRKINTILLOCH, GLASGOW

SALES & SERVICE : OLIVE GROVE RD. SHEFFIELD, 2.

LONDON OFFICE : 36 VICTORIA ST., S.W.1



## RECONSTRUCTION

will demand more and more

Electric Power...

and even greater use of



# ROTHMILL

## CABLE INSULATING PAPER

*Tullis Russell & Co. Ltd.*

AUCHMUTY &  
ROTHES PAPER  
MILLS, MARKINCH  
SCOTLAND

LONDON  
1 Tudor Street  
E.C.4

MANCHESTER  
372 Corn Exchange  
Buildings  
Corporation Street

BIRMINGHAM  
116  
Colmore Row



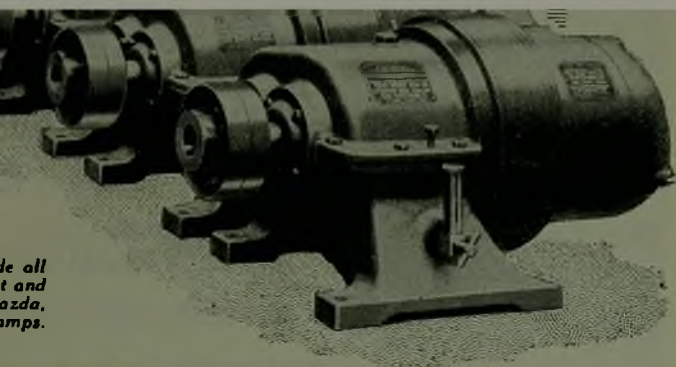
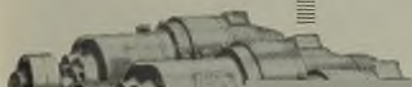
# LOW-SPEED MOTOR UNITS

## A.C. or D.C.

For speeds down to 25 r.p.m.

Designed and built as a unit incorporating an electric motor and helical gearing.

Can be used with existing belts, pulleys, line shafting; or for direct coupling.



de all  
t and  
azda,  
amps.

*BTH products include  
kinds of electric plant  
equipment; and M  
Mercra, and Sodra l*

**H RUGBY**  
SON-HOUSTON COMPANY LIMITED, RUGBY, ENGLAND

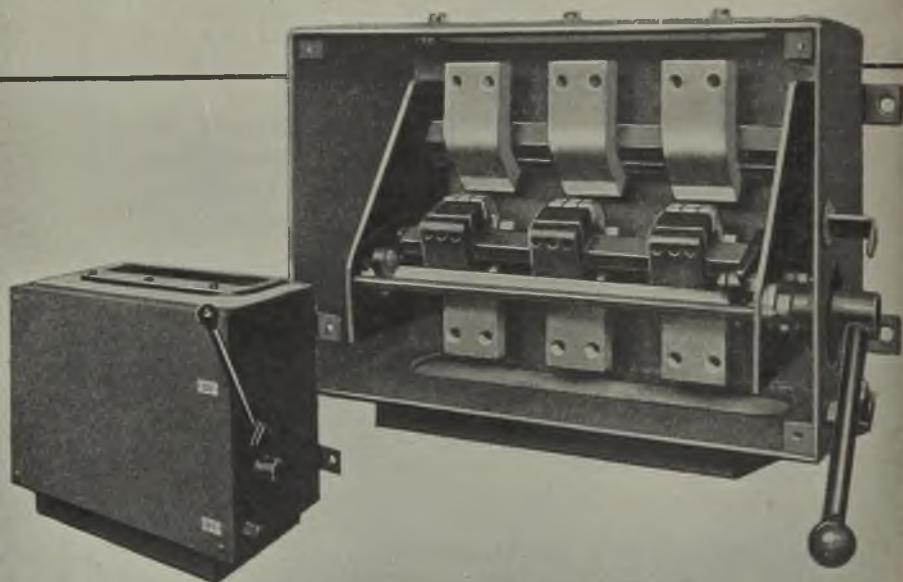


A3187

**BT**  
THE BRITISH THOMSON



## 1,200 AMPERE AND 1,600 AMPERE 660-VOLT AIR-BREAK ISOLATING-UNITS



### INCORPORATING:

High-pressure Contacts

Solid-silver Inserts

Provision for  
Padlocking

### WITH:

High Through-  
current Rating

Robust Construction

Small Panel-centres

### THE H RANGE OF UNIT-TYPE DISTRIBUTION-GEAR NOW COMPRISES:

FUSES: 10 TO 600 AMPERES

SWITCHES: 60 TO 600 AMPERES

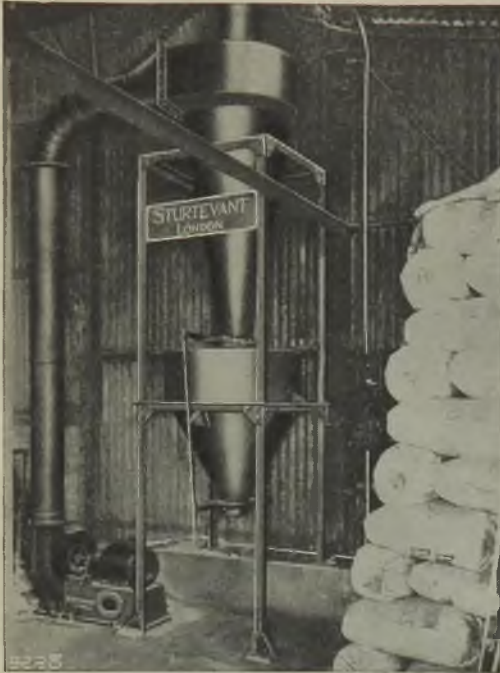
ISOLATORS: 1,000 TO 1,600 AMPERES

*SAFE AND EASY TO MAINTAIN*

# REYROLLE

HEBBURN-ON-TYNE ENGLAND





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Sturtevant T.L. Cyclone on a rotary dryer

## *The Sturtevant T.L. Cyclone Dust Collector solves many Industrial Dust Problems*

- The salvage of processing losses
- Collecting the dust caused in machining processes or material handling plant
- Collecting the dust from chemical plant and metallurgical furnaces
- Cleaning gases from stoker fired boilers

*Full details are in our post free publication U.1161*

**STURTEVANT ENGINEERING CO. LTD.**  
**25. WORCESTER ROAD, SUTTON, SURREY.**

**TELEPHONE : VIGILANT 2275**

# *The Amazing Electric Kettle!*

## ★ THINGS YOU CAN DO WITH THE PREMIER PYLON

- ★ PUT IT ON CIRCUIT AND LEAVE IT FOR A WEEK, A MONTH OR AN INDEFINITE PERIOD
- ★ SWITCH IT ON WITHOUT WATER
- ★ ALLOW IT TO BOIL DRY AGAIN AND AGAIN
- ★ AFTER ALL THIS THE KETTLE WILL BOIL AS USUAL ON BEING FILLED WITH WATER

As a test, Premier Pylon Kettles, *without water*, have been on circuit for no less than 5,000 continuous hours, during which time the safety device has operated over 100,000 times. After all this the kettles continued to work normally.

FOR A.C. CIRCUITS ONLY



PREMIER ELECTRIC HEATERS LTD., BIRMINGHAM, 9

RP 1137D

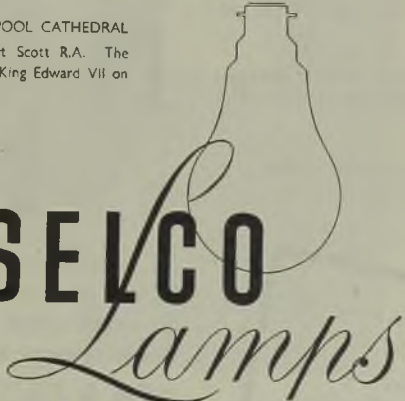
# Landmarks of Britain



## Liverpool

LIVERPOOL CATHEDRAL

Designed by Sir Giles Gilbert Scott R.A. The foundation stone was laid by King Edward VII on 10th July 1904



# CRYSELCO

MADE IN ENGLAND

# Lamps

FIFTY YEARS OF  
QUALITY & SERVICE

### Branches

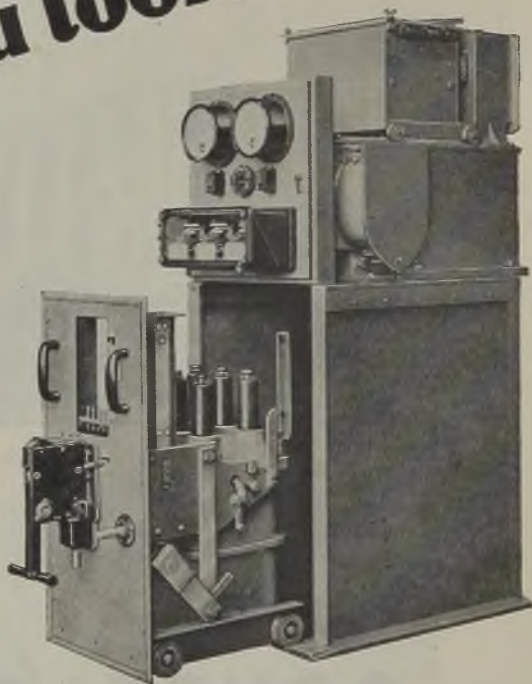
- |            |                 |           |            |
|------------|-----------------|-----------|------------|
| BIRMINGHAM | BURY ST EDMUNDS | LEEDS     | LONDON     |
| BRIGHTON   | CARDIFF         | LEICESTER | MANCHESTER |
| BRISTOL    | GLASGOW         | LIVERPOOL | NEWCASTLE  |



CRYSELCO LIMITED, KEMPSTON WORKS, BEDFORD


# What are the points you look for?

- 1** Compound-filled, metal-clad switchgear ?
- 2** Vertical isolation of utmost simplicity ?
- 3** O.C.B. fully withdrawable on wheeled truck ?
- 4** Range from 75 MVA at 3.3 kV to 350 MVA at 6.6 kV ?
- 5** Hand, solenoid or spring-operated closing mechanisms ?
- 6** Robust construction : compact dimensions ?



The illustration shows a typical S & C "FA" type panel. S & C engineers will be pleased to demonstrate this switchgear — point by point—at any time ; but, meanwhile, write for descriptive matter.

IF switchgear of this type is required, PLUS the solid reliability which comes of meticulous attention to detail from drawing-board to compounding, then "FA & FB" TYPE SWITCHGEAR deserves your consideration.

**SWITCHGEAR & COWANS LTD**  
Old Trafford  Manchester

# RECOGNIZED STANDARDS OF EXCELLENCE...

No. 37—1937.

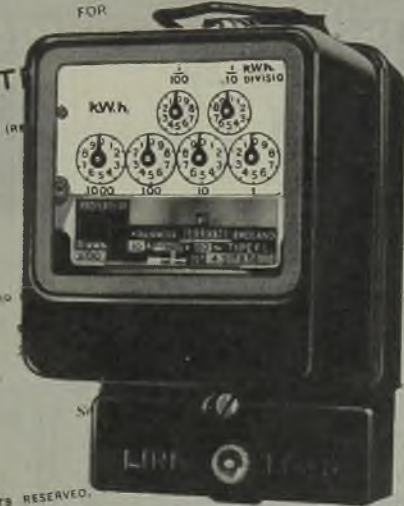
British Standards Institution  
Incorporated by Royal Charter

FORMED IN 1901 AS THE ENGINEERING STANDARDS COMMITTEE.  
INCORPORATED IN 1919 AS THE BRITISH ENGINEERING STANDARDS ASSOCIATION.

BRITISH STANDARD  
SPECIFICATION

FOR

ELECTRIC



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Post Free 2/2.

# FERRANTI Meters

FM7B

FERRANTI LTD., Hollinwood, LANCS.

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



6 Range  
Portable  
Ohmmeter  
Series 110

## INDUSTRIAL MEASUREMENT *by* PULLIN

This self-contained 6-Range Ohmmeter is invaluable for the work shop and for test bench use, for testing on sight.

The Moving Coil Meter has a  $3\frac{1}{2}$ " open scale with 6 ranges: 0/200 Ohms; 0/1,000 Ohms; 0/10,000 Ohms; 0/100,000 Ohms and 0/1 Megohms; 0/10 Megohms. The double scale is calibrated 0/200 Ohms and 0/10,000 Ohms. The knife edge pointer ensures accurate reading.

The instrument is supplied complete in a polished wood case with 2-pole, 6-way range change switch and self-contained 1.5 Volts and 13.5 Volts batteries. The lid houses three test leads which are supplied: two with crocodile clips and one with prod.

Price: £14. 1. 4d.  
— subject to Trade Discount.



MEASURING INSTRUMENTS  
(PULLIN) LTD

Address all enquiries to Dept. C Phoenix Works,  
Great West Road, Brentford, Middlesex. Ealing 0011

# Nevelin



## GLASS BULB MERCURY ARC RECTIFIERS



'Nevelin'  
ELECTRIC · CO · LTD  
PURLEY WAY · CROYDON · SURREY

TELEPHONE: CROYDON 2258 TELEGRAMS: 48741N CRO.S.S.

## What do you look for in Overhead Service Accessories ?



Henley's offer a wide range of overhead service accessories which are of robust construction and simple to install. The designs incorporate all those features, based on long and specialised experience, which the discriminating engineer looks for in such accessories.

Here are a few typical items from the wide range available.



**INSULATING SHROUD**  
for nut type service taps.  
Insulates neatly and efficiently.



**NUT TYPE SERVICE TAP**  
specially designed to prevent loosening due to vibration.



**VICE TYPE SERVICE TAPS**

In two sizes, for a wide range of line and service wires.



**VICE-TYPE SERVICE CONNECTORS**  
for jumper connection work at "non-tension" junction points.

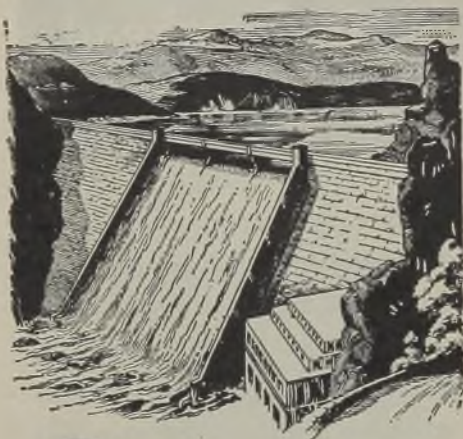
★ Ask for full details of the comprehensive range of  
**HENLEY** Overhead Service Accessories.

# HENLEY

## ELECTRICAL DISTRIBUTION EQUIPMENT

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, E.C.1

## in the manufacture of



Synthetic Ammonia for Fertilisers, Knowles plant plays a great part by providing electrolytic hydrogen of great purity (99.95%). Such plants are often of considerable size absorbing as much as 25,000 kw.

In some installations, the Knowles equipment is used on off-peak loads, a convenient and economical arrangement.

Plants in operation all over the world.

# KNOWLES

ELECTROLYTIC PLANT FOR  
HYDROGEN AND OXYGEN



THE INTERNATIONAL ELECTROLYTIC PLANT CO. LTD., SANDYCROFT, CHESTER

® HO16

# BURCO

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# CO

**BURCO V 840.**  
Cabinet type  
Electric  
Wash Boiler

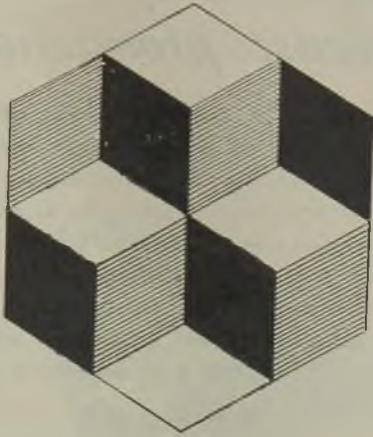
*Post war design  
at its best*

**R  
YOU  
SEEKING  
THE LAST  
WORD  
FOR  
PRIORITY  
ORDERS**



**BURCO LTD · ROSE GROVE · BURNLEY**





*Which way round are these cubes? Are the two cubes at the top of the figure or below? The appearance seems to change every time you look—a well-known optical illusion proving how easily our eyes can play tricks on us.*

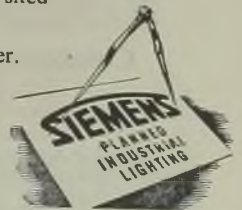
*How  
your eyes  
deceive  
you!*

## THAT'S WHY LIGHTING MUST BE **PLANNED**


Just as the shadows in the picture above suggest first one image, and then another, so lighting in factory or office can play tricks with vision, affecting the efficiency even of the most skilled workers. It may be too bright. Or it may be the right light—in the

wrong place. Or it may cast confusing shadows. Work is possible, of course, in such a light, but mounting output and increased efficiency will show the difference when lighting is scientifically planned and sited by a lighting engineer.

The Illuminating Engineering Department of Siemens will be pleased to advise you on any lighting problem or scheme without obligation.



# ★ Forge saves 800 tons of coal a year; increases production

  
**An example  
of what  
THERMAL LINKAGE  
can do ★**

What is Thermal Linkage? It is a proved, practical method of getting maximum work from total heat supplied. In brief, Thermal Linkage integrates your various heat-using processes and, as far as possible, operates them as a single co-ordinated heat-using unit. Instead of being independently supplied directly to separate consumption points and the surplus from each going to waste, heat is circulated and re-circulated to extract from it the last ounce of work.

## ★ Capital outlay recovered in 13 months

**THE PROBLEM:** 14 x 10 cwt. steam hammers installed in two shops: 7 in constant use, demanding 5,000 lb. of steam per hour over a 58-hour week; additional 3,000 lb. of steam an hour for space heating; 700 lb. per hour lost through leakage. Boiler needed 40 tons of washed trebles per week during winter. 2,000 lb. of condensate per hour ran to waste.

**ACTION TAKEN** included detail improvements in boiler plant and steam transmission. Steam pressure at hammers reduced from 100 to 80 p.s.i. and foot controlled cut-off valves installed. Feed pump exhaust taken through a coil in feed tank. Most of space-heating load carried by exhaust steam without interfering with hammer operation. Surplus exhaust sent to hot well. Condensate return system installed. Only 5,300 lb. of steam required. Rough smalls substituted for washed trebles. 800 tons of coal p.a. saved. Production increased through not having to stop hammers owing to shortage of steam. Capital outlay (£1,904) recovered in only 13 months.

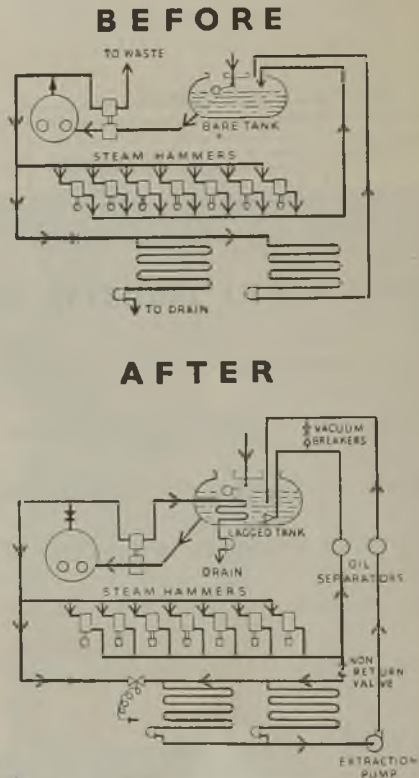
For complete description see "Fuel Efficiency News," September, 1945

## Consider this NOW

Whether or not you are reconstructing or re-converting your plant, consider this question now:—What economies can Thermal Linkage achieve in your plant?

FOR GENERAL INFORMATION, see Fuel Efficiency Bulletin No. 21.

FOR SPECIFIC ADVICE, contact the Regional Office of the Ministry of Fuel and Power.



ISSUED BY THE MINISTRY  
OF FUEL AND POWER



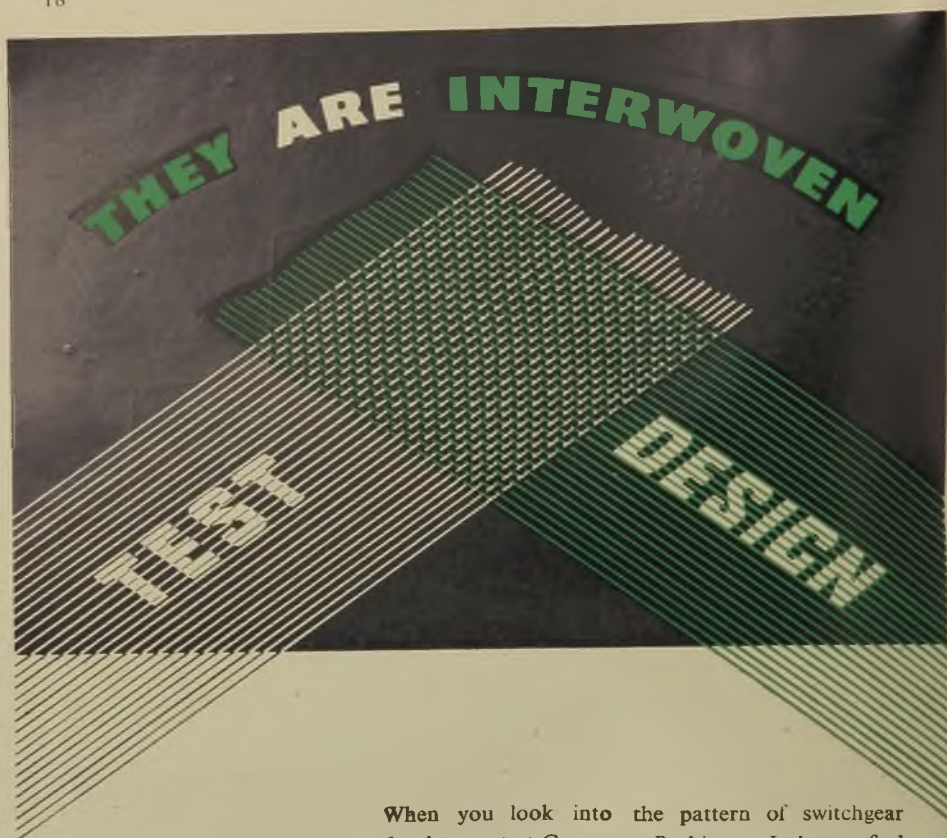
Write for this

## free guide to battery charging

It is, of course, mainly a catalogue of Westinghouse battery chargers, but it also contains a technical appendix on the theory of accumulators and charging; hints on installation of chargers; testing accumulators; methods of charging. Anyone interested in battery charging will find the book of great use and a copy may be obtained on application to Dept. E.R.

**WESTINGHOUSE**  
**WESTALITE**  
**BATTERY CHARGERS**

Westinghouse Brake & Signal Co. Ltd., 82 York Way, King's Cross, London, N.1

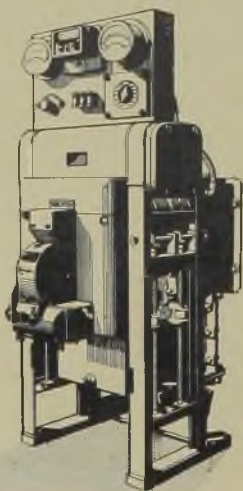


When you look into the pattern of switchgear development at Crompton Parkinson, Ltd., you find that design and experiment are closely interwoven at every stage. Every important design decision is based on practical data from research in the full scale testing station. As members of the Association of Short-Circuit Testing Authorities the Company carries out official proving tests. But with Crompton switchgear the early use of the test facilities has made the result already certain.

**CROMPTON SWITCHGEAR DESIGN  
BEGINS IN THE TEST STATION**

**CROMPTON PARKINSON**  
LIMITED

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



# CHECK THESE FEATURES

—features that emphasise the value of  
JACKSON ELECTRIC COOKERS



- 1 Pressed Steel Hob with Chromium Plated finish.
- 2 Thermostatic Oven Control.
- 3 Plug-in Elements throughout.
- 4 E.D.A. Earthing throughout.
- 5 E.D.A. Interchangeability (Grill Boiler and Boiling Plate).
- 6 Simmering device if required.
- 7 Precision building on modern Power tracks ensure easy reconditioning.

## JACKSON 192 SERIES IV

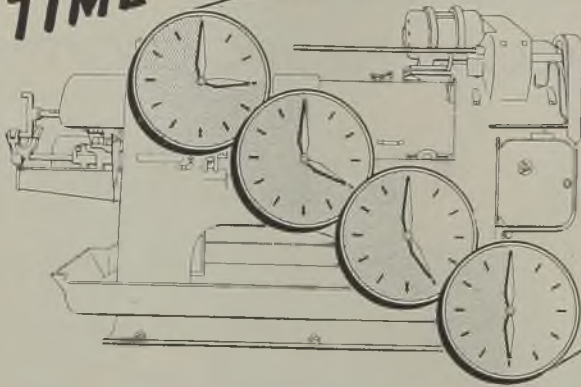
All these features—plus the exceptional fine quality—well planned mechanical construction—completely dependable electrical performance—make the Jackson Cooker the logical choice of all who buy with an eye to the future.

*The*  
**Jackson**  
**Electric**  
**Stove Co., Ltd.,**

143, Sloane Street, London, S.W.1.

Phone: SLOane 6248

**TIME WILL TELL!**



**VENNER**

**TIME SWITCHES LTD**

The numerous processes employed in modern production methods depend largely on time control and the Venner Process Timer is designed to meet this need.

Send for List T.S.16 for full details

Kingston-By-Pss • New Malden • Surrey • Phone : MAL 2442

*Pulley wheel to carry control cables for rudder and ailerons on Florva glider, machined from Bakelite Laminated.*



**BAKELITE**

TREFOIL



REGD. TRADE MARKS

**LAMINATED**

**for hard service**

Bakelite Laminated combines lightness with remarkable toughness. It is resistant to water, heat, acid, chemicals, oils, abrasion . . . gives excellent electrical properties . . . and can be machined to fine limits. The tensile strength of one standard grade exceeds 18,000 lb. per square inch. Available in 40 different grades and a variety of forms including sheets up to 6 inches thick, rods, tubes and special shapes. Further information on request.

**BAKELITE LIMITED**

*Pioneers in the Plastics World*

18 GROSVENOR GARDENS · LONDON · S.W.1

T59



**SAFELY  
CONDUCTED**



Specify  
**METALLIC**  
for consistent quality  
and accurate fitting

**METALLIC**

CONDUIT TUBE

**METALLIC SEAMLESS TUBE CO. LTD.**  
LUDGATE HILL BIRMINGHAM

Phone: CEN. 7167 Grams: "Flask," Birmingham

Sales Depots: London—88 Goswell Rd., E.C.1; Newcastle-

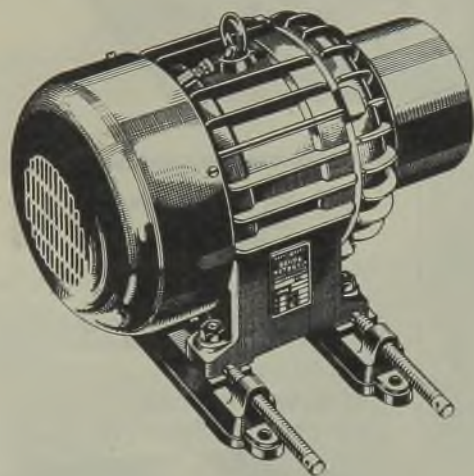
on-Tyne—St. John Street; Leeds—5 York Place; Swansea

—1 Grove Place; Glasgow—137a, St. Vincent Street

M.S.1

# PUBLIC SERVANT

TOTALLY ENCLOSED  
performing a thousand  
different tasks effortlessly,  
silently, indefinitely



**BROOK MOTORS LTD**  
HUDDERSFIELD  
ENGLAND



## *It's possible to turn a hair on a* **PULTRA MICRO-LATHE**

The ability to perform such a delicate operation is evidence of the efficiency and versatility of Pultra Lathes and their equipment. They are ideal for all small work calling for maximum accuracy.

Write for Catalogue CA4.

**PULTRA**  
MANCHESTER

**PULTRA LTD**

24 GRAVEL LANE, SALFORD 3,  
MANCHESTER. Phone: 81A.9181.



Photograph  
by courtesy of  
Miles-Martin Pen  
Co., Ltd.

**SPARKLETS**

RELIABILITY

ACCURACY

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PRANA PRESSURE  
**DIE CASTINGS**

WRITE FOR TREATISE TO:  
SPARKLETS LTD., DIE CASTINGS DIVISION, LONDON, N.18.

Established  
1896

## **CAXTON METER BOARDS**

AS SUPPLIED TO  
LEADING CORPORATIONS AND  
ELECTRIC SUPPLY COMPANIES



**CAXTON WOOD TURNERY LTD.**  
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# You'll be needing Power

## FOR THAT NEW EXTENSION

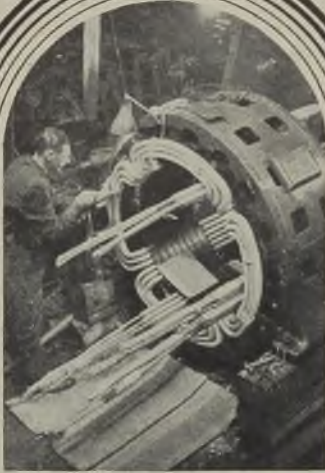
. . . the substation is already overcrowded . . . the cables a tangle from war-time extensions and alterations . . . not enough copper here . . . too little transformer capacity there. And, of course, the work must be done without interrupting production.

Why not hand over the whole problem to J. & P. engineers? They specialise in difficulties like yours, and their war experiences have accustomed them to tricky schedules. You'll get a planned and efficient installation with the minimum of interruption if you

**LEAVE IT ALL  
TO J. & P.**



**JOHNSON & PHILLIPS LTD., LONDON, S.E.**



"What the eye doesn't see..." When a machine has been repaired by Collins you cannot see the incorporation of some of the many "wrinkles" which are the trade secrets of Britain's Premier Repair Service. We don't advertise them, but they are there to maintain our lead and to enable us to Guarantee every job from the word "Go."

# COLLINS

*Collins Electrical Ltd.*

*Head Office*

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 Holborn 0212-3-4

33 St. Albans Place Upper St. Islington N1  
 Canonbury 3227-8

9 & 11 Fenchurch Lane Rd. Southall  
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For sheer value you cannot 'star' a more attractive line to your customers than the BYLOCK "Triplex" cleaner.

£12.12.0  
 (Plus £3.3.0 Tax)  
 Complete with  
 all accessories

# BYLOCK

*A Housemaid in herself!*

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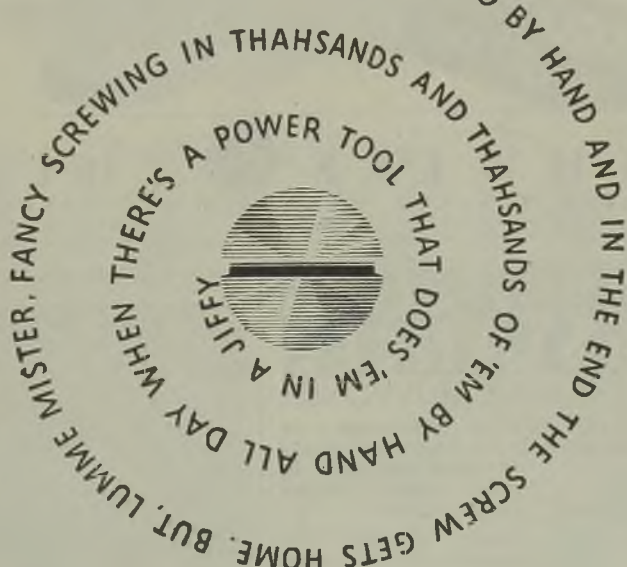
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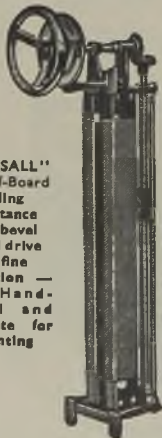
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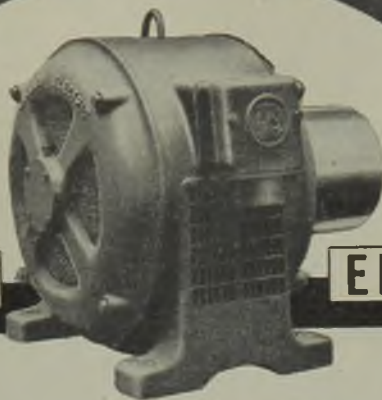


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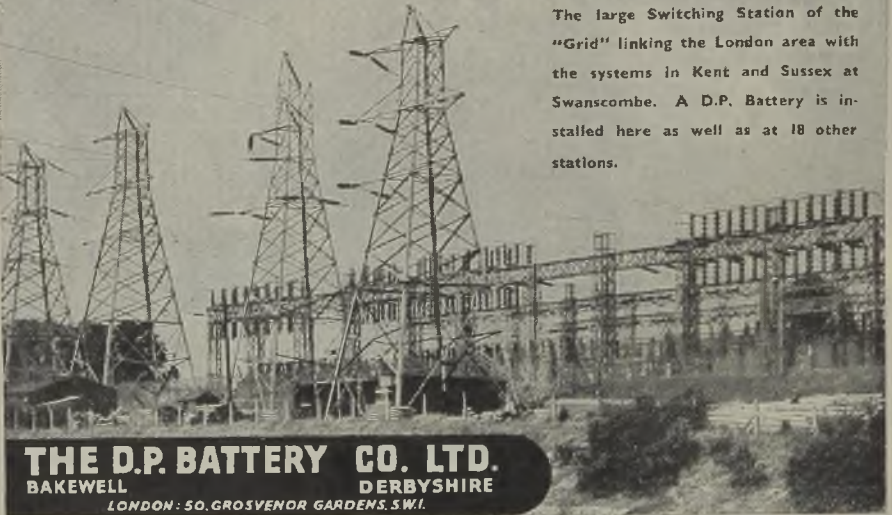
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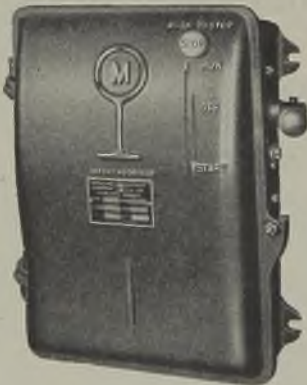
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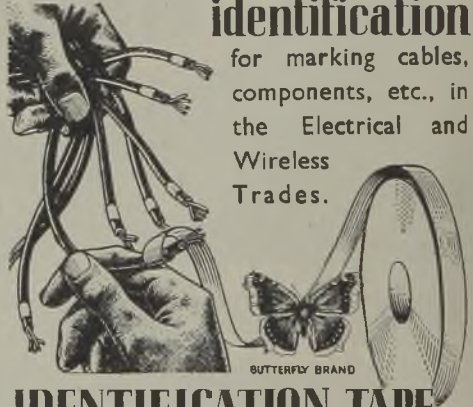
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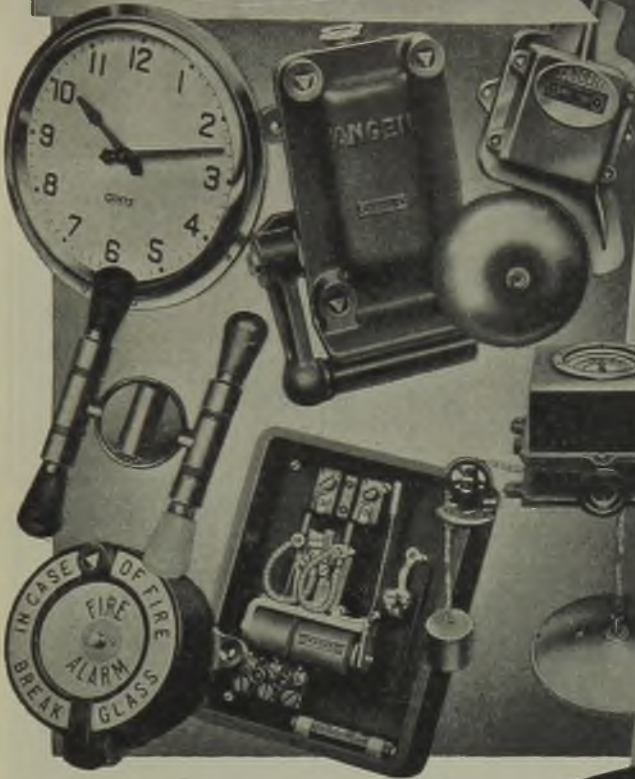
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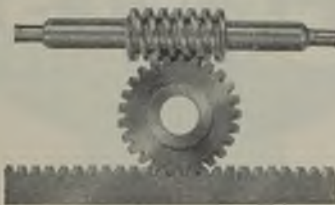
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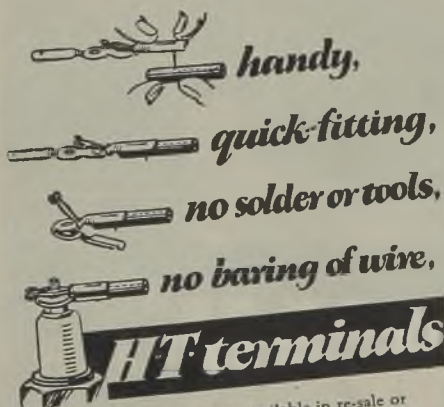
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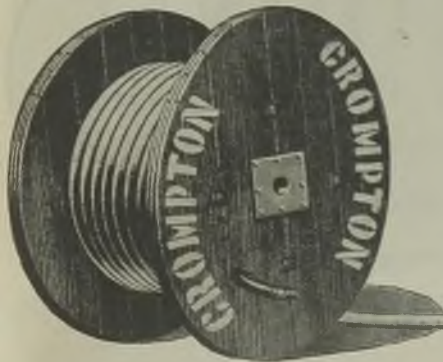
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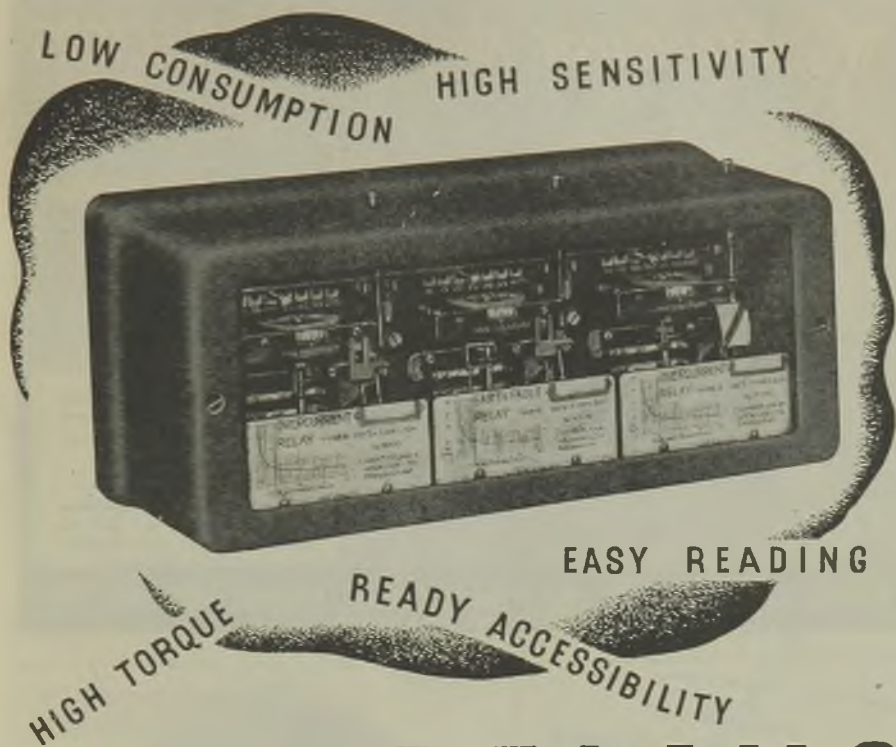
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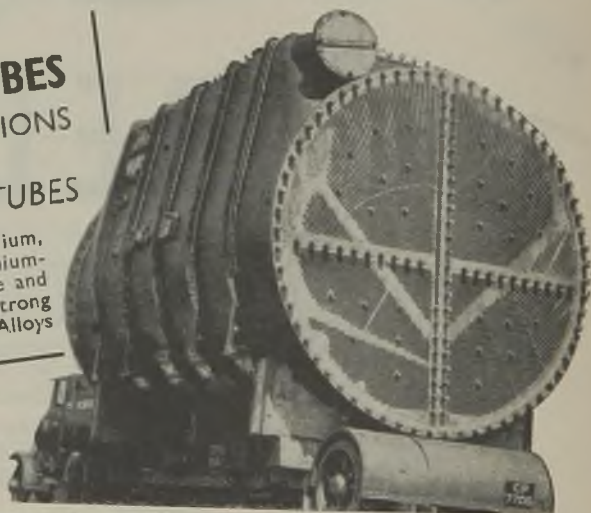
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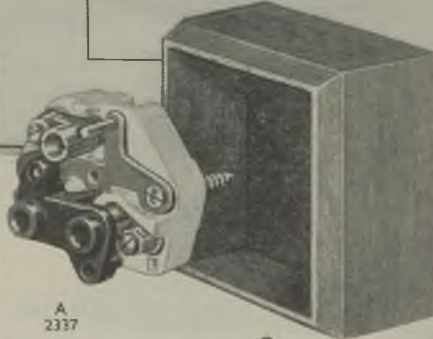
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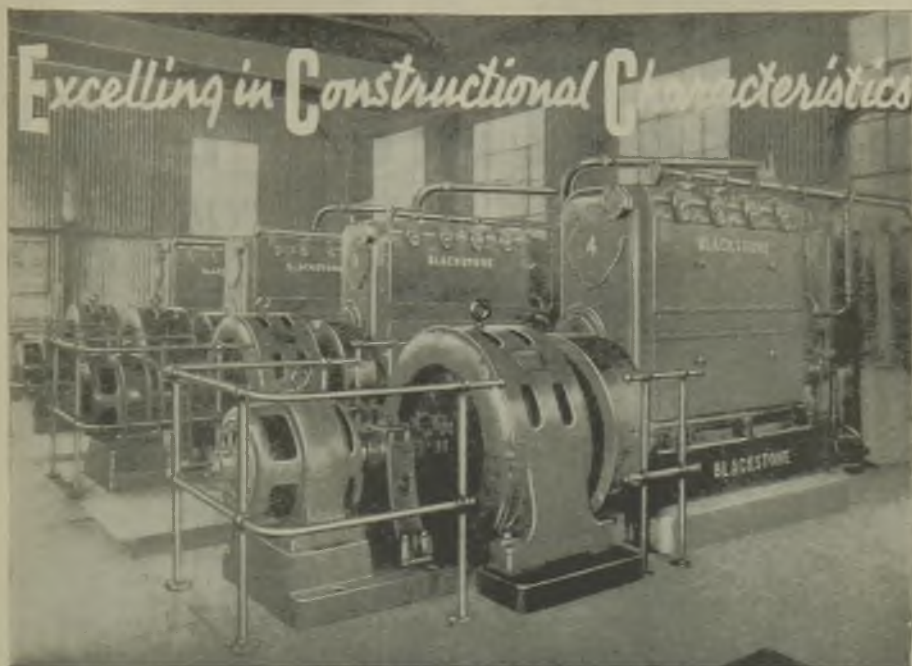
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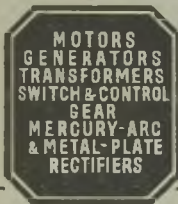
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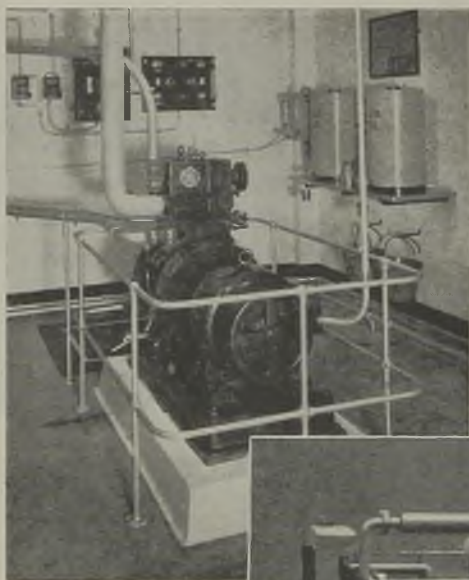
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September 13, 1946

Managing Editor :  
Hugh S. Pocock, M.I.E.E.

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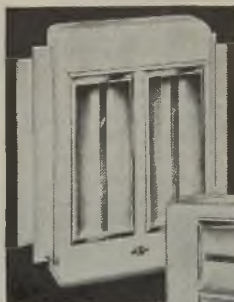
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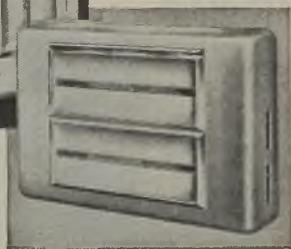
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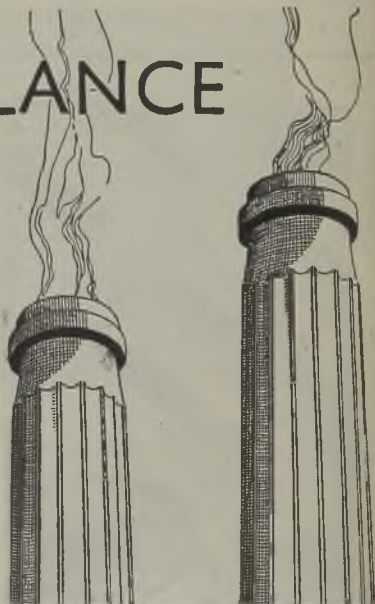
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# ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXIX. No. 3590.

SEPTEMBER 13, 1946

9d. WEEKLY

## Electrical Safeguards

### Still Room for Improvement



**I**N 1905, the year covered by the first of the series of "Electrical Accidents," 175 persons were injured, seven fatally, as a result of the use of electricity in factories. These figures are naturally larger to-day, but the increase is disproportionately small having regard to the enormously developed scale of electrification; they form an almost negligible fraction of the total number of accidents from all causes. Moreover, electrical methods are now applied to industries in which there are special hazards of fire and explosion. Higher voltages and short-circuit kVA have also brought their own complications. It will be noticed, too, from the account given this week of the record for 1945, that a large proportion of present-day accidents is not attributable to either shock or burns, but to eye-flash from welding.

#### Value of Inspectors' Reports

For the relatively much greater safety that accompanies the use of electricity to-day, much credit is due to the electrical inspectors for the analyses of accidents and suggestions for their avoidance which they have made out of a wide and cumulative experience. Their efforts have been well backed by manufacturers, who have taken full advantage of information received from users in improving design and have in hand several new devices to serve the same end.

Nevertheless, many accidents bear a basic resemblance to those of forty years ago. Thus the reference made then to the large proportion of accidents in connection

with portable appliances strikes a familiar chord. Earthing problems have become much more difficult of solution. Supplies are being given in rural areas where good earths may be unobtainable. Water mains may no longer furnish a reliable low-resistance path to earth and leakage trips may not always prove an adequate safeguard.

#### Overload Settings and Leakage

Again, there is the probability that, with the higher settings required for overload protection with growing installations, sustained leakages may occur which, although too small to trip the breakers or blow the fuses, are yet enough to bring risk of fire or shock. This is more likely with older installations in which a low earth-circuit resistance is too often taken for granted. Visual inspection gives no clear guidance and more extensive use should be made of earth-leakage protection or, at least, of leakage indicators. There is plenty of evidence that these repay their cost.

Technical advances in the design of apparatus are not enough without adequate maintenance. The division between preventive and curative maintenance outlined in the Report has much to recommend it. Negligent or unskilful operation may offset the benefits to be derived from the most efficient plant. Accidents owing to aberration on the part of skilled men no doubt can be minimized by the provision of safeguards, such as interlocks, but those, and they are in the majority, that arise out of ignorance are to be avoided only

by the spreading of understanding of the risks involved in diverse circumstances. Fewer lives would be lost, as the Report shows, if immediate and sustained artificial respiration were always administered to those who have apparently succumbed to shock. In addition to causing suffering to the men employed, electrical accidents affect output. The human element is at this stage the most uncertain factor and the chief need is to ensure that electrical men in factories shall be fully qualified and be accorded appropriate status for the performance of duties that are essential to the well-being of industry as a whole.

**Presage** WARNING from the Central Electricity Board, coming in a summer quarter, that inconsiderate use of electricity between 11 a.m. and 1 p.m. may lead to "cuts" augurs ill for the coming winter. The primary cause is that the Central Electricity Board could not obtain sanctions for the manufacture of generating plant during the war to meet present loads. As an instance, the maximum demand last week exceeded that recorded at the same time last year by about 700 MW, but the installed capacity was only 100 MW more. Unsatisfactory coal has put some 300 MW out of action and shortage of maintenance staff has prolonged the overhauling period unduly, leaving an inadequate margin for emergencies. The "last straw" is probably an increased use of convenient electric fires in this unseasonable weather.

**Science and the Humanities** LAST week Dr. P. Dunsheath, the President of the I.E.E., joined in the correspondence in *The Times* upon the position of science in the universities, to which reference was made in our last issue. Dr. Dunsheath disagrees with the views of Lord Cherwell that there should be separate establishments of university status for the training of engineers and that universities attempting to provide thorough engineering training would be thrown out of balance. In Dr. Dunsheath's opinion the separation of the engineering faculty would result in a far greater unbalance. He stresses the need for "as close a liaison as possible between our sociological development and our engineering development, as between the latter and our scientific progress."

**Nuclear Power** REPORTS in the lay Press that atomic energy will be commercially available in the form of electricity within twelve months are not supported by the most recent authoritative information as given on another page. No nuclear-power station has yet been designed and four years is normally allowed even for the building of coal-fired stations designed in accordance with long-established principles. From the estimates given, the cost per kWh from such a source would be 26 per cent more than by existing methods and the price of coal would have to rise by one-third in order to break even. The most probable lines of development seem at present to be those indicated in Mr. Baruch's statement.

**Flame-proof Enclosure** IN view of the increasing use of electrical apparatus in enclosures that have been certified as "flame-proof," it should be pointed out that the onus is upon the user of ensuring that the external surface temperature shall not exceed a safe value having regard to operating conditions and the presence of inflammable gas. With some types of apparatus external temperature may exceed 100 deg C and this leaves insufficient margin for safety, especially where cool flame combustion occurs, which, as is shown in Testing Memorandum No. 4 of the Ministry of Fuel and Power, may be at very much lower temperatures than those at which ignition takes place. Moreover ignition temperatures themselves are not physical constants but vary with the methods used to ascertain them.

**Public Lighting** If there is one matter in which uniformity is without reproach, it is in respect of intensity of illumination on street surfaces. No doubt the application of this point and others in the Departmental Report on Street Lighting which was stressed by the Minister of Transport contributed largely to the realistic atmosphere at this week's conference in London of the Association of Public Lighting Engineers. The papers have been read and discussed as indications of what is likely to happen rather than merely as guides to good practice that may or may not generally materialize. A report of the conference will appear in our next issue.





### From 132 kV to 400 V

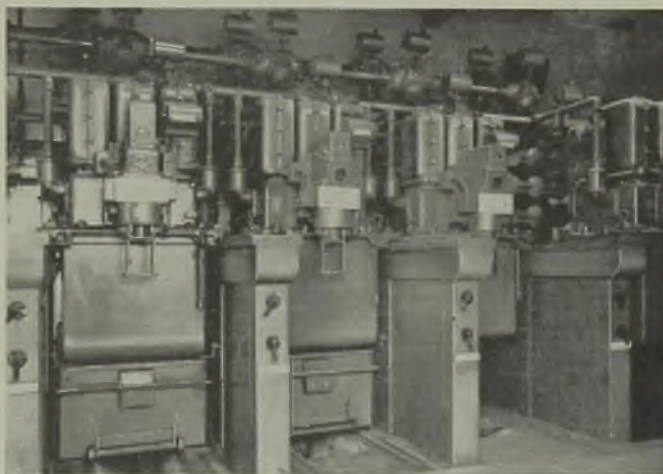
**I**N the *Electrical Review* of June 7th last we described the equipment and operations involved in the production of calcium carbide at the factory of British Industrial Solvents, Ltd., near Port Talbot. The very large electric furnaces installed at this factory were described separately in the *Electrical Review* of July 12th. In this article we propose to describe the factory's electrical distribution system which has a number of features of particular interest apart from those introduced to minimize the possible effects of enemy action.

The 132-kV tie-line between the Upper Boat power station of the South Wales Power Co., and the Tir John station of the Swansea electricity undertaking passes a few miles to the north of the factory. To supply the factory an open-tee connection was made and a loop of the tie-line carried from the point of connection to the factory site by means of a double-circuit transmission line. A supply is therefore available from two sources.

The double-circuit line terminates at the factory in a special outdoor substation constructed and controlled by the Central Electricity Board (illustrated in the heading

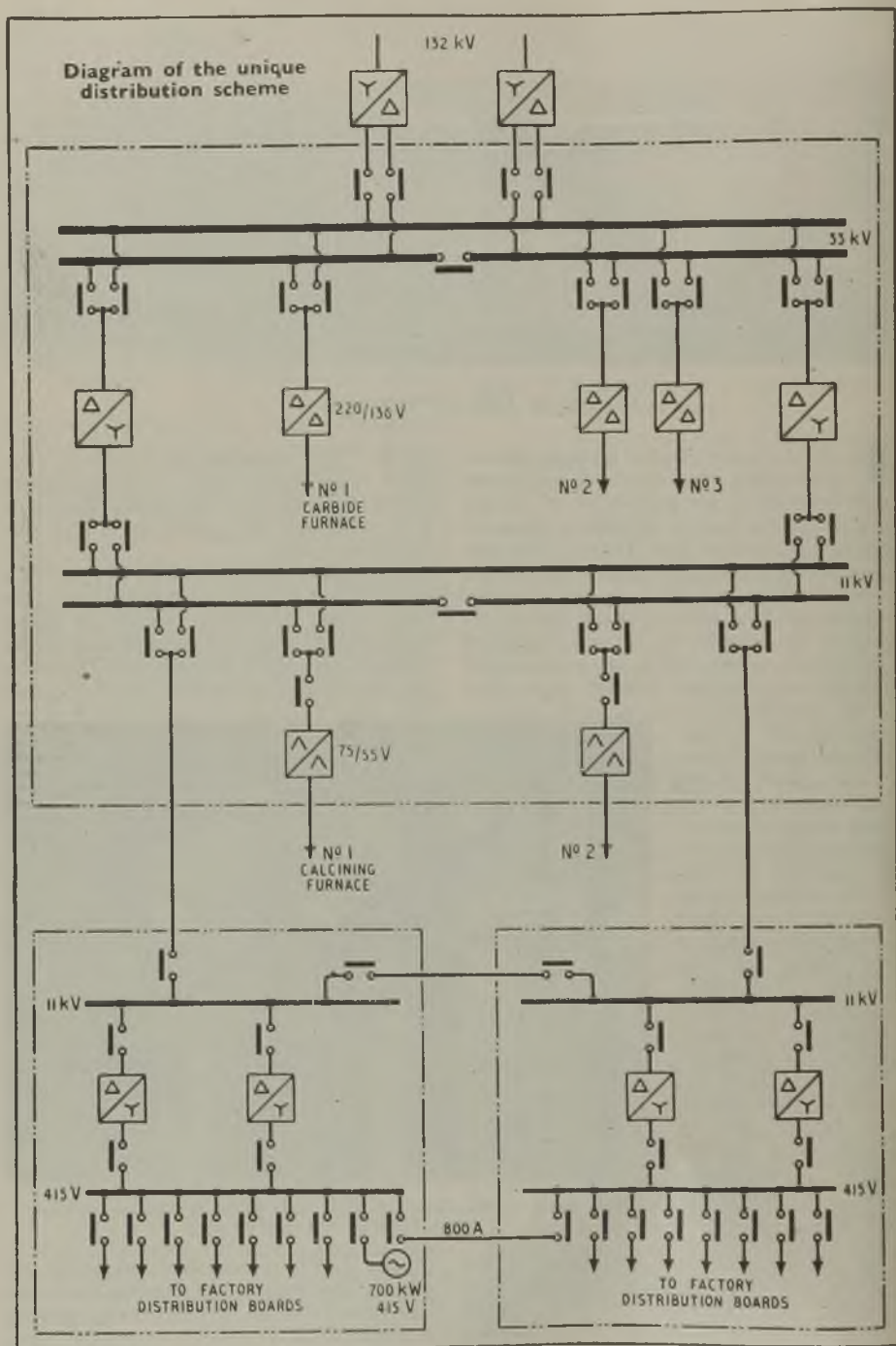
block). This contains the 132/33-kV step-down transformers which are connected by underground cable to the factory main substation situated just outside the C.E.B. substation enclosure.

The factory main substation consists of a switch-house and main control building. The switch-house is divided roughly in halves longitudinally with compartments containing units of the 33-kV switchboard occupying one half, and compartments containing units



Two 33-kV supplies are taken to the duplicate busbars through 800-A, 750-MVA oil circuit breakers

of the 11-kV switchboard occupying the other. The station sub-distribution boards and battery for the switch closing, tripping and indication services are in compartments



on the 11-kV side. A duplicate 33/11-kV step-down transformer is located at each end of the switch-house. In the main control building is the supervisory, metering, protection and control gear for the main substation switchgear and transformers.

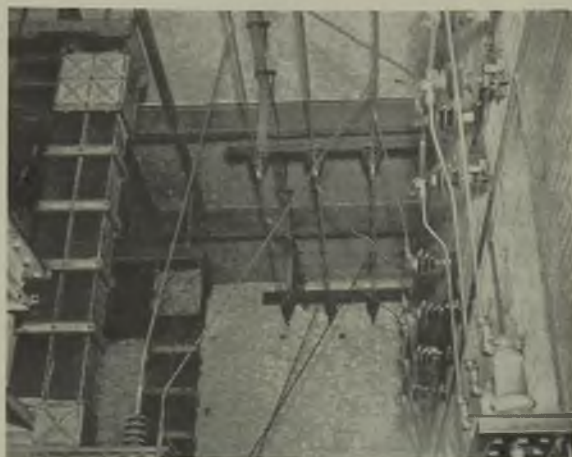
All switching can be done by remote electrical control from the main control building. In the case of the carbide- and calcining-furnace circuits, to be described later, the oil circuit breakers controlling these circuits can also be tripped or closed from their respective control panels at the furnaces.

For the 132/33-kV step-down, the C.E.B. have provided duplicate 45,000-kVA three-phase Fuller transformers. Either transformer alone is capable of dealing with the normal factory demand of approximately 40,000 kW and provision is made on the 132-kV side to connect either transformer to either or both of the incoming lines. On the 33-kV side each transformer is

permanently connected to an oil circuit breaker on the 33-kV switchboard in the factory main substation. This comprises eight English Electric metal-clad switch pillars, the fixed portions of which are connected to duplicate sets of condenser-type busbars.

Off-load busbar selection is carried out by means of removable plugs, and isolation is effected by rack-ing-out the moving portions. The board is physically and electrically divided into two approximately equal sections by a bus-section switch, the two load sections and the bus-

section switch being housed in separate compartments. One of the two incoming supply circuit breakers is connected to each of the load sections of the switchboard. The loads supplied at 33 kV are one carbide furnace and one 10,000-kVA, 33/11-kV transformer from one section; and two carbide furnaces and a duplicate 10,000-kVA transformer from the second section. The



**Above:** From the 33-kV cables in each carbide-furnace transformer house, the circuit is led through two sets of hand-operated isolating switches and tubular busbars; note heavy l.v. busbars on left of picture. Each carbide-furnace transformer bank (left) consists of three single-phase 10,120-kVA transformers; normal working current is 46,000 A

busbars and the bus-section o.c.b. have a current rating of 1,200 A. The remaining o.c.b.'s are rated at 800 A. All the o.c.b.'s have a safe rupturing capacity of 750 MVA.

Each of the three carbide-furnace circuit breakers are connected to their respective separately housed furnace transformers about a quarter of a mile away, by two sets of three 0.5-sq in. single-core p.i.c. underground

cables. From the cable terminal insulators in each furnace transformer house the furnace supply circuits are contained in bare copper tubing through two three-gang hand-operated isolating switches to a set of three tubular busbars running the full length of the transformer bank, these bars being supported by insulators attached to the transformer house ceiling. The isolating switches may be operated individually so as to connect one or both

**The 11-kV switchgear in each auxiliary substation has four 400-A oil circuit breakers; i.v. board with air-break switches on right**



sets of cable to the overhead busbars. One set of cables is sufficient to deal with the normal furnace load, but usually both sets are connected. Each carbide furnace transformer bank consists of three 10,120-kVA single-phase transformers connected delta-delta. The primary delta connection is made by connecting the transformer terminals to the appropriate overhead busbars by means of copper tubing.

The shell-type furnace transformers were

the furnace circuit, i.e., between the furnace electrodes, it was necessary to take steps to reduce circuit reactance as much as possible if operating power factors were to be reasonable, and in keeping with this idea a trans-

former reactance of less than 2 per cent was specified. The actual value for normal operating voltages lies between 1.6 per cent to 1.7 per cent. This was achieved by the liberal use of core iron and the interleaving of the high- and low-voltage coils.

The high-voltage windings are tapped to give secondary voltages from 220 to 136 in thirteen steps, and proportioned to give a secondary current of 46,000 A on all taps. Tap selection is carried out off-load by the operation of motor-driven tap-changing gear controlled from the furnace control panels. Three bushing-type current transformers are installed on the h.v. insulator stems of each transformer—one for the winding temperature thermometer heater, one for the power indicating and recording



**All the 11-kV circuit breakers can be operated both by hand and electrically from local or remote stations; control room at main substation—33-kV right, 11-kV left and grid board rear**

designed and constructed by the British Electric Transformer Co., Ltd. Owing to the low resistance of the productive part of

meters, and one for automatic current control relays and indicating ammeters. The last mentioned c.t.'s are tapped and connected to

a tap changer ganged with the main winding tap-changing mechanism. The c.t. ratio is changed to compensate for changes in the main transformer ratio, so that the output is a fixed proportion of the furnace transformer secondary current and hence of the electrode currents.

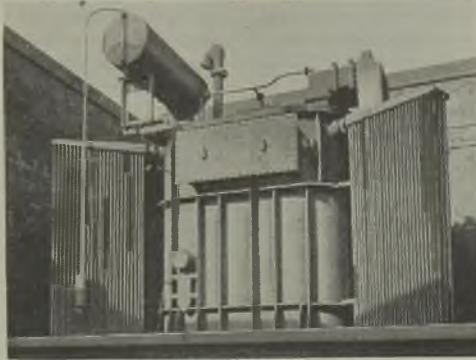
The l.v. winding of each transformer consists of eight single-turn coils which are distributed between the h.v. coils. The two ends of each l.v. coil are extended and slightly displaced laterally inside the transformer tank, so as to line up with adjacent bars of the busbar stack connecting the transformer in question to the furnace electrodes. There are thus sixteen bars in each stack. The stacks are about 40 to 50 feet long, so each secondary coil circuit is extended by this amount and they are not paralleled until they reach the electrodes. The l.v. coil circuits from each of the transformers in the bank for one furnace are connected to two of the three furnace electrodes in turn, so as to form the secondary delta.

From the point where the busbars leave the transformer house to beyond the last connection to the furnace they are encased in a metal duct. Air taken from outdoors, after being drawn through cleaning plant, is blown into the transformer house and thence through the busbar ducts.

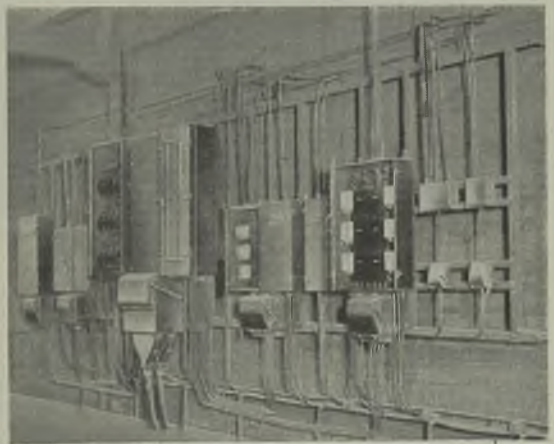
During the early days of operation of the furnace transformer installation, serious difficulty was experienced as a result of apparently random and unexplained breakdowns of the low-voltage busbar stacks. Klydonographs lent by Dr. W. W. Wilson (General Electric Co., Ltd.) indicated that voltages of the order of several thousand volts to earth appeared occasionally on the low-voltage bars. A detailed investigation by the Electrical

Research Association, acting on behalf of the Ministry of Supply, indicated that the high voltages appearing on the l.v. bars were due to h.v. high-frequency transients originating on the 33-kV system. The primary transients were measured, as well as the induced voltages appearing on the secondary sides of the transformers, and the latter were found to amount to as much as 20 per cent of the former, which could, under possible conditions, result in voltages to earth on the l.v. bars of the order of 5,000 V.

The remedy was to make the impedance to earth (at transient frequency) of the l.v. bars small compared with the inter-winding capacitance of the transformers by connecting 2- $\mu$ F condensers between several of the l.v. bars and earth. The condensers were non-inductively wound and the earth connections were made as



Serving the intermediate-voltage system there are two of these single-phase 10,000-kVA, 33/11-kV transformers at the main works substation



A good example of the distribution gear in the buildings is that in the carbide-furnace room

direct as possible. Since the installation of the condensers only one case of busbar failure has been experienced; on examination it was found that one of the condensers was "open circuited." The conclusion reached

was that the connection of condensers in the manner described is necessary and sufficient to reduce the induced voltages on the l.v. busbars to values that will not result in breakdown.

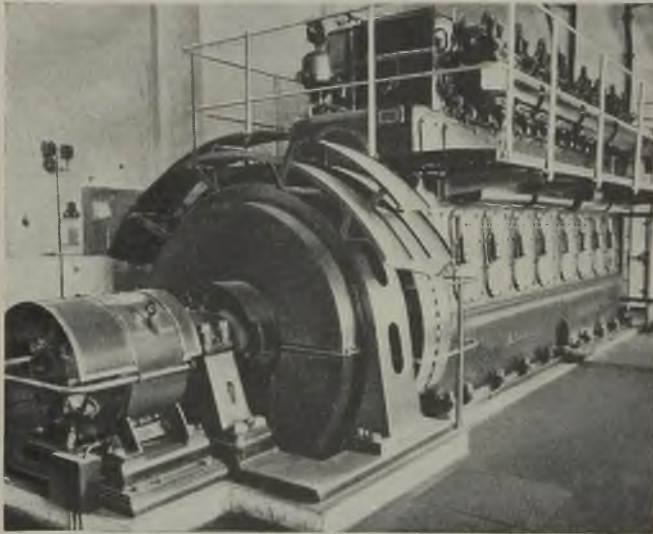
The carbide-furnace loads of approximately 19,000 kW each, justify the employment of individual high-rupturing-capacity circuit breakers and 33-kV feeders. However, for the distribution of power to the auxiliary loads, which represent only 5 per cent of the factory load, two further stages of voltage and short-circuit rating reduction are provided. The first stage is a step-down to 11 kV by means of the duplicate 10,000-kVA transformers previously referred to. The secondaries of these transformers are con-

The calcining furnaces described in our first article, are single-phase loads of about 350-kV each. They are connected to the 11-kV board in open-delta. Like the carbide furnaces, the calcining furnaces are situated in the main group of factory buildings about a quarter of a mile from the main substation. Transmission from the substation to furnace transformer rooms is by means of 2-core 0-0225-sq in. p.i.l.c. underground cables.

At each calcining-furnace transformer room the supply circuit is taken through an oil-immersed isolating switch and thence by p.i.l.c. cable to the furnace transformer. The core-type Parsons transformers have a reactance of about 4 per cent. The resistance of the calcining furnaces is approximately

fifteen times that of the carbide furnaces, and consequently extremely low transformer reactance values are not required. Tap changing is carried out off-load, the tap changers being interlocked with the transformer isolating switches. Eight voltage taps are provided to give secondary voltages from 55 to 75 V, and the secondary current rating is 6,000 A on all taps. The busbars from transformer to furnace are interlaced as in the case of the carbide furnaces.

For reasons of war-time security and because of the relatively extended factory layout, two separate auxiliary substations for 400-V



In one of the auxiliary substations there is a third incoming connection from a 700-kW stand-by Diesel alternator

distribution were provided. Each normally caters for approximately half of the factory auxiliary load, exclusive of the calcining furnaces. The two substations, which are almost identical in layout, are located about 150 yards apart in the vicinity of the centre of the auxiliary load.

Three-core 0-3-sq in. p.i.l.c. underground cables connect the 11-kV switchboards in the auxiliary substations with the feeder o.c.b.'s on the two sections of the 11-kV switchboard at the main substation, and a similar cable completes an 11-kV ring main by connecting the switchboards in the auxiliary substations. These switchboards are of the same type as

This switchboard, which is composed of seven English Electric o.c.b. pillars, is, like the 33-kV switchboard, metal-clad and arranged with duplicate busbars, plug selection and draw out isolation. It is also divided into two sections by a bus-section switch, each section being supplied from an individual transformer. The circuit breakers have a safe rupturing capacity of 150 MVA. Each section of the board supplies one of the auxiliary substations, to be described later, and one calcining furnace.

These switchboards are of the same type as

those in the main substation, except that they are fitted with a single set of busbars. They are each made up of four o.c.b. units, two controlling the ring-main cables and two controlling the primaries of two 2,000-kVA 11-kV/415-V outdoor transformers connected delta-star, with the secondary neutrals connected directly to the neutral busbar of the 400-V switchboard.

The phase connections from the transformer secondaries to the busbars of the 400-V switchboard are made through 3,000-A three-pole English Electric air-break circuit breakers, in series with hand-operated isolating switches. The outgoing feeders are supplied through similar isolating switches and air-break circuit breakers. In addition to the transformer and feeder panels, the switchboards each include a panel, similarly equipped, to control an 800-A tie-line joining them.

As a further provision for possible emergencies a 1,000-H.P. English Electric Diesel engine connected to a 700-kW 415-V three-phase alternator is installed adjacent to one of the auxiliary substations. The output of the alternator can be connected to the 400-V

bars through a special control panel fitted with synchronizing equipment. The provision of this stand-by set was made chiefly to assure continuity of supply to the cooling water pumps of the carbide furnaces.

The feeder circuit breakers are connected by underground p.i.l.c. cables to the main distribution boards in the factory buildings. Individual circuit ratings vary between 400 A and 800 A. A typical example of the distribution gear in the buildings is that installed in the carbide-furnace house. The feeder from the substation in this case is a double one, each cable being four-core 0.5 sq in. p.i.l.c., and terminating at an 800-A metal-clad fuse-switch connected to the underside of an 11-way metal-clad distribution fuse board. From this main board large individual loads are supplied direct and smaller loads supplied through sub-distribution boards. As the prospective short-circuit value at the building main distribution boards is about 25 MVA, all the building main and sub-circuits are protected by high rupturing capacity fuses. With only minor exceptions all sub-circuit wiring is carried out in Pyrotex cable.

## Retailers and Chain Stores

**E**LECTRICAL retailers frequently complain that they are undercut by the chain stores and attribute the ability of these stores to charge low prices to quantity buying, carrying large discounts. Mr. F. G. Benson, of Cinelux, Ltd., Leigh-on-Sea, decided to satisfy himself on this point and his story, as told in the September *Electrical Contractor*, makes interesting reading.

Mr. Benson identified the makers of some accessories in a chain store then wrote to them asking for their views and for quotations for direct supplies. The manufacturers replied that the retail prices of their products were regulated to ensure a fair and reasonable profit to wholesalers and contractors and Mr. Benson should not be called upon to pay wholesalers higher prices than those charged by the chain stores. Mr. Benson then sent them a page from a London wholesaler's catalogue showing that 14s. 6d. a dozen was asked for plugs which were sold in a chain store (a sample was enclosed) at 9½d. each. The makers then said that they had never supplied the wholesaler in question and he must therefore have obtained supplies through a third party which would account for his high prices. They suggested that Mr. Benson should transfer his custom to another wholesaler and upon being further pressed offered to arrange for one of their "wholesale friends" to supply the goods. This was eventually

done and Mr. Benson found that the invoiced prices were such as to enable him to sell most of the accessories at chain store prices and still earn a reasonable profit.

Mr. Benson's conclusion is that electrical retailers have nothing to fear from chain-store competition and that they can get the goods if they only try hard enough. He makes reference to the possibility of persuading customers to buy better-class accessories and says that while this is normally the correct procedure supplies of the better-quality goods are short and in any event there is still a case for stocking the cheaper accessories if only to show that the electrical retailer can compete with the chain store.

## North Midland I.E.E. Students

**A** SUMMER outing of the North Midland Students' Section of the Institution of Electrical Engineers, delayed due to transport difficulties, has been arranged to take place on September 28th. It will comprise a visit to the Castle Museum at York in the afternoon, after which tea will be provided at Richmond's Café, Wetherby. The party will then proceed to the Green Hammerton Hotel, Green Hammerton, for a private dance. Transport for the whole trip will be by motor coach. The inclusive charge is 15s. per head. A deposit of 7s. 6d. should be forwarded with applications, which should be sent to Mr. R. Spence, 1, Prince Street, Primrose Hill, Huddersfield.

# Views on the News

## Reflections on Current Topics

**I**N my notes of August 30th I suggested that a watch should be kept on the electrical installations in the camps which were being taken over by "squatters," to guard against possible accidents. Mr. W. A. Gazard, in the September number of the *Electrical Contractor* supports this idea, having seen some of the installations. Some of the "improvements" made by former occupants have included "lengths of string for remote control of the door switch; bell-wire points for wireless and iron; electric fires consisting of a naked element and exposed connections—and so on." He confesses to having made a few additions himself while living in camp but I am sure that as a qualified contractor he did these jobs properly, merely upsetting the quartermaster and not the I.E.E. Regulations.

\* \* \*

Writing in the September *Electrical Contractor*, "Pilgrim Three" says he has thrown out his coke boiler and in its place has installed a seven-gallon tank fitted with two 10-kW immersion heaters with space for a third if it should be wanted. This is something of a *multum-in-parvo* arrangement for it is used to supply four hot-water radiators, two baths, a sink and seven lavatory basins—opulence indeed. Although 20 kW is a pretty good loading I think it would take it all its time to catch up with all this water passing through a seven-gallon tank. If the capacity hasn't been misprinted, it looks like a rather remarkable performance in both installation and speed.

\* \* \*

It is very interesting to witness the gradual reconversion of electrical manufacturers to their peacetime products as indicated by the displays of equipment in electrical showrooms. During the war the showrooms were of course practically cleared of all apparatus. Then as hostilities ceased came a considerable number of lighting fittings accompanied by a veritable deluge of irons, most of them of unheard-of makes and the majority of very indifferent construction. The poorer class of fires, which incidentally were for some unaccountable reason moderately plentiful throughout the war, also showed a tendency to multiply, and then followed sundry kettles. A glance round the showrooms to-day, however, shows that the old-established firms, till recently fully occupied with war contracts, are now getting into their stride again and beginning to produce not only many of their most popular pre-war lines but a number of new models as well. Production is, of course,

only a trickle compared with what it will be in a few months' time, but there is already quite a good selection of well-made lighting fittings, irons, fires, kettles, vacuum cleaners, wash boilers and, just lately, toasters. Washing machines should be getting more common soon and, though I scarcely dare mention it, I have seen a couple of refrigerators (sold). The last-named, however, I gather will not be available in any appreciable quantities until well into next year.

\* \* \*

In view of the recent correspondence in the *Electrical Review* on the subject of the shortage of supplies of electrical equipment, Mr. Aneurin Bevan's speech at Bristol last Saturday is of some interest. He said that many houses could not be occupied because they were short of certain "fitments" (I do not like this word). He had found that enough electrical equipment had been produced to furnish 4½ million houses but they had not gone into the houses "because the distributive machinery has not been honouring the promises to send all those goods to the new houses and they have been wasted in the process." If Mr. Bevan's figure is correct there should be enough equipment both for new houses and for a great deal of electrical work besides. Has he endeavoured to discover why every sort of shop except the electrical contractor-retailer's seems to be able to get supplies of accessories, and what is done with them?

\* \* \*

Recently I referred to the growing use of photo-electric cells for grading and colour discrimination purposes. Now I see that they are being used in the Colorado and Big Thompson Rivers Scheme for regulation of the trains employed for driving the Alva B. Adams Tunnel. The difficulty of utilizing this type of apparatus for signalling purposes is that objects other than the trains are liable to cause the relays to operate, but I understand that precautions have been taken to guard against this.

\* \* \*

The Editors tell me that they have again allowed the word "Megger" to slip through as a substantive, this time in a contributed article, and once again Evershed & Vignoles, Ltd., have very rightly called attention to it. As I said some time ago the word is E. & V.'s registered trade mark and should strictly be applied only to their instruments. It must not be used as a descriptive noun, even though in inverted commas, but only as an adjective.

—REFLECTOR.



# Power Station Auxiliaries

## Factors Affecting Methods of Supply

**E**LECTRICITY systems require above all other considerations to be reliable,

and the auxiliaries associated with power stations contribute in no small way to that end. In power station design it is essential for this purpose to consider all possible conditions under which a station may operate and different problems present themselves in almost every case. A variety of methods of affording supplies to particular auxiliaries is to be found, but examination of these often raises the question of their justification.

The problem of designing a reliable and economical auxiliary system is capable of many solutions, and the system to be adopted for a new station must permit of extensions without necessitating alterations to the fundamental features of the initial installation.

Generally speaking, a simple system is as reliable and efficient as an elaborate one, and, what is more important, it is better for the operating staff, providing safety is unimpaired. The means chosen for supplying the various sections of plant depend on many factors, and in some respects site conditions play an all important part. Thus, the use of cooling towers or a river will materially affect the circulating-water system auxiliaries, whilst the boiler-plant layout and boiler capacity and pressure affect the feed-water system auxiliaries. When laying out auxiliary plant, considerations other than cost or efficiency, particularly as regards items of equipment, arise. Factors of primary importance are: Reliability, efficiency, simplicity and capital and operating costs.

### Factors Favouring Electric Drive

In addition to providing for conditions of normal operation, the need to get a station into service after complete shut-down must be kept in mind, and this usually necessitates the provision of an alternative supply, especially if electrically-driven auxiliaries are exclusively used for essential services.

The trend in this country has been from steam to electric drive, and the principal reasons for this appear to be the greater simplicity and flexibility of the latter, together with important changes in boiler and turbine-

By **T. H. Carr**, *M.Inst.C.E.,  
M.I.Mech.E., M.I.E.E., M.I.F.*

house practice. To use steam necessitates high-pressure pipe lines from the

main steam receivers or ranges, whereas cables usually provide a much cheaper and simpler means of conveying power. The layout of the auxiliary plant in relation to the sources of electric or steam supplies may, however, materially affect the cost. If medium-voltage motors are used transformers and controlling switchgear have to be installed and, in addition, reactors in higher-voltage circuits.



Mr. Carr is electrical engineer and manager of the Bradford Corporation undertaking

Objections to steam drive are relative inefficiency of small turbines and the difficulties associated with high steam pressures and temperatures, steam pipes, traps, drains and valves, which are liable to leakage troubles, ultimately necessitating increased attention

and high maintenance charges. Although joints can be almost completely eliminated with the present-day technique of welding throughout, drainage points by way of traps are usually unavoidable.

The compromise in many stations of having steam-driven auxiliaries for emergency service, the chief of which are boiler-feed pumps, turbo-alternator auxiliary oil pumps and fire-service water pumps, appears to be satisfactory both from operating and economic aspects.

Having decided on an electric drive for all normal running auxiliaries, the choice of a.c. or d.c. has to be considered or whether two auxiliaries should be provided for one particular service, e.g., condensate-extraction pumps, alternator ventilating fans, and, if so, whether one a.c. and one d.c. drive should be adopted. There are still certain drives for which engineers prefer to employ d.c. motors, e.g., governor control, stand-by turbine-oil pumps, exciter field rheostats and valves. The turbine stand-by flushing oil pump possibly justifies a d.c. drive if both steam and electrical failures are to be provided for.

There is little to choose between the two classes of motor, in relation to power station auxiliaries, the principal reason against the general application of d.c. being the difficulties and complications entailed in affording a supply rather than in any inherent defect of the d.c. motor. Duplication of drives would also necessitate duplication of spares if a.c. and d.c. were both adopted. The choice of voltage for the various auxiliaries affects not only the motors, controlling switchgear and cables, but also the selection of auxiliary switchboards.

There are no restrictions on the supply of steam to auxiliaries, for there is ample power available at all times so long as one boiler is on the range. If a shut-down should be caused by an electrical disturbance and the

steam range were still charged, there would usually be sufficient steam to start up and run a house service set of reasonable capacity.

Auxiliaries can be primarily grouped as either essential or non-essential. The first must be kept in almost continuous service if the station output is to be maintained. The second can be taken out of commission for some considerable period without affecting output. The auxiliaries in each class vary according to the method of boiler firing and the stand-by plant installed and also to some extent on local conditions. In recent years there has been a tendency towards installing one boiler per turbine, in which case the boiler auxiliaries are of equal importance to those which are associated with the generating unit.

## New High-Intensity Lamp

**A** NEW source of light in the form of concentrated arc lamps announced by the Western Union Telegraph Co., 22, Great Winchester Street, E.C.2, is unique because the light-emitting spot in various sizes of bulbs may be from 0.003 to 0.1 in. in diameter, with brightnesses of up to 65,000 candles/sq in., which is about ten times that of an ordinary tungsten filament and only slightly less than that of the usual carbon arc. The lamp was developed during the war in the company's electronic research laboratories in New York and has now been released for general sale.

Permanent electrodes are sealed into a glass bulb, which is filled with an inert gas; an incandescent spot forms on the specially prepared refractory oxide cathode, the surface of which is raised to its melting temperature when the arc is established so that the molten area emits a cloud of vaporized material, which extends for a few thousandths of an inch from the cathode. The vapour returns to the cathode, thus renewing its surface so that the lamp has a useful life of several hundred hours.

The white brilliance of the spot source appears to be uniform and constant, but is actually brightest near the centre. Variation of the position assumed by the arc stream and irregularities of the cathode surface may change the symmetry and distribution of brightness across the luminous spot; also the position of the spot itself may move slowly during operation by an amount equal to a small percentage of its own diameter. Those variants combine to affect the brightness by about 10 per cent, which is not important for most narrow-beam and high-intensity projection purposes. The smaller sizes of these lamps closely approximate to a point source, which is useful for optical and photographic purposes.

The lamps may be operated in any position and are rugged enough to be normally unaffected by blows and vibration which will not break their glass bulbs. Their light is distributed over the visible range in a continuous spectrum, similar to that from a tungsten filament but several times brighter. It is emitted in one hemisphere only, its spatial distribution being of the cosine type.

They are made in four sizes and many types, usually arranged to emit light from the side or end of the bulb, which must be made of unusually clear glass free from striæ and bubbles to avoid the casting of sharp shadows. Their bases are normally of the multi-pin moulded bakelite type used for radio valves, polarized to fit into their sockets only in one way; but pre-focusing bases are also available, which enable lamps to be replaced without adjustment.

The nominal ratings of these lamps are 2, 10, 25 and 100 W. They require special d.c. circuits, a high starting voltage to break down the arc gap and, because of their negative V/A characteristic, a ballast resistance in series to limit the current which might otherwise be destructive. The smallest lamp in a "peanut" bulb needs 1,000 V for starting and 130 V or more for operation; the larger sizes, which closely resemble radio valves in appearance, need up to 2,000 V for starting and may be operated at from 24 V upward with improved stability at higher voltages.

### Reports on German Industry

Among further reports on German industry now available are the following:—F.I.A.T. 224. "Survey of Electrical Control Devices in Germany" (2s. 6d.); F.I.A.T. 670. "Survey of a new Storage Battery" (6d.).

# Electricity in Factories

## Advice Based on Experience

IN the 40th annual report on "Electrical Accidents," the Senior Electrical Inspector of Factories, Mr. H. W. Swann, shows that in 1945 the number of reportable accidents (i.e., those involving more than three days' disablement) was 891 of which 31 were fatal; the latter figure is the same as for 1944, when the total was 1,072. In places other than factories 147 fatalities came unofficially to the notice of the Department; 48 occurred on domestic premises, including 13 in bathrooms due mainly to the improper use of portable appliances, such as the immersion of an electric iron in the water to heat it and the wearing in the bath of ear-phones of a mains wireless set. Most of the remaining fatalities on miscellaneous non-factory premises were associated with live rails of electric railways and with overhead lines.

Of the 891 accidents in factories electrically skilled men were involved in about 30 per cent of the fatal and 40 per cent of the non-fatal cases, excluding 208 instances of eye-flash from electric welding suffered by unclassified workers. While the latter presented the highest figure for any single category, it was closely followed by portable apparatus, which accounted for 207 accidents (23 per cent of the whole) and included 13 fatalities (42 per cent). Cables in fixed installations were responsible for 89 injuries, none fatal. Switchgear above 650 V caused five deaths in 72 accidents and below 650 V one death in 63. Most fatalities, 19 out of 31, occurred at voltages below 250 a.c. and 6 at 250 to 650 V.

### Artificial Respiration

It is a statutory obligation, where the voltage exceeds 125 a.c. or 250 d.c., to exhibit instructions on the giving of artificial respiration to victims of electric shock. Analyses made of successful and unsuccessful applications from 1941 to 1945 showed that the majority of recoveries occurred within the first ten minutes and a good proportion in the second ten minutes, but fewer after that time. Treatment should, however, be continued, as recoveries after three hours are on record. In most successful cases, efforts at resuscitation were not carried on for more than an hour. Chances of recovery appear

to be slightly greater at higher voltages; the injured person is seldom "held" as at lower voltages, although he may be severely burned. One in three of a number of shock cases examined was accompanied by incidental physical injuries such as falls.

Ignorance is the greatest single cause of electrical accidents arising from negligence, but mental aberration is responsible for a large proportion of those involving experienced persons. Apart from unconscious preoccupation with personal matters, an operative's mind may be concentrated on some feature of the equipment designed without appropriate regard for the human element instead of on the primary objective, e.g., switching. Again repetitive work may lead to carelessness, the results of which should be prevented, e.g., by well-designed and maintained guards and interlocking arrangements.

### Causes of Explosions

Failures with explosive violence are summarized for 35 instances. In one of these an 11-kV steel-cubicle switch tripped on fault during the night; on reclosure eight hours later it tripped again with an explosion believed to be due to gas emitted from the breaker on the original fault. Another explosion, of a transformer tank, was probably caused by scale dislodged from the cover falling on tap-changing gear.

Hydrogen-filled generators call for precautions for avoiding an explosive mixture of the gas with air, since no apparatus is certified as flameproof for hydrogen. One system is to maintain the purity of the hydrogen at 95 per cent and its pressure at from 5 to 10 in. of water to avoid air leakage into the machine casing. Investigations into most effective methods are still in progress.

High resistance of earth circuits is usually concentrated at a few defective joints; the passage of leakage currents not heavy enough to operate the protective gear may cause local arcing or hot spots between cable sheathing and other earthed metalwork with consequent fire risk. In some areas high earth-electrode resistances introduce dangers from shock, especially in view of the increasing use of non-metallic water pipes, often as replaced sections of the mains, or of

semi-insulating joint packing. This may be done without the knowledge of the electricity supply authorities, an increasing number of which are using the sheaths of cables or an additional wire on overhead services for earthing consumers' metalwork. Vagaries of potential gradients in these circumstances have prevented the functioning of earth-leakage trips and resulted in the transference of dangerous potentials from one installation to others.

Where earth-leakage trips depending on voltage rise are adopted, the associated earth spikes must be placed so as not to be influenced by potential gradients produced by earth faults in the ground. As the age of an installation increases, the need for leakage indicators or trips and instruments for the measurement of the resistance of earth-fault path loop becomes greater. New instruments are expected to be available shortly.

### Installation and Running Maintenance

Differentiation between installation maintenance and running maintenance staffs is recommended, the first being responsible for regular inspection, testing and overhaul to prevent breakdowns and the second to rectify troubles. In one factory with 250 motors, stoppages for more than an hour over a given period were reduced from 64 to 13 after the adoption of this system. For smaller works insurance companies are considering undertaking installation maintenance in addition to their existing service.

Absence of readily accessible isolators for cutting off supply of motors and their starters has been responsible for many accidents. Fuse-withdrawal is not a satisfactory substitute when carried out by machine operators, particularly in view of the increasing adoption of automatic and push-button control. For large motors isolators should in many cases be interlocked with the starters to prevent their use for stopping purposes. Starting push-buttons should be shrouded; existing unshrouded buttons can be covered by bent flat metal, between which and the button a finger must be inserted for operation, or by a hinged cover that drops back by gravity. Stop buttons, which are required in an emergency, should not be shrouded.

Far fewer accidents have occurred with high-frequency portable machines with solid rotors than with 50-cycle 200/250-V universal motors with wound rotors, commutators and brush gear. Moreover, the former are

usually operated at 110–120 V, including their flexible cables. With any type, however, transformation from 230 to 110 V (55 V to earth) is recommended and there is no difference in the size of the tools. Portable lamps at 12 or 24 V are also desirable. Voltage-operated earth-leakage circuit-breakers and other protective devices could advantageously be used to supplement the statutory requirement for earthing.

Devices are on the market which enable the operator to ascertain whether a tool is safe to use or to test the continuity of the earthing core with 15 to 25 A. Investigations are in hand to raise the testing current to 100 A for one second which, while unlikely to damage the cable, would melt the few remaining strands of a conductor when most of the strands are severed. Simple testing sets are available for locating a break in any core, thus obviating the scrapping of cable otherwise sound. A further set is expected to be ready soon for quick testing of insulation, continuity, running and faults (open-circuit or short-circuit) and for locating short-circuits and breaks of cable. It is often preferable to repair flexible cables with rubber vulcanized by a machine made by cable manufacturers than to rely on black adhesive tape.

Rubber gloves only protect the wearer's hands, whereas contact with a faulty portable tool might be made with other parts of the body. Also a faulty tool might come into contact with unearthed metal and extend the risk of shock over a wide area.

### Plug Errors

Mistakes have been made through the insertion of three-pin single-phase plugs into three-phase sockets or through insufficient difference in diameter between earth and phase pins on four-pin three-phase plugs. For general testing, a design of test-lamp outfit, embodying safety requirements but capable of being carried in the pocket, would be a desirable introduction. In the notes on welding, the need for providing an insulating handle for electrode holders is emphasized; although the voltage is low, a shock may result in a fall.

In addition to numerous statistical tables and details of individual accidents in general and special industrial processes with suggestions for preventing their recurrence, the Report gives a list of intrinsic safety certificates issued by the Chief Inspector of Factories for various types of equipment.

# PERSONAL and SOCIAL

## News of Men and Women of the Industry

**T**HE Air Ministry has appointed Mr. A. Watson, B.Sc., M.I.E.E., M.I.Mech.E., deputy chief mechanical and electrical engineer in the Directorate General of Works, Air Ministry, as chief mechanical and electrical engineer. Mr. Watson was educated at Dundee High School and at St. Andrews University where he obtained the B.Sc. degree in mechanical and electrical engineering. He served as a student apprentice at the Dick Kerr Works, Preston, of the English Electric Co., Ltd., from 1921 to 1923, and from 1924 to 1927 was engaged by that company on the Southern Railway electrification, the Post Office underground railway and the Falls of Clyde hydro-electric scheme. He joined the Directorate General of Works, Air Ministry, in 1927 and for the past three years has been deputy chief mechanical and electrical engineer. The responsibilities of the Directorate include all mechanical and electrical services (home and overseas) at R.A.F. airfields and establishments, including those for the Ministry of Civil Aviation.



Mr. A. Watson

Mr. L. C. Montague, A.C.I.S., has been appointed a joint managing director of Johnson, Matthey & Co., Ltd. Mr. Montague has been associated with the company for twenty-seven years and has been secretary for the past twelve years.

Lt. Col. C. H. Brazel, M.C., who has been chairman of the Ceylon Overseas Committee since its inception, has been appointed by the I.E.E. to serve as its first overseas representative for Ceylon.

Major H. G. Faulkner, M.B.E., well known in the radio industry before the war, and lately wireless staff officer, Royal Signals, at Field-Marshal Lord Montgomery's H.Q., has been appointed radio components sales manager to the Plessey Co., Ltd.

Dr. Edwin Gregory, Ph.D., M.Sc., and Brigadier Arthur Levesley, O.B.E., M.C., T.D., have been appointed directors of Edgar Allen & Co., Ltd. Dr. Gregory joined the company in 1944 as chief metallurgist. Brigadier Levesley, who was appointed foundry manager last October, had previously been with the company from 1910 to 1928, except for war service. From then until 1939 he was with Hopkinsons, Ltd., becoming assistant to the managing director with the special function of

dealing with contracts for large power stations. He was embodied with the Territorial Army when war broke out and under the R.E.M.E. organization became chief electrical and mechanical engineer of the central workshops at Chilwell.

Mr. H. Gray, chief draughtsman of Edgar Allen & Co.'s engineering department, has just retired. His place has been filled by Mr. A. Wadsworth, of the British "Rema" Manufacturing Co., Ltd., a subsidiary of the company.

Mr. Frederick H. Rayer, who joined Brush Coachwork, Ltd., in 1944 as chief designer, has now been appointed chief engineer of the company. He is well known in the coachbuilding industry, and is an authority on all-metal body construction. Mr. J. Harrison, of the Mumford Body and Engineering Co., Ltd., has been appointed production manager.

Mr. William Duncan, senior maintenance engineer at the British Broadcasting Corporation's Westerglen station, Falkirk, has been appointed engineer-in-charge at the Londonderry station.

Captain H. A. Lamb, A.M.I.E.E., has, on demobilization, joined the staff of South Wales Switchgear, Ltd., Treforest. Following early training with Lambton, Hetton & Joicey Collieries, Ltd., he served six years with A. Reyrolle & Co., Ltd., and relinquished the post of deputy technical engineer at the Hebburn Short Circuit Testing Station to become switchgear test and inspection engineer with the Harland Engineering Co. From 1937, until joining the R.E.M.E. in 1942, Captain Lamb was protective gear engineer with Ferguson, Pailin, Ltd.



Capt. H. A. Lamb

Mr. G. Burt, acting chief electrical engineer to Gateshead Corporation, has been confirmed in the position.

Mr. Clark H. Minor, who recently retired from the presidency of the International General Electric Company of America, has been appointed an Honorary G.B.E. for his work in connection with the British War Relief Society in America.

The *Electrical Engineer and Merchandiser* reports the resignation of Mr. Daniel McVey from the Commonwealth public service to become chairman and managing director of Standard Telephones & Cables Pty., Ltd.,

Sydney. Mr. McVey joined the Government service in 1914 and has held the positions of Director-General of Posts and Telegraphs, of Civil Aviation and of Aircraft Production.

Mr. J. Clifford Wood, commercial manager of John Fowler & Co. (Leeds), Ltd., has been appointed a director.

**Appointments Vacant.**—Among the vacant positions advertised in this issue are the following:—Electrical engineer and manager for Bury (re-advertised at the "Walker scale" salary); assistant power station superintendent, etc., for Belfast; industrial power engineer for Luton; chief constructional assistant, Brighton; electrical inspector of works, Sierra Leone; head of Department of Electrical Engineering and Physics, Borough Polytechnic, London; head of the Department of Electrical Engineering, Bradford Technical College; and senior assistant for electrical engineering, Hull Municipal Technical College.

## Obituary

Mr. I. W. Chubb.—We learn with regret of the death on September 1st of Mr. Isaac William Chubb, who for forty-two years, until his retirement last November, was editor of the *Machinist* (formerly *American Machinist*); he was seventy-six. In 1891 Mr. Chubb joined the General Electric Power & Traction Co. and later went to the Brush Electrical Engineering Co., with whom he was engaged in the design of junction boxes, fuses and switchgear. He was for a time attached to the County of London Co., assisting in the installation of central station equipment.

Mr. W. Hamilton.—We announce with regret the death on August 28th, at Monkseaton, of Mr. William Hamilton, manager of the North East Coast branch office of G. & J. Weir, Ltd., Glasgow. Mr. Hamilton, who was seventy years of age, received his early engineering training with Lobnitz & Co., Ltd., Renfrew. He joined G. & J. Weir, Ltd. in 1901, and went to Newcastle in 1904 to assist the company's representative on trials, etc. He remained on the North East Coast, and in 1912 was appointed to take full charge of the Newcastle office.

Mr. H. Bridgett.—The death occurred in a Wolverhampton nursing home on September 1st, at the age of forty-five, of Mr. Harold Bridgett. Mr. Bridgett had been with the Electric Construction Co., Ltd., Wolverhampton, for thirty years. He had been chief of test since 1930, and had taken charge of the erection and setting to work of many important E.C.C. installations at home and abroad.

Mrs. A. Scott-Ram.—We regret to learn of the death, on September 8th, of Mrs. Ada Scott-Ram, widow of Mr. G. Scott-Ram, O.B.E., M.I.E.E.

Wills.—The late Sir James Devonshire, past vice-president of the Institution of Electrical

Engineers and formerly deputy chairman of the Northmet Electric Power Co., left £75,282 (net personality £74,393).

Mr. C. E. Vance, A.M.I.E.E., Hindhead, left £35,552 (net personality £33,715).

Mr. W. A. W. Jones, electrical engineer, left £4,680 (net personality £3,143).

## Ship Propulsion

**P**HASES of marine propulsion were commented on in the presidential address of Sir AMOS L. AYRE (permanent chairman, Shipping Conference) to the Institute of Marine Engineers. He pointed out that a considerable amount of research was at present being carried out in this country by the Parsons and Marine Engineering Turbine Research and Development Association. There could even be detected a tendency to move from Diesel to steam turbine propulsion, particularly for units of about 7,000 S.H.P. and over.

The last of the Scotch boilers had been seen; the modern turbine and water tube boiler layout, with its 30 per cent saving in "steaming weight" as compared with the corresponding Diesel layout of the same S.H.P. and r.p.m., was a factor of importance which could be set off against the greater economy of fuel consumption of the Diesel engine.

It was difficult to state where the turbo-electric and Diesel-electric types now stood with respect to the modern geared turbine and water tube boiler combination. It would seem fair to say that neither in first cost nor overall economy did they show any decided improvement, although they did seem to have some advantage in respect of reliability and upkeep. But for the improvements that had taken place in gear cutting, the electric drive might have made greater progress.

## International Technical Congress

**T**HE principal aim of the International Congress of Engineers, which will open in Paris on Monday next at La Maison de Chemie and continue until Saturday, is to provide an opportunity for the renewal of contact between technical men of different countries. Several papers of electrical interest will be presented dealing with hydro-electric power in Scotland, France and Tennessee. A session will be devoted to atomic energy at which M. Joliot Curie (Haut-Commissaire à l'Energie Atomique, France) will give an address.

The programme includes a reception by the Municipal Council of Paris and a six-day conducted motor-coach tour of the hydro-electric scheme of the Massif Central, which supplies power to a large part of France, including the Paris region. The plants to be visited include those of the barrages of Mareges, l'Aigle and Sarrans, and the underground station at Brommat, near Aurillac.

## CORRESPONDENCE

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

### Power Factor Correction

IT would not be correct to conclude from Mr. H. Neale's article in your journal of August 9th that there is a practical need to correct the power factor of a motor at full, three-quarter and half load to one and the same value. Such a procedure is not advisable as in many cases a power factor of 0.985, suggested for instance in the article, would not be economical and would include the risk of a leading power factor under varying load and voltage conditions.

The requirement which is most frequently met in practice is that the power factor of the load should under no conditions drop below a minimum value or that the kVA demand should under no load conditions exceed a maximum value. The allowable minimum power factor or maximum kVA demand depend on the circumstances of the case, e.g., the capacity of the cables and switchgear already installed, the tariff of the supply authority, etc.

The calculation of the required capacitor usually has to take into consideration the full, three-quarter and half load but can be greatly simplified by using  $\tan \phi - \tan \phi_c$  tables which under the heading "Capacities required to correct the power factor of a load of 1 kW from an existing figure to a given figure" appear in the catalogues of a number of manufacturers of capacitors for power factor correction.

London, W.4.

M. RAHT.

### Fluorescent Lighting Effects

MR. G. V. DOWNER'S letter in your issue of September 6th commenting on my article on the above subject starts with a false assumption. He says:—"Surely when considerable numbers of users, both here and in America, experience eye trouble, headaches, etc., when working with this type of lighting it is reasonable to attribute the trouble to some harmful effect of the light." It may be reasonable in such circumstances to wonder whether fluorescent lighting is a contributory cause and to carry out an investigation to determine what bearing it has, if any, on the matter. Without such an investigation it is quite unreasonable for Mr. Downer to make such an assumption.

There is always a tendency to blame new conditions for old ills, forgetting that these ills existed long before the new conditions were introduced. People suffered from eye trouble, headaches, etc., long before fluorescent lighting was invented and it is only if it can be shown that such ills have increased in incidence or severity under fluorescent lighting that there is any *prima facie* case for suggesting that the lighting is a contributory cause. It is with a view to determining this very point that medical men, both here and in America, have made their investigations and the result has been to give fluorescent lighting a clean bill.

This is no surprise to those of us who have been extensively associated with the introduction of fluorescent lighting in industry. Our whole experience goes to show that, in fact, complaints of strain, etc., are less under the new system than the old.

Mr. Downer speaks of "considerable numbers of users" complaining and says that "instances are far too numerous to be dismissed," "so many people suffer," etc. If this is so, surely he can quote some independent investigating body, such as the Industrial Health Research Board with chapter and verse so that suitable investigations can be made and his suggestions either confirmed or refuted. Until this is done no thinking man will fail to be satisfied with the pronouncements of the medical authorities of this country and the United States.

London, W.C.2.

R. O. ACKERLEY.

### Shortage of Supplies

I AGREE entirely with Mr. Alex. Milne (August 30th issue) regarding extreme shortages of electrical accessories, small switchgear, etc., which the contractor is experiencing to-day. What appears so strange to the contractor is how the multiple stores acquire these electrical goods. Surely they fall within the scope of the W.B.A. Scheme, in which case how are they obtained for indiscriminate counter sales, when the legitimate trade must produce their W.B.A. priority in order to obtain their supplies for essential house wiring, etc.? Many contractors are being compelled to dispense with their wiremen because of these shortages.

Luton, Beds.

ALEX. DYSON.

# Overload Protection

## Discriminative System for High-voltage Feeders and Ring Mains

**A**DVANTAGES of overload protection on a high-voltage network are low cost,

simplicity, direct action in circuit-breaker tripping and simultaneous protection of both feeder and busbars, and for these reasons series overload trip coils shunted by time-limit fuses are extensively used. The discriminative properties of this combination are, however, negligible, because in most systems to-day the fault currents are so far in excess of the overload of the fuses that their characteristics are completely swamped. The result is that the blowing of fuses that are subjected to the straight-through fault current is followed immediately by the opening of the circuit breakers, thus causing healthy areas of supply to be shut down unnecessarily.

Balanced protective schemes require both

By **E. V. C. Habgood,**  
A.M.I.E.E.

feeder is necessary. When the fundamental essentials for these forms of protection are absent,

the problem arises as to what scheme of protection will give satisfactory fault discrimination.

A new scheme of feeder protection was specially evolved for such circumstances. It belongs to the d.c. interlock class, and though it is applicable to systems employing either overload relays or series overload coils shunted by time-limit fuses it has been especially applied to the latter.

For protecting radial feeders by time-limit fuses (Fig. 1a), additional "discriminating" relays are connected between the R and B phases of the current-transformer and the common return leads. The contacts are connected to the locking supply and the pilot wire from the preceding substation, at which is provided a four-contact d.c. locking relay.

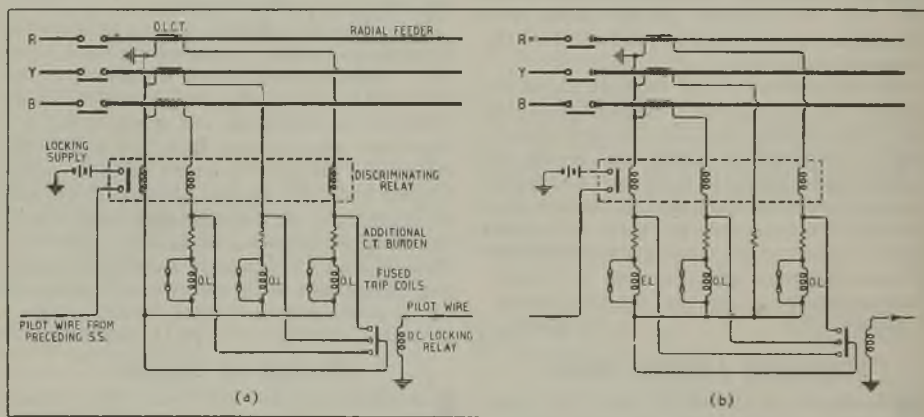


Fig. 1.—Radial-feeder protection with (a) same settings for phase-to-phase and earth-leakage protection and independent settings for equivalent discrimination, and (b) with independent settings for protection and discrimination

incoming and outgoing feeders to be provided with automatic circuit breakers. With the overload time-graded relay arrangement the number of substations that can be progressively timed is definitely limited.

For economy it has become the practice to reduce the number of circuit breakers per substation by the use of an oil-immersed or air-break isolator for one of the looped-in feeders and as the electrical demand increases a larger number of substations per

Should a fault occur on any section of a radial feeder the discriminating relays in all substations through which the fault current passes immediately close their contacts, causing immediate operation of the locking relays in the preceding substations, thus short-circuiting the overload-trip coils and time-limit fuses, preventing the circuit breaker from opening. The trip coils of the last substation feeding the fault arc, however, permitted to function, since the locking relay



at this substation cannot operate because its operating coil circuit is broken by the open contacts of the discriminating relay situated

The ring is thus split into two radial feeders and the protection acts as previously stated.

Definite relationship between the direction of the power flow and the sequence of interlocking must always be preserved. Fig. 3 shows how this is done simply without directional relays. Six substations A, B, etc., are shown connected in ring main with the key switch at the mid point, L and M are the main oil circuit breakers at the source of supply and are protected by inverse overload relays. The interlocking circuit differs insofar that two pilot wires are necessary and that it requires the contacts of the discriminating relay at two substations to make before the coil of the d.c. locking relay can be energized.

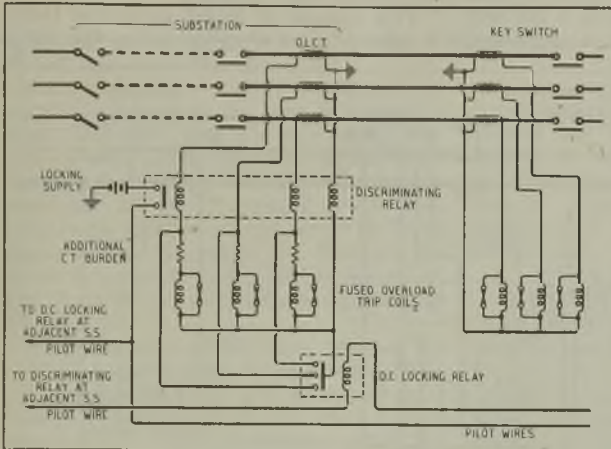


Fig. 2.—Protection of ring-main feeders with one oil circuit breaker per feeder

in the substation immediately following the faulty section. Any number of substations can be connected and only one oil circuit breaker per substation is required to provide protection and discrimination for both feeder and busbar.

The basis for successful discrimination is that the fusing time shall always exceed the operating time of the discriminating relay plus the operating time of the locking relay. Tests have shown that a time ratio of 2:1 is easily obtainable with fault currents in the neighbourhood of twenty-five times full load with a No. 22 s.w.g. tin-wire fuse. Where current-transformer saturation does not occur at this value of fault current, it is produced by the introduction of additional current transformer burden. On a new installation current transformers of limited output could be provided, in which case the additional burden would be omitted.

For ring-main feeders, discrimination is provided by selecting one of the circuit breakers as a "key switch," which opens first on a fault because it is not included in the interlock circuit.

If for example the fault on the feeder is between B and C, with the key switch open the discriminating relay contacts at M, 2 and 4 are made. No. 2 oil circuit breaker is now

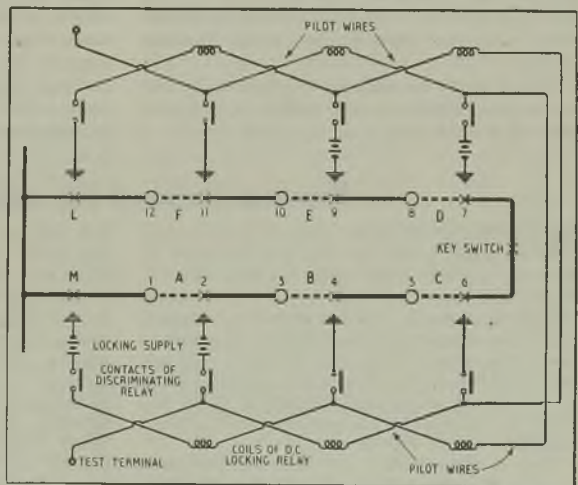


Fig. 3.—Schematic diagram of Fig. 2, coils of discriminating relays and contacts of locking relays not shown. (Numbered circles indicate isolators)

locked in, since its locking relay is closed through discriminating relay contacts M and 4, but No. 4 o.c.b. is not, since No. 6 contacts

are open because the coil of this relay is beyond the fault. Therefore No. 4 o.c.b. opens as desired. If the key switch is provided with an auto-reclosing feature, it will reclose on to the fault and o.c.b. 6 will trip so that the entire ring with the exception of

provided with an automatic circuit breaker. It is particularly suitable as a supplementary protection to an existing system that covers the feeders only.

This method of feeder protection (which is patented) was designed during the war to

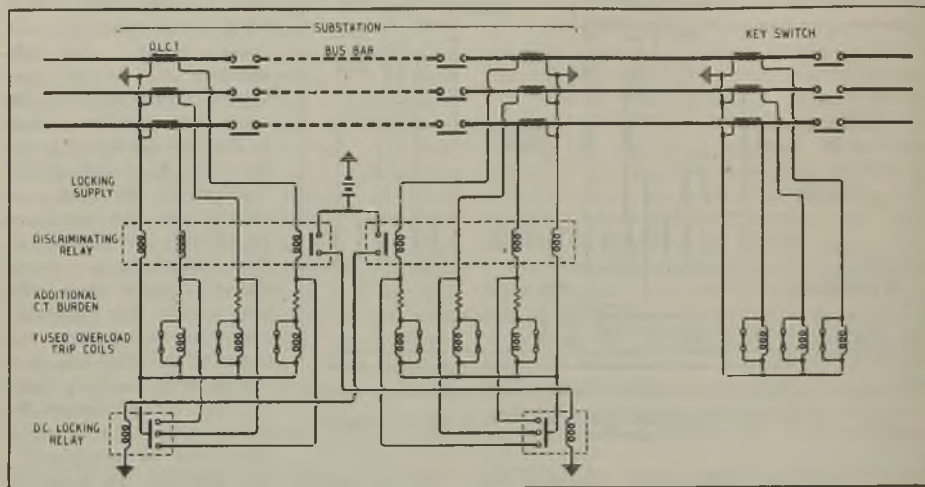


Fig. 4.—Adaptation of scheme to busbar protection

the faulty section is energized. It will be found that wherever the position of the fault and whatever the direction of the power flow only the appropriate circuit breaker clears.

Fig. 4 shows the scheme applied to busbar protection, where no pilot wires are required and each incoming and outgoing feeder is

provide discriminative protection to several miles of 11-kV overhead lines at Southend-on-Sea and district. These lines were very vulnerable to frequent enemy action, anti-aircraft fire and other disturbances. During the war years it was called upon to operate twenty-five times, achieving complete discrimination in every case.

## Russian Railway Electrification

**A** CORRESPONDENT states that precedence is being given to the electrification of railways in the Urals and Western Siberia. Work has begun on one of the most active freight sections of the North Urals railroad, the Goroblagodatsk-Nadezhdinsk-Bogoslovsk line. This new section, 242 km long, will join the electrified Sverdlovsk-Chusovskaya-Perm line, forming a through electrified main line from Sverdlovsk to Bogoslovsk, with a total length of about 440 km.

The electrification of the Rion-Tkvivili line, running through difficult mountainous country, will be an important factor in reducing the freight bottleneck of the Transcaucasian railroad. On the Moscow-Kursk line, the electrified section will be extended from Podolsk to Krivno and, on the so-called "Western" railroad, from Setuni to Odintsovo.

On the South Urals line, electrification of

159 km of the Zlatoust-Kropachevo section has been started. Work on electrifying the main line between Novosibirsk and Omsk for a distance 640 km was to begin this year. During the next few years the entire Kuzbass-Chelyabinsk route, uniting the Urals with Siberia, will be electrified, providing for an increase in freight haulage for the coal and metallurgical bases of the east. Communication between the Karaganda coal basin and the South Urals will be strengthened by the completion of the Karaganda-Kartaly electrified line. The line between Baikal and Berdyansh will be converted to electricity in order to improve the service to the large mines of Baikal, where the output of ore is expected to be doubled during the next five years.

During the 1946-50 Five-Year Plan it is proposed to electrify the Moscow suburban lines within a radius of 40 to 50 km.

# Awards to Inventors

## Matters for the Commission's Consideration

**I**N order to recognize the value of our inventive genius in winning the war a Royal Commission on Awards to Inventors has been appointed by Royal Warrant. The chairman of the Commission is Sir Lionel Leonard Cohen, a Lord Justice of Appeal. The six other Commissioners are Mr. Kenneth R. Swan, K.C. (who is the chairman of the Board of Trade Departmental Committee on Patents), Sir James Rae, Sir John H. Greenly, Sir Albert Lee, Sir William A. Stainer, and Dr. George M. Bennett.

Under the terms of the Royal Warrant the Commission will have to deal with claims for compensation or remuneration under Section 29 of the Patents Act, which is concerned with the rights of a subject against the Crown under letters patent and agreements relating thereto, and with Section 58a which similarly treats of registered designs. It will also have to advise the Treasury regarding awards for "unpatented" inventions, and agreements relating thereto. In addition cases in connection with the 1946 agreement between this country and the United States concerning the interchange of patent rights and information will also come up for consideration by the Commission.

### Assessors and Evidence

Authorization is given to the Commission to sit in two divisions and to call in the aid of specially qualified assessors, who will be remunerated, to assist in investigating and determining the matters before it. Oral and written information may be called for by the Commission, which may also examine records and personally inspect relevant places. Adjournments may be made by the Commission, and individual exercise of the powers and privileges of the Commission may be made by the members thereof. Neither the provisions of the Arbitration Act, nor any re-enactment of it, are applicable to the proceedings. Periodical reports may be made to the Crown by the Commission, and it must report to the Treasury its opinions on the matters with which it is concerned.

The principles which will guide the Commissioners in deciding the cases which come before them are not mentioned in the Royal Warrant. Since we are fond of precedents,

By "Pagent" it will be instructive to summarize those (stated in the First Report) which guided the Royal Commission on Awards to Inventors, appointed after the 1914-18 war under the chairmanship of Sir Charles H. Sargant. This Commission sat for fifteen years and disbursed £1,500,000 in awards. It dealt with 1,839 cases directly or indirectly, of which 444 were heard by the Commission.

### Establishment of Validity

The Report began by pointing out that under Section 29 of the Patents Act the subject lost the right to exercise his patent monopoly or prohibition against the Crown, but in return received the right of claiming compensation or remuneration for Crown user. Before he could do this, however, the validity of his patent and Crown user had to be established by the claimant, and these might be disputed. The established practice was to have these questions settled by legal procedure, and this was the routine adopted by the Commission when strict. Sometimes, however, the claimant and the Crown were willing for the Commission to form its view upon the case without appeal, or the parties did not insist on strict rights under Section 29. The Commission acceded to these requests, and strict procedure was waived.

In arriving at the amounts of money to be paid in normal simple cases the Commission considered that a patentee should not be extortionate in his demands on the nation and that the Crown should not use the inventions at too low prices simply because Government Departments were the only possible customers. In its position as statutory licensee the Crown had the advantages of being able to exercise its option of user when (including prospectively or retrospectively) and to the extent the public service demanded. But with these conditions the prices or consideration should be fixed as between willing licensors and willing licensees bargaining on equal terms, on a royalty basis as in private bargains. If the licensee took large quantities the rate of royalty consequently was often much diminished. In private bargains the technical merit of an invention sometimes bore little relationship to the patentee's profit thereon.

Exceptional user was very important when practical utility was the main test of the commercial value of an invention. The royalty or rate, usually calculated on the cost price or selling price of the patented invention, was affected by its advantage or saving in use over a competitive invention, its cost, and its relation to that part of the article which was of ordinary construction.

Where the case was not normal and simple and the considerations clear, there might be doubt as to the validity or user of the patent or both. When the determination of the matter was left to the Commission allowance had to be made for the risk of failure on the part of the patentee to establish these.

In cases where the invention came under the special regulations of the Services or the Ministry of Munitions or the Air Ministry and a representative of the Department was joined as a patentee, allowance had also to be made. The inventive merit, the claimant's position and any Departmental assistance were taken into consideration, as also were any benefits accruing to the inventor through the relevant Government Department having allowed him to exercise patent rights for his own benefit.

#### Unpatented Inventions

In cases where for some reason of public policy or at the direction or request of a Government Department an inventor had refrained from taking out a patent, the inventor was treated as if he had done so, his position being subject to the modifications above mentioned. Where the claimant was otherwise in Crown employment and had special facilities or assistance for apprehending and solving a problem, this was also taken into account. No account was taken of lapsed or expired patents or inventions which had previously been placed in the public domain.

Six applications were made to the Commission to approve an agreement between a Government Department and a patentee. In all six cases the approval was granted after the Commission had inquired and been satisfied that not only had an agreement been come to, but also that the agreement was a proper one and fit for approval.

With regard to unpatented inventions, claimants sought bounty of the Crown as they had no statutory or legal right to award, and the subject matter of the invention was less well-defined. To deal in the first place with all claims of this kind not recommended

by some Government Department, the Commission appointed an investigating committee consisting of the secretary and the chairman or one or two other members of the Commission. The first examination was made in the absence of the applicant and on written materials. But a request for a personal hearing before the Committee was never refused.

A claimant had to prove matters analogous to real novelty and inventive merit and more than a trifling degree of utility. Furthermore the idea had to be embodied in practical working shape. As in an unpatented invention, as distinguished from a patented one, there was no legal monopoly or right, there might be several claimants. A claimant had therefore to show that his invention was a link in the causal chain leading to the use of the invention under consideration.

#### Effort and Reward

Besides use, other factors were taken into consideration, as for example, the importance and difficulty of the problem to be solved, and the effort and time spent thereon, the inventive merit shown, and what reward was obtained by the inventor from other sources. The utmost remuneration to be expected for an unpatented invention was that which would have been awarded for a patented one.

The above applied to a normal or simple case. A deduction had to be made where the inventor was in a branch of Crown service connected or interested in the subject matter of the invention, because by his service his attention would be directed to the problem and to the conditions of a satisfactory solution of it.

Similarly for a contractor for a Government Department who might in addition have thereby made extra profit on his existing contracts or obtained others. Where such an inventor had made large personal profit from commercial sources there might be no occasion for his receiving the Crown's bounty; this also applied to patented inventions vested in or assigned to Crown nominees, where the inventor had received permission to deal commercially with his invention for his own profit. Allowance had also to be made for independently discovered inventions developed with Government help, and to a still greater degree where the invention under consideration was merely a subordinate part of the main invention or a step in its solution.

# COMMERCE and INDUSTRY

## Lighting Column Specifications. City and Guilds Report.

### Street Lighting Columns

**A** BRITISH Standard Specification for Reinforced Concrete Street Lighting Columns (B.S. No. 1308: 1946) has recently been issued; it forms one of a series of three specifications which is being prepared for street lighting columns. A standard for cast-iron columns has also recently been issued (B.S.1249) and a standard for steel columns is in course of preparation.

The standard for reinforced concrete columns provides for three classes of columns giving mounting heights of 30, 25 and 15 ft. The standard lays down the quality of the material to be used in the manufacture of the columns and also the tests on the columns themselves. Details of the fittings associated with the columns are also given. Copies of the specification are available from the Publications Department, British Standards Institution, 28, Victoria Street, S.W.1, price 2s.

### Marconi-Pye Agreement

An important development in the manufacture and marketing of airborne and ground wireless apparatus to facilitate the blind approach of aircraft to aerodrome, and aircraft landing, is contained in the announcement of an agreement between Marconi's Wireless Telegraph Company, Ltd., and Pye, Ltd. The agreement covers the design, manufacture and sale of a peacetime model of a radio instrument landing system for aircraft, operating at very high frequencies which offers accurate and reliable glide-path and localizer guidance from a distance of several miles down to within a few feet of the runway. During the war years Pye, Ltd. was entrusted with the development of blind landing equipment for the Government and has now been given a special contract to develop and manufacture this particular type of blind approach and landing equipment for the Ministry of Supply.

The two companies have entered into an agreement by which Pye, Ltd. will, in technical collaboration with Marconi's, develop and manufacture this new type of apparatus and the Marconi Company will be responsible for its sale, installation and maintenance throughout the territories in which it operates.

### City and Guilds Institute

In its report for 1945 the Council of the City and Guilds of London Institute expresses its anxiety at the continued decline in the amount of annual subscriptions in the face of increased activities. The City Corporations and the

Livery Companies are warned that unless substantially greater support is secured there is likely to be a deficit this year of not less than £4,000.

There were increased entries in practically all of the 113 technological subjects for which the Institute arranged examinations in 1945. Electrical engineering practice examinees numbered 1,097, which was 155 more than in 1944, while there were increases of 98 in electrical installation work (371) and 41 in radio service work (256). Telecommunication subjects attracted 15,033 entrants, a decrease of 95, and included telephony (2,328), telegraphy (839), radio-communication (4,109), technical electricity (6,582) and transmission and lines 1,175. Candidates for technological examinations overseas showed an increase of 525 at 3,591.

### Cardiff Horticultural Show

A joint exhibit of the Cardiff Electricity Dept. and the South Wales Electric Power Co. won a silver medal at the recent Cardiff and County Horticultural Show. This annual event has previously been held indoors at the City Hall but this year it was held in the open air, an innovation which it is hoped will become a



Part of the electrical display at the Cardiff Horticultural Show

permanent feature. Particular interest was shown by visitors in a greenhouse fitted with tubular heaters and a cold frame with soil-heating cable. Other items included in the electrical display were wool shearing clippers, pumps, sterilizers and other farm equipment and a selection of the latest domestic appliances.

### Aluminium Price Increase

It was announced by the Ministry of Supply last week that as from September 9th the price of virgin aluminium in ingot or notch bar form would be increased from £67 to £72 15s. per long ton, delivered into consumers' works. The new price applies to metal of 99 to 99.5 per cent purity, with premiums for higher purities. The increase has been necessitated by a rise in cost to the Ministry under the Canadian contract owing to an alteration in the rate of exchange.

This increase leaves the price considerably lower than it was a year or so ago. In March, 1945, the rate per ton was £110 and it was then reduced by £25. Later there was a further reduction of £18 to the level existing until the present increase.

### British Gas Council

Application has been made to the Board of Trade for a licence for the registration of an association, to be called the British Gas Council, with limited liability but without the addition of "limited" to its name.

The objects of this body are to take over all or any of the assets and liabilities of the British Commercial Gas Association and the National Gas Council of Great Britain and Ireland, and to promote the commercial prosperity of the gas industry and to extend, promote, and defend its interests and welfare and to raise and administer funds for those purposes.

### Modern Homes Exhibition

Interior furnishing and equipment will be the keynote of the Modern Homes Exhibition which is being planned to open at the Dorland Hall, Regent Street, London, W., on March 25th, 1947. One of the special features of this exhibition, sponsored by the *Daily Herald*, is a novel demonstration theatre in which household processes and equipment will be given an unusual presentation.

### Shirt Factory Lighting

An interesting fluorescent lighting installation was recently completed in the Guisborough Shirt Factory. The installation was planned by B.T.H. lighting engineers who recommended the use of 80-W "Mazda" fluorescent lamps

allow a proportion of the light from the fluorescent lamps to flood upwards and illuminate the light coloured roof. The lines of reflectors were mounted 6 ft above the conveyor belts to give an illumination value of approximately 18 lumens per sq ft in the region of the needles on the sewing machines. The continuous line lighting gives illumination from many different angles so that there is a marked absence of shadows. The installation was completed by A. Anderson & Son, Ltd., of Middlesbrough. The cabling from the distribution board to the ends of the lines of fittings was carried out in Pyrotenax and the fittings were suspended on conduits which were introduced in order to ensure that the lines of fittings remained level from end to end.

### Batti-Wallahs' Society

At the Society's luncheon at the Connaught Rooms, London, on September 26th, Col. H. J. Wellingham, M.C., T.D., will give an address on "A Survey of Overseas Cable and Wireless Communications during the War with Personal Experiences."

### Aircraft Equipment Display

Member and associate member firms of the Society of British Aircraft Constructors participated in an exhibition at Radlett Aerodrome on September 12th and 13th. Of the 190 exhibitors, about forty were electrical and allied manufacturers, among them being Marconi's Wireless Telegraph Co., Ltd., which exhibited radio navigational systems and communication equipment, and the General Electric Co., Ltd., which showed heating and cooking equipment for 24-V operation as well as lamps and lighting fittings, motors and a radio transmitter receiver.

The British Thomson-Houston Co., Ltd., displayed an extensive range of magnetos, a plug and socket enabling magneto cable harness to be quickly removed, a range of very small motors, a variety of switches and control devices, radar generators and alternators, and landing, navigation and interior lighting fittings.

Facilities are being arranged by the Ministry of Civil Aviation for demonstrations of radio and radar equipment, involving visits on various dates to a number of aerodromes.

### Exhibition of Photography

Prints shown at the Royal Photographic Society's ninety-first annual exhibition which opens to-morrow at the Science Museum, London, S.W.7, illustrate such diverse subjects as sound recording on glass discs, the effect of electron bombardment, enlargements of 160,000 utilizing the electron microscope, radiographs of safety razors, radiographic photos of the formation of shell on an egg



Guisborough Shirt Factory showing the new lighting installation

in fittings mounted in continuous lines extending the whole length of the room. Each line was made up of ten "Mazdalux" F164 single lamp reflectors. These reflectors have open tops and were specifically chosen because they would

inside a hen, radiography of pearls, and photos of molecules (taken by the X-ray diffraction method of Sir Lawrence Bragg). The use of photographic methods in nuclear research is also demonstrated. The exhibition which includes nearly 900 photographs, will remain open until October 26th.

### Mr. Riggs' E.I.B.A. Appeal

In appealing to electrical men to support the Electrical Industries Benevolent Association the president, Mr. Walter Riggs, emphasizes the fact that the Association does good by stealth. He points out that because little is heard of the cases which the E.I.B.A. helps this does not mean that it is inactive; it is very active but maintains close confidence, for which it deserves the highest praise. The Association's beneficiaries, those who work on its committees and those who have brought needy cases to its attention all speak in the highest terms of the effectiveness and comprehensiveness of its work, which, by the way, has more than quadrupled during the past ten years. The address of the E.I.B.A. is 32, Old Burlington Street, London, W.1.

### Telecommunications Research

In our issue of August 16th we announced the formation of a research company by an industrial group of which British Insulated Callender's Cables, Ltd., and the Automatic Telephone & Electric Co., Ltd., are principals. The new company was registered on August 30th under the title of British Telecommunications Research, Ltd., its objects being to carry on research in the applications of telecommunications of all kinds, including radio, radar, television and transmission equipment, automatic and other telephones, telegraphs, wires, cables, lines and appliances of all kinds, electronics, electrical and electro-mechanical equipment, etc.

### Faulty Church Wiring

The Chancellor of the Carlisle Diocese, Mr. H. H. King, K.C., said at a Consistory Court in Carlisle Cathedral on September 4th, that he was "shocked" at the large number of cases in the Diocese where wiring for electricity had been improperly done. People did not seem to realize the importance of adhering to the regulations which were drawn up by his predecessor in consultation with most eminent engineers. Those regulations were not fantastic, though some engineers would say they were if they wanted to save themselves trouble.

### Thorn Sales Conference

Plans for further extending the activities of Thorn Electrical Industries, Ltd., were discussed at a successful two-day national sales conference held last week in London. Matters dealt with by the fifty or so representatives present ranged from general sales policy to practical hints on selling. At a dinner held at the Connaught Rooms at the conclusion of the programme, Mr. G. A. Shea, proposed the toast of the company and its chairman and managing director, Mr. J. Thorn.

In reply Mr. Thorn said they had laid the

foundations of a lamp manufacturing organization which had proved during the war that it was as good as any in the country. Mr. A. S. Shier, sales director, presided at the dinner, and other speakers included Mr. L. M. Glancy, Mr. M. Donaghy, Mr. F. Roberts, Mr. R. Childs, Mr. A. Deutsch, Mr. A. Weenan, Mr. Vernon Smith, Mr. Matthews, Mr. S. T. Holmes, Mr. O. Pawsey and Mr. Ward Burton.

### Reyrolle's Training Scheme

A. Reyrolle & Co., Ltd., have now put into force their new apprentice training scheme. Sixty boys have started their basic training which will last two years. There will be a three months' course at a recognized school and afterwards the boys will be given a full and varied experience in Reyrolle's workshops. After this training it will be decided for what type of work the boys are best suited. The intake of apprentices will rise to about 120 per annum and about 600 youths will be undergoing training simultaneously.

### Tribute to Electricity Company

High tribute was paid to the Mid-Cumberland Electricity Co., Ltd., a subsidiary of the Yorkshire Electric Power Co., Ltd., at the switching-on ceremony on September 4th of an electric pumping plant at Maryport Waterworks, Cumberland. It was emphasized that the company since it went to the county in 1930, had shown a keen public spirit in advancing employment schemes, especially between the wars when West Cumberland was known as a "distressed area."

Councillor Gasgarth, chairman of the Finance Committee, said that Maryport and other local authorities had had powers for electrical development, but it had been left to private enterprise to take the risk in their isolated area and they had done the job most commendably. Among those present were Messrs. R. E. Gamlen, resident manager, and Mr. G. E. Wardle, resident engineer, of the Mid-Cumberland Co.

### Association of Steel Conduit Manufacturers

In our issue of August 16th we stated that the Association of Steel Conduit Manufacturers had moved to 21, Waterloo Street, Birmingham. The secretary of the Association informs us, however, that *additional* accommodation has been taken at this address and that all correspondence should still be addressed to 25, Bennett's Hill, Birmingham, 2.

### Non-Ferrous Metals Disposals Section

The Ministry of Supply announces that the Disposals Section of the Non-Ferrous Metals Directorate has moved from Berkeley Court, Glentworth Street, N.W.1, to 31-43, Norfolk Square, W.2 (Tel. Paddington 3434; telegrams, "Metrol, Padd, London.")

### E.A.W. Branch Officers' Conference

A conference of branch officers of the Electrical Association for Women is to be held at the Grand Hotel, Grange-over-Sands, from November 12th to 15th. This will be the first business conference since the outbreak of

war, and it is intended to give officers, especially those of new branches, a comprehensive grasp both of the right background of the Association's work in electrical education and also of the correct procedure for meetings, committees and the general organization. Mrs. Rendell-Baker, chairman of the National Executive Committee will preside, and speakers will include Miss Caroline Haslett, director of the E.A.W., Miss Vera Norvick, assistant secretary, and Mrs. E. E. Edwards, area organizer, S.E. England Area.

### American Company in Canada

Plant comprising 90,000 sq ft of floor space has been acquired from the Canadian War Assets Corporation by the International Telephone and Telegraph Corporation through its recently organized Canadian subsidiary, the Federal Electric Manufacturing Co., Ltd. The company will employ about 200 persons initially, and will produce telephone, radio and other electrical equipment for the expanding Canadian market.—*Reuter's Trade Service* (New York).

### Canadian Electrical Trade

During the six months ended June last Canadian exports of electrical apparatus totalled \$11,465,000 in value compared with \$39,261,000 during the corresponding period of 1945. The value of radio apparatus exported was \$6,540,000 (\$24,510,000). During the same period total imports of electrical apparatus were valued at \$22,084,000 compared with \$23,620,000, those of radio apparatus being \$5,280,000 (\$9,217,000).

### Cable Makers' Export Brochure

In a well-produced eight-page brochure Scottish Cables, Ltd., briefly describe their works and products for overseas customers actual and potential. With illustrations and the minimum of text the brochure covers wire drawing, paper-insulated cables, "super-tension" cables, rubber-insulated and mining type cables. It concludes with a list of overseas agents.

### Commercial Travellers' Dinner-Dance

The first post-war dinner and dance of the Electrical Trades Commercial Travellers' Association is to be held at the Connaught Rooms, Great Queen Street, W.C.2, on October 18th. Tickets may be obtained from Mr. S. Johnson, "Woodcot," Ifield Road, Charlwood, Surrey, at one guinea each.

### Factory Managers' Institution

The Councils of the Institution of Factory Managers and of the Works Management Association have decided to form a new body to be known as the Institution of Works and Factory Managers. To this the members of the older bodies will be transferred, thus uniting forces and creating an organization worthy of the personnel of works and factory management throughout the country. It is hoped to effect the complete transference by November 30th.

### Reconditioning Aluminium Saucepans

This month's fuel saving hint contained in the September issue of "Cheerful Rationing"

(published by the Association for Women) is for restoring the flatness of aluminium saucepans which are not of the very heavy variety. A suggestion is also given as to the best way to coil wartime flexible cables which generally are not so robust as pre-war types.

### Philips to Decentralize Plants

To increase production, the Philips organization is shifting from Eindhoven a number of branches which can be more conveniently housed elsewhere. The production of radio valves was started recently at Sittard, in Limburg Province, and the company has now obtained a further plant in this town, which will also be used for the manufacture of radio valves. Philips have also rented a former textile plant at Roermond, Limburg Province.—*Reuter*.

### P.V.C. Export Licensing

Among the classes added to the schedule of goods requiring export licences by the Export of Goods (Control) (No. 3) Order, 1946 (S.R. & O. 1946 No. 1473, Stationery Office, Id.) are polymers of vinyl chloride, co-polymers made mainly from vinyl or polyvinyl chloride, and compositions consisting mainly of any of these materials, in the form of rough sheet, strip, powder, granules or chips.

### "The Brook"

The latest issue of "The Brook," published by Brook Motors, Ltd., reviews the company's activities during the war and gives some indication of its contribution to the war effort. It is profusely illustrated and has an attractive cover design in colour with St. George and the dragon as the centre piece.

### Trade Publications

**Venner Time Switches, Ltd.,** Kingston By-pass Road, New Malden, Surrey.—Illustrated catalogue (QB) of single-phase watt-hour meters; also priced lists (TS.16) motor-driven a.c. process timer, (TS.17) self-starting motor-driven solar dial time switch for street and shop window lighting, (TS.18) hand-wound time switches, (M.3) motor-driven a.c. hour meter to register machine operation and (V.7) motor-wound master pendulum clock.

**Standard Telephones & Cables, Ltd.,** Connaught House, Aldwych, London, W.C.2.—Power cable handbook: 124 pages of tabulated data, including information on joints and terminations.

**Park Royal Scientific Instruments, Ltd.,** 52 Minerva Road, London, N.W.10.—Data sheets on miniature neon indicator tubes for export; home sales agency, Runbaken, 71 Oxford Road, Road, Manchester, 1.

### Trade Announcements

British Diamix, Ltd., has transferred its head office to its works, the address of which is Metrum Works, Beatty Street, Camden Town, London, N.W.1 (telephone: Euston 5951-3; telegraphic address: Diamix, Norwest, London).

### Change of Address

Progress Cables (Southampton), Ltd., has removed to 122, St. Mary Street, Southampton.



## E.D.A. Activities

### Committee on Simon Report : New Members

AT the July meeting of the Council of the British Electrical Development Association a memorandum was received from Mr. V. W. Dale, the general manager, on the Report of the Fuel and Power Advisory Committee on Domestic Fuel Policy (the "Simon Report"), which he described as "a challenge which the electricity supply industry cannot lightly ignore." Consequently the Council in conjunction with the Joint Committee of Electricity Supply Organizations has set up a committee to consider the Report and prepare observations on certain points embodied in it. Mr. Dale's memorandum is to be regarded as an interim report.

The chairman of the committee is Mr. Leslie Gordon (who is just relinquishing the position of clerk to the London and Home Counties J.E.A.); the honorary secretaries are Mr. Dale and Mr. H. F. Carpenter (West Midlands J.E.A.). The members are Mr. W. N. C. Clinch (Northmet Co.), Sir John Dalton (County of London Co.), Mr. J. Eccles (Liverpool), Mr. A. J. Fippard (Electric Supply Corporation), Mr. C. Heathcock (Midland Electric Corporation), Mr. F. Newey (Lincoln), Mr. R. A. S. Thwaites (Manchester) and Mr. J. W. J. Townley (West Ham).

### County Group Joins Up

The group of companies associated with the County of London Electric Supply Co. (which, with its Brentwood company, is already a member) applied for membership as from July 1st and the application has been approved. There are eighteen of these companies, including the Kent Electric Power Co., the South-East Kent Electric Power Co., the South London E. S.

Corporation, the South Metropolitan E. L. & P. Co., and the Bournemouth & Poole Co.

An application by St. George County Council, New South Wales, for enrolment as a Dominion contributor has also been approved.

### Demonstrators' Salaries

Mr. F. Newey has reported on discussions regarding demonstrators' salaries between Miss C. Haslett, Sir William Walker and himself. They had produced a scale somewhat on the lines of the E.P.E.A. schedule, but it was felt to be desirable that the scale should be submitted to certain large undertakings which conducted a number of showrooms in their areas. It was hoped that an agreed report on the subject of demonstrators' salaries would be submitted at the September meeting of the E.D.A. Council.

### House Service Unit

Discussions have been proceeding between the Service Unit Committee and the manufacturers on the price and delivery of the E.D.A. House Service Unit. It was thought that the price schedule as drawn up did not give smaller undertakings sufficient benefit from the work carried out by the Association on behalf of all its members. The manufacturers agreed to amend the schedule to give price reductions in respect of smaller quantities than originally specified and to maintain the present prices until the end of the year. As a result the prices applying between April 1st and December 31st this year will be, for example (for the standard arrangement of the unit with meter pins, sealing chamber, etc.):—1 to 24, 73s. each; 25 to 499, 71s. 3d.; 500 to 1,999, 70s. 4d.; and 2,000 and over, 69s. 4d.

## Atomic Energy

### Prospects of Application

A REPORT on nuclear power, which has been prepared by a committee of engineers and scientists presided over by Dr. Charles Thomas of the Montsana Chemical Co., has, *The Times* states, been presented by Mr. B. Baruch, the United States representative, to the United Nations Atomic Commission. It is pointed out that no atomic power plants have yet been designed or built, but it is believed that a 75,000-kW station could be built in the eastern States for \$25 million. Operated continuously at full capacity, taking interest at 3 per cent, the cost per kWh is estimated at 0.8 cent per kWh.

It is said that capital expenditure on a similar coal-fired station would be \$10 million and, with suitable coal delivered at \$7.5 per ton, the cost per kWh would be 0.65 cent, but

with coal at \$10 per ton it would be equal. Prices of coal and oil are expected to continue to rise while the costs of harnessing nuclear power diminish with development and standardization.

This comparison assumes that all plutonium formed would be recovered for later consumption in the pile. Nuclear power is expected to open up for industrial development regions without water (through the use of gas turbines) and other places where the cost of coal and oil is prohibitive. Comparatively small plants, it is suggested, could be developed for inclusion in established electricity supply systems. Atomic power would be within the financial means of small nations, but economic development would depend upon the effective outlawry of atomic weapons of war.

# Municipal Reports

## Power Sales at Aberdeen. West Ham Contracts.

### Aberdeen

**A**N increased scale of charges operative during the second half of the year ended May 31st reduced the deficit to £2,134, an improvement of £14,906 on the previous year. Mr. Alex. Gardner, the city electrical engineer, says that it is to be hoped that there will be no more unforeseen increases in costs and that it may be possible for the undertaking to return a balanced budget next year.

There has been an increase in output under all headings, the total sales amounting to 101 million kWh as compared with 93 million kWh in 1944-45. There has been an unexpected rise in power consumption from about 29 million kWh to 32 million kWh. An increase of practically 16 per cent in the domestic tariff sales is due to the continued change-over to this tariff and to difficulties experienced in obtaining solid fuel. Once again the rise in the price of fuel and its poor quality more than account for an increase from 0·812d. to 0·857d. per kWh sold.

Mr. Gardner says that the immediate result of the end of the war was a spate of applications from would-be consumers. The supply of materials, however, has not kept pace with the demand and the work of connecting up these is very much in arrears. A more serious anxiety is the shortage of generating plant to meet these new demands. Until the Hydro-Electric Board can bring into operation the new generating schemes now under construction the position in the whole of the North of Scotland will not be free from anxiety.

In spite of the poor quality of fuel there was a slight improvement from 1·853 to 1·837 lb of fuel per kWh generated.

### West Ham

A remarkably rapid recovery of activity in this heavily war-damaged area resulted in a satisfactory increase in the electricity undertaking's sales and revenue during the year ended March 31st last. Since then the rapid rate of improvement has continued and Mr. J. W. J. Townley, the borough electrical engineer and manager, says there is every prospect that the pre-war figures will be equalled if not exceeded in the coming year. The gross revenue for 1945-46 was £929,796, as compared with £785,908 in the previous year, the gross profit being £189,285 (£67,067), and the net profit £53,535 (£5,202).

The total sales of electricity showed an increase of over 14 million kWh to 151 million kWh. The number of consumers at the end of the year was 42,412, as compared with 39,420 at March, 1945, and over 56,000 at the outbreak of war. During the year

121 million kWh was generated and the maximum load on the generating station was 63,400 kW.

Contracts valued at over £1,300,000 were placed during the year for two 30,000-kW turbo-alternators, four 180,000-lb/hr high-pressure water-tube boilers, turbine house cranes, buildings and preliminary civil engineering work in connection with the generating station extensions. Manufacture of the plant has commenced and also preliminary work on the site. On the distribution side a scheme has been prepared and approved by the Council for the laying down of the first section of the standard three-phase system of supply at an estimated cost of £203,000. This includes eleven three-phase, 11-kV, 7,000-kVA feeders to Canning Town and the dock area, and the provision of a complete new distribution system in the replanned Tidal Basin No. 1 Area.

In all 24½ miles of 11-kV cable and 9 miles of medium and l.v. cable are to be installed. In the replanned areas the voltage or supply will be the new standard (240V). It has not yet been possible to resume in full the hire schemes for installations and domestic apparatus in operation before the war, owing to the shortage of labour and material, but the position is rapidly improving.

### Bethnal Green

Because of wartime difficulties the report of the Electricity Department (engineer and manager: Mr. E. F. Jolly) for the year ended March 31st, 1945, has only just been published. Owing to flying bomb and rocket attacks the rate of increase in electricity sales was less than in the previous year, the total sold amounting to 18·6 million kWh as compared with 17·7 million kWh.

The operation of increased charges for a full year resulted in an increase of 0·027d. in the average price received per kWh sold to 1·729d. The number of consumers connected at March 31st, 1945, was 15,233, representing an estimated connected load of 45,808 kW, as compared with 15,437 consumers and 45,399 kW a year before. Just over 60 per cent of the undertaking's consumers receive their supplies through pre-payment meters.

There was a surplus of £6,630, as compared with £1,353 for the previous year, but of this sum £3,017 was in respect of income tax retentions for 1939-44. Mainly of account of the severe increase in coal costs, bulk supply charges have increased 65·68 per cent over pre-war years. The undertaking's new rising main distribution system provides for the standardization of distribution equipment in block dwellings. It was described by Mr. Jolly in the *Electrical Review* of July 7th, 1944.

# ELECTRICITY SUPPLY

## Projected Accrington Station. Cables in New Estate Roads.

**Accrington.**—NEW POWER STATION.—The Central Electricity Board has approved the provision of a station at Huncoat costing about £3,000,000 and comprising four generating sets with a total capacity of 126,000 kW. The first section, which will be in service by the winter of 1950-51, will include two 31,500-kW generating sets and a 1,500-kW auxiliary alternator.

**FARM CHARGES.**—The Electricity Committee proposes to revise the charges for farm supplies.

**Blackburn.**—POWER STATION EXTENSIONS.—The Electricity Committee is to consult Mr. C. T. S. Arnett, manager, North West & North Wales Area, Central Electricity Board, on the question of engineering supervision for Blackburn's £1,000,000 power station extension scheme.

**Blackpool.**—LIGHTNING CAUSES BREAKDOWN.—Lightning was responsible for three failures of the electricity supply last week. Mr. F. Jasper Cole, the borough electrical engineer, said that the Department normally had four overhead lines supplying Blackpool. These were struck by lightning and three were severely damaged.

**Burnley.**—SEPARATE STREET LIGHTING DEPARTMENT PROPOSED.—In view of the Government's intentions to nationalize the electricity and gas industries, the town clerk suggests that a separate street lighting department should be formed.

**Darwen.**—REVISION OF CHARGES.—The Electricity Committee is shortly to consider a revised scale of charges for electricity. There has been no increase in the tariff since 1938, though the cost of coal has risen by £20,000 a year and wages by £2,000 a year. Last year the Electricity Department incurred a loss of £460.

**Gateshead.**—REINSTATEMENT OF ROADS.—The North-Eastern Electric Supply Co., Ltd., has written to the Town Council regarding the delays in securing supplies of cables and poles and has suggested that roads and footpaths on new estates should not be made permanent until the company is able to carry out the electrical work. If the Council does not agree to this proposal, the company states that it would only be able to undertake the work subject to the Council's bearing the cost of reinstating the roads, when the work was done. The Council has referred the matter to the Minister of Health.

**CONVERSION OF STREET LIGHTING.**—The Town Council has included in its estimates £40,000 for converting street lighting to electricity. Half of this relates to 1947-48 and half to 1948-49.

**Glasgow.**—ESTIMATES FOR 1946-47.—At a special meeting of the Corporation Electricity Committee the manager submitted an estimate of the revenue and expenditure of the Electricity Department for 1946-47 as follows: Revenue £2,302,500 and expenditure £2,299,504, leaving a surplus of £2,996. The manager also submitted the following estimate of capital expenditure for 1946-47 of which the Committee approved:—To be met out of loans—Specified works: Generation, £320,000;

distribution, £98,800. Unspecified works: Distribution, £177,000. To be met out of estimated revenue surplus: Cost of land for substations transferred from other departments of Corporation, £800, less sale of apparatus on hire, £5,800; total £590,800.

**SEWAGE PUMPING PLANT.**—The Corporation Sub-Committee on Sewage Disposal has recommended the replacement of steam driven plant at Kinning Park pumping station by six new electrically driven pumps, etc., at an estimated cost of £17,500.

**COOKER HIRE PROSPECTS.**—Because of the shortage of electric cookers, the Electricity Department does not expect to be able to resume its hire service for at least eighteen months. Two thousand householders who have hired their cookers for ten years or more are getting the chance of buying them outright for 30s.

**Greenock.**—REDUCTION OF POWER CHARGES.—Approval of the Minister of Fuel & Power is awaited by the Corporation to a proposal to reduce power charges with a view to helping local industry. The concessions will amount to over £10,000.

**Grimsby.**—SALE OF COOKERS.—At its meeting on September 3rd the Electricity Committee decided to sell cookers and other appliances to consumers, in accordance with the suggestion of the borough electrical engineer. Hitherto it has only been possible to hire appliances.

**Leigh (Lancs).**—INSPECTION OF NEW STREET LIGHTING.—The Electricity and Highways Committees inspected the first section of post-war street lighting reconstruction in Twist Lane last Friday. Previously the Committees met in the electricity showrooms, where the borough electrical engineer, Mr. T. S. Parkinson, explained that the lighting of the road was designed to the Ministry of Transport Departmental Committee's recommendations for main road lighting (Group A). The high-pressure, mercury vapour, fluorescent lamps were automatically controlled by solar dial time switches, and on economy grounds half the lighting would be extinguished at midnight. After the inspection Alderman Newton, chairman of the Highways Committee, and Councillor Morgan, vice-chairman of the Electricity Committee, congratulated the electrical engineer and his staff on the remarkable transformation that had taken place, and appealed to the Committees and the Electricity Department to forge ahead as early as possible with other schemes which were now in hand.

**Reigate.**—DISPOSAL OF SURPLUS REVENUE.—The Corporation has received the sanction of the Electricity Commissioners to spend £10,000 upon domestic electrical apparatus and £1,050 for transport vehicles from the surplus revenue of the Electricity Department.

**Swindon.**—SUPPLY TO COOKERS.—The Town Council has decided that the requirement that an electric cooker rated at not less than 3 kW shall be installed before the domestic tariff can apply shall be rescinded, and that in its place, a minimum charge of £2 10s. per annum shall

be made in respect of the fixed charge per annum of 15 per cent of the net rateable value of the house as a condition of the application of the domestic tariff. The variation was decided on after tenants on the M.A.P. estates had asked for a supply of electricity on the domestic tariff, and a report had been received from the borough electrical engineer regarding the system of wiring for electricity in the temporary aluminium and Arcon houses being erected in the town.

**Thanet.**—**ELECTRICITY BOARD.**—The Electricity Commissioners have made, and the Minister of Fuel and Power has confirmed, the Margate, Broadstairs and District Electricity Special Order, 1946, which has now to be laid before both Houses of Parliament. The Order (Stationery Office, price 1s. 6d. net) constitutes the Margate, Broadstairs and District Electricity Board, consisting of six members appointed by Margate Corporation and three by the Broadstairs and St. Peter's U.D.C., to take over Electric Lighting Orders which are at present operated by the Isle of Thanet Electric Supply Co., Ltd.

**West Riding.**—**SPECIAL ORDER.**—The Electrical Distribution of Yorkshire, Ltd., has

applied to the Electricity Commissioners for a Special Order authorizing it to supply electricity in certain parishes in the rural district of Skipton.

### Overseas

**Austria.**—**LARGE POWER PLANS.**—The Control Office for Germany and Austria says that if present plans materialize Austria will not only be in a position to produce sufficient electric power for her own needs but to supply most of the neighbouring countries. Discussions are taking place between Switzerland and Austria for the harnessing of the water power in the Austrian Tyrol, Switzerland providing the materials in return for some of the power produced. In the eastern part of Austria construction is beginning at Persenbeug on a hydro-electric station which is expected to supply 65 million kWh annually. Construction of this plant will take between three and four years and Austria will then be able to provide power to Czechoslovakia and Hungary.

**Canada.**—**OTTAWA UNDERTAKING PURCHASED.**—The Ontario Hydro-Electric Power Commission has purchased the undertaking (excluding the gas plant) of the Ottawa Light, Heat & Power Co. for \$4½ million.

## Planning in Scotland

### How Supply Undertakings are Affected

**A**TENTION is drawn by the Electricity Commissioners to the implications for electricity supply authorities of the Town and Country Planning (General Interim Development) Order (Scotland), 1946 (S.R. & O. 1946 No. 1147/S.8). In effect, this Order, which came into force on August 15th, applies to all land in Scotland which is subject to a planning resolution, that is, land in respect of which an approved planning scheme is not already in operation.

The point with which electricity undertakers will be more particularly concerned is what development proposed to be undertaken for the purposes of their undertaking is "permitted development" (i.e., development which can be carried out without first obtaining interim development permission); or development in respect of which interim development permission must be obtained.

The various classes (I to V) of permitted development are specified in Article 4 of the Order. Although electricity undertakers may be carrying out development under Classes (I), (III) or (IV), they will be more particularly concerned with Class II which relates to development sanctioned before the commencement of the Order by any Government Department, including the Electricity Commissioners, and Class V, which relates to certain types of permitted development by electricity and other undertakers, which includes (i) development of any description below the surface of the ground, and (ii) the provision of any overhead line for the supply of electricity.

While it will not normally be necessary for

undertakings proposing to apply for the consent of the Minister of Fuel and Power to erect overhead lines to make any separate application for interim development consent, the Minister of Fuel and Power has agreed that before giving his consent under the Electricity (Supply) Acts, he will refer to the Department of Health for Scotland certain types of cases, including any case in which the Minister of Fuel and Power receives an objection from a local authority on amenity grounds; any proposal which involves the use of certain specified types of structure which might conflict with amenity; and other types of application which present special features.

So far as new construction is concerned, the main types of development in respect of which it will still be necessary for undertakings to apply for interim development permission will be any new buildings or extensions of existing buildings and such structures and erections as are not covered by paragraph 4 of Part I of the Schedule, e.g., chimneys, external coal conveyors or cooling towers not coming within the category of sub-paragraphs (3) or (4) of paragraph 4, or substations, feeder pillars or transformer kiosks of stone, concrete or brickwork.

In connection with the procedure to be followed in respect of those limited classes of development for which electricity undertakers are required to obtain interim development permission, the Commissioners emphasize the desirability of all undertakers establishing the closest possible general contact with the various interim development authorities within their areas of supply.

# RECENT INTRODUCTIONS

## Notes on New Electrical and Allied Products

### High-speed Motors

A RANGE of new two-pole three-phase motors of 3,000 r.p.m. (synchronous at 50 c/s) for driving centrifugal pumps and air blowers has been developed by the ENGLISH ELECTRIC CO., LTD., Stafford. They are not adaptations of multi-polar machines, but have been specially designed and mechanically strengthened to withstand high speed, their stators somewhat resembling those of alternators driven by turbines.

Both slip-ring and squirrel-cage types are available, the latter having strengthened frames and end-shields with braced end windings to withstand the shock of direct-on-line starting. The rotor bars are secured into the end rings with special care and the shafts are very stiff. The kind of stator winding utilized varies with the H.P. and voltage (hairpin, mush, barrel) and ventilating holes are provided in the back of the stator stampings of the larger sizes, all of which have cartridge-type bearing housings.

Ratings range from 100 to 675 H.P. at up to 3,300 V, the output from any given frame size varying with permissible starting current and form of enclosure.

### Bed Warmer

A heating pad suitable for medical uses as well as household bed airing is being made by LOTEM, LTD., 672, Fulham Road, London, S.W.6, and distributed by ENGINEERING & INDUSTRIAL EXPORTS, LTD., 72, Horseferry Road, S.W.1. The pad measures 12 in. by 15 in. and is controlled by two thermostats in series, of the bi-metal strip type which actuates a phosphor bronze spring carrying a silver contact, thus ensuring that the bi-metal is relieved of stress when the pad is switched off. The element wire is wound on and covered with asbestos, then sewn into 22 channels within mechanically supporting material and the whole covered with white felt, the working temperature approximating to 150 deg F. The flexible connector is provided with a through line switch and plug adaptor.

### Large Refrigerator

An addition to the existing range of refrigerating equipment made by FRIGIDAIRE, LTD., Edgware Road, The Hyde, Hendon, London, N.W.9, is the type T-15 known as the "Reach-In" model, which will become available in October. It will serve both household and commercial needs, the storage capacity being 15 cu ft.

The all-steel cabinet is finished in white hard-baked synthetic enamel, while the inside liner is formed of one piece of steel finished in

white vitreous porcelain enamel. Eight galvanized bar type removable shelves provide a total area, including the bottom, of 26.2 sq ft. Two doors mounted on concealed hinges have fasteners fitted with locks. A white porcelain all-steel hydrator is supplied for moist storage of salads.

The evaporator, which is of the direct expansion type and is mounted behind the left-hand door at the top of the storage compartment,



Frigidaire "Reach-In" cabinet refrigerator

incorporates three ice-making trays. The refrigerant is "Freon 12." A twin-cylinder reciprocating compressor driven by a  $\frac{1}{4}$ -H.P. motor, with an air-cooled radiator-type condenser are housed in the base of the cabinet so that the food storage compartment is readily accessible without stooping.

### Lighting Code

THE Illuminating Engineering Society has reprinted the I.E.S. Code for the lighting of building interiors, which was published in its original form in 1936 as a guide for the lighting of homes, factories, offices and public buildings.

The 1945 edition provided the scientific background on which values of illumination are based and included information on natural lighting with clauses relating to quality of lighting (absence of glare, etc.). The new edition now available is essentially the same as the 1945 edition, embodying only minor alterations of layout. Copies may be obtained, price 1s. 6d., from the Illuminating Engineering Society, 32, Victoria Street, S.W.1.

## NEW BOOKS

### Principles of Electron Microscopy. Building Construction and Equipment.

**Introduction to the Electron Microscope.** By F. E. J. Ockenden. Pp. 24; figs. 27. Williams & Northgate, Ltd., 36, Great Russell Street, London, W.C.1. Price 2s. 6d.

This is the second of a series of monographs to be published by the Quekett Microscopical Club. Its author is one of the leading British designers of electrical instruments and a keen practical microscopist. His monograph can be recommended to those who need a clear explanation, simply written, of the three principles on which electron microscopy is based and the manner in which they are combined to focus the emitted beam which penetrates electronically transparent objects, with an outline of the general construction of the instrument.

Its performance is commented upon more briefly; certain limitations would seem, for the present, to prevent the use of the device for some kinds of biological research, but its accomplishments (though much less than its theoretical capability) have already been so much greater than those of ordinary light microscopy as to remove any doubt regarding the potentialities of the electronic method.—W.O.F.

**Architects', Builders' and Civil Engineers' Technical Catalogue.** Pp. 736; illustrated. Country Life, Ltd., Tavistock Street, Covent Garden, W.C.2. Price 45s.

In this volume are brought together essential data required by those for whom the Codes of Practice of the Ministry of Works have been mainly compiled. Following introductory articles on the building programme, collaboration between the architect and the engineer, codes of practice and standard specifications, plastics, and the Building Centre, the contents of the book are divided into four sections relating to construction materials and processes, special forms of construction, constructional plant and equipment and engineering services. Each section contains a number of sub-sections, at the end of which are given lists of makers of the kind of equipment under mention, while the system of pagination employed includes relevant advertisements.

Of the 248 pages in the Engineering Services Section, 32 are allocated to electricity supply, wiring and lighting in three of the sub-sections in addition to references to applications in other parts of the book. The sub-section on electric wiring is concerned mainly with certain aspects of the Eleventh Edition of the I.E.E. Wiring Regulations and makes no mention of Post-War Building Study No. 11 (Electrical Installations). References to B.S. 372 and 546, therefore, need amplification in view of the proposals to standardize a 13-A plug, while

methods of wiring should include the ring-main system, which is likely to be widely adopted in future housing.

Although a coloured plate well illustrates the decorative value of fluorescent-tube lighting, those responsible for recommending the introduction of this recent development would probably like to have more details about its working principles and performance than are given in the text.—C.O.B.

**Questions and Answers on Electric Lighting and Wiring.** By E. Molloy. Pp. 144; Figs. 87. George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2. Price 5s.

This pocket-size booklet is uniform with other "Q and A" manuals on electrical, mechanical, car repair and building subjects. Starting to outline how electricity reaches the consumer, the first question is: "What is meant by the grid system?" the answer given being that it is "the system of supplying consumers in the most efficient manner," which is an unfortunate beginning. There is no mention of the purpose of bulk supplies or reference to the functions of local distribution undertakings.

Two sections describe six systems of house wiring, including wood casing, but the advantages claimed for the ring-main system are not dealt with. Two pages with three diagrams are considered sufficient to describe the "essential differences" between factory and house wiring. Nine pages are given to lamps, lighting schemes and calculations; the section on water heaters merely differentiates between the displacement and pressure types and the description of space heaters of different kinds is largely diagrammatic. In contrast there is a relatively long section on bell and burglar alarm circuits and call-signalling systems.

Installation precautions and the need for proper earthing are stressed throughout; in addition the last section of the booklet is entirely concerned with the protection of lighting and power circuits.—W.O.F.

### Books Received

**Installation and Care of Electrical Power Plant.** By "Engineer-in-Charge." Pp. 133; figs. 72; illustrated. Emmott & Co., Ltd., 31, King Street West, Manchester. Price 3s. 6d.

**Atomic Theory for Students of Metallurgy.** By William Hume-Rothery. Pp. 286; figs. 124; index. Institute of Metals, 4, Grosvenor Gardens, S.W.1. Price 7s. 6d.

**Electrical Contacts.** By L. B. Hunt, A.R.C.S., M.Sc., Ph.D. 122 pages; 132 figs. Johnson, Matthey & Co., Ltd., and Mollory Metallurgical Products, Ltd., 73-83, Hatton Garden, E.C.1. Price 10s. 6d.

# FINANCIAL SECTION

## Company News. Stock Exchange Activities.

### Reports and Dividends

**Berry's Electric, Ltd.**, report a gross profit of £75,277 for the year ended March 31st last, compared with £67,564 in the previous year. To this is added £1,645 (£2,116) interest on investments and tax reserve certificates, making £76,922 (£69,680). After providing for depreciation, directors' fees, staff pension fund, amounts written off freehold and leasehold properties, interest paid and loss on purchase of  $7\frac{1}{2}$  per cent cumulative convertible notes, the net profit amounted to £60,825 (£50,145). Of this £20,000 (nil) goes to general reserve account (to which £100,000 previously standing to the credit of  $7\frac{1}{2}$  per cent cumulative convertible note reserve had already been transferred), £26,767 (£25,666) to reserve for income tax and £3,167 (£2,700) to reserve for N.D.C. In 1944-5 reserve for redemption of  $7\frac{1}{2}$  per cent cumulative convertible notes received £10,000 and reserve for repairs to premises £2,000. The dividend is raised from 10 to  $12\frac{1}{2}$  per cent and £8,599 (£7,402) is carried forward.

**Franco Signs, Ltd.**—At the recent annual meeting the chairman (Mr. J. F. Mallabar) told the shareholders that the transition from wartime to peacetime production was proceeding smoothly but the company was hampered by the restricted supply of labour and materials. They were extending their range to include transformers, electrical goods, surgical and medical glassware and small glass pressings. The industry as a whole was making strong representations regarding the continuance of restrictions on illuminated signs, for normal progress would only be possible when these restrictions were removed or modified.

**The Nigerian Electricity Supply Corporation, Ltd.**, reports a net profit of £42,720 (against £49,085 for 1944-45). The rate of dividend on the ordinary shares is raised from 10 to  $12\frac{1}{2}$  per cent, but taxation at a higher rate reduces the net distribution. There was a reduction in the sales of electricity of about 11 per cent. The hope is expressed that an early settlement of prices will be reached between the Ministry of Supply and the Nigerian tin companies which take 98 per cent of the company's output.

**Thorn Electrical Industries, Ltd.**—The problems of changing over from war to peacetime production were mentioned by Mr. Jules Thorn, chairman and managing director, at the annual general meeting last Friday. The company was suffering, he said, from considerable shortage and doubtful qualities of materials and components, which made it difficult to produce high quality goods at competitive prices. Shortage of workers and a drop in the output per man-hour provided an additional anxiety. Unless productive efficiency could be achieved and the supply problems overcome, their industry, in common with others, would not be able for long to compete in the world markets. The lamp factories had, however, increased their output and a great deal of effort had been put into the new factory in

South Wales which should soon begin to give results. Their lamp factory had been built up under difficult conditions and it was now being transferred to their own freehold land just acquired at Enfield. The Ferguson Radio factory, apart from restarting its radio production, had carried out development work on television receivers which they expected to market shortly. They had also taken on the manufacture of "Mary Ann" domestic electrical appliances and had planned to extend the range of products further in that field.

**The Ransome & Marles Bearing Co., Ltd.**, reports a net profit of £127,371 for 1945-46 (against £123,227 for 1944-45) after providing for income tax and crediting an E.P.T. refund. The final dividend is  $12\frac{1}{2}$  per cent (against 11 per cent) again making 20 per cent for the year.

**The Great Northern Telegraph Company's Holding Company (Limited)** (of Denmark).—The board proposes to distribute for the year ended June 30th a total dividend of 15 per cent or 8.10 Danish kroner per share of Kr. 54 and to carry forward Kr. 934.32.

**The Lancashire Dynamo & Crypto, Ltd.**, has declared an interim ordinary dividend of 5 per cent. (unchanged). The interim on the new ordinary shares is 3 per cent.

**The County of London Electric Supply Co., Ltd.**, is maintaining its interim ordinary dividend at 3 per cent.

**The Bournemouth & Poole Electricity Supply Co., Ltd.**, is paying an interim ordinary dividend of 5 per cent. (unchanged).

**The South London Electric Supply Corporation, Ltd.**, is paying an interim ordinary dividend of 3 per cent. No interim dividend was paid last year; the final distribution was 7 per cent.

**The Automatic Telephone & Electric Co., Ltd.**, is again paying an interim dividend of 3 per cent.

### New Companies

**Parsons of Gloucester, Ltd.**—Registered August 19th. Capital, £2,500. To acquire the business of an electrical engineer and contractor carried on by Richard A. Parsons at 49, Westgate Street and Bull Lane, Gloucester, as "Parsons Brothers." Directors: R. A. Parsons, O. F. Parsons and Mrs. D. H. Parsons. Regd. office: 59, Westgate Street, Gloucester.

**Embee Heating Appliances, Ltd.**—Registered August 29th. Capital, £1,000. Manufacturers of, and dealers in, electric fires, electric boiler rings, elements, heating appliances, etc. Subscribers: H. W. Fisher and M. E. Crichton. Secretary: Margaret E. Crichton. Regd. office: 81, Charlotte Street, W.1.

**G. Ashby & Sons, Ltd.**—Registered August 30th. Capital, £1,000. Electrical engineers and contractors, etc. Directors: Mrs. Maud B. Ashby and C. B. Ashby. Regd. office: 184, King's Road, Chelsea, S.W.3.

**Electrical Instrument Manufacturing Co. (Beeston), Ltd.**—Registered August 29th. Capital, £2,000. Manufacturers and repairers of, and dealers in, dynamos, motors, armatures, magnetos, batteries, stoves, cookers, etc. Directors: C. A. West and A. Stubble. Regd. office: Mount Street, Basford, Nottingham.

**Compax Electrical Co., Ltd.**—Registered in Belfast, August 22nd. Capital, £1,000. Manufacturers and merchants of hairdressers' machinery and utensils, etc. Directors: L. Shannon, W. T. H. Shannon and F. Bryan. Regd. office: 29, Samuel Street, Belfast.

**Multi-Broadcast (Rugby), Ltd.**—Registered August 31st. Capital, £23,500. Distributors and relayers of radio television and radio programmes, etc. Directors: A. R. Almond, N. Edyvean-Walker, A. E. Limehouse and E. A. Tittle. Secretary: A. E. Limehouse. Regd. office: 24, Market Place, Rugby.

**Angel Electrical Industries, Ltd.**—Registered August 26th. Capital, £1,800. To acquire the business of an electrical engineer carried on by A. E. Izzard at 111, Upsdell Avenue, N.13. Directors: A. E. Izzard, F. J. Block and W. E. Miller. Regd. office: 38-44, Station Road, N.22.

**Walmer Electrical Appliances, Ltd.**—Registered August 26th. Capital, £1,000. Electrical equipment specialists, etc. Directors: W. E. Cole and S. Morris. Regd. office: 117, Walmer Road, W.10.

**White & Carpenter, Ltd.**—Registered August 26th. Capital, £3,000. Manufacturers and repairers of, and agents for, and dealers in, electrical and mechanical apparatus and in particular electrical resistance wires and tapes, etc. Directors: G. M. White and J. Carpenter. Regd. office: Mosley Buildings, 56, Mosley Street, Manchester, 2.

**Electrical Power Specialists (Hendon), Ltd.**—Registered August 28th. Capital, £3,000. Electrical, mechanical and general engineers and contractors, etc. Directors: A. J. Ramsay, F. G. Hoare, B. Gomersall and A. C. Dibley. Regd. office: 2a, New Brent Street, Hendon, N.W.4.

**Gordon Wright (Electric), Ltd.**—Registered August 28th. Capital, £1,500. Electrical engineers and contractors, etc. Directors: C. G. H. Wright and Marjorie H. Wright. Regd. office: 186, High Street, Hadley, Herts.

**Gelectrix, Ltd.**—Registered August 19th. Capital £5,000. Electrical and radio engineers, etc. Directors: H. Gee, J. Gee and S. Gee. Regd. office: 46a, Finsbury Square, E.C.2.

**Ryton Manufacturing Co., Ltd.**—Registered August 21st. Capital, £100. Electrical and radio engineers, etc. Directors: J. E. Brookfield, 55, Hanstoft Avenue, Workop, and J. O. Rollo, 49, Essex Road, Biscotes, near Doncaster.

**John Curran (Electrical), Ltd.**—Registered in Belfast August 20th. Capital, £100. Electrical contractors and engineers, manufacturers and repairers of, and dealers in, radio, etc. Subscribers: J. Curran, 1, Oakman Street, Belfast, and E. Logan, Blackcave North, Larne.

**Lenco Products, Ltd.**—Registered August 19th. Capital, £100. Electricians, manufacturers of, and dealers in, lampshades, electric lamps and fittings, valves, radio sets, etc. Directors:

L. H. Salter, C. Salter and R. G. Salter. Regd. office: 4, Higher Hinds Lane, Bury.

**Stockton Electrical Co., Ltd.**—Registered August 22nd. Capital, £1,000. To carry on business as indicated by the title. Directors: A. N. Nesom, H. Pearce, J. Hugill, and T. H. Place. Regd. office: 21, High Street, Stockton-on-Tees.

**E.C.E. Co., Ltd.**—Registered August 24th. Capital, £3,000. Electrical engineers and general electrical installation contractors, etc. Directors: G. E. Platts and G. A. Beardmore. Regd. office: The Green, Matlock, Derby.

**Autoelectric (Herts), Ltd.**—Registered August 20th. Capital, £1,500. Manufacturers and repairers of, and dealers in, artificial lighting apparatus, etc. Directors: A. Pepper, E. R. Haywood and A. L. Cain. Regd. office: Midland Bank Chambers, Letchworth, Herts.

## Receiver Appointed

**British Radio Corporation, Ltd.**—C. O. Skey, 46, Throgmorton Avenue, E.C., was appointed receiver and manager on July 19th, under powers contained in debenture dated February 25th, 1946.

## Liquidations

**Hornsey Engineering & Electrical, Ltd.**—Winding up voluntarily. Liquidator, Mr. A. L. Westbury, 14-18, High Holborn, W.C.1.

## TRADE MARKS

APPLICATION has been made for the registration of the following trade marks. Objections may be entered within one month of September 4th:—

**STEINER** (design). No. 641,525, Class 7. Hairdressing machines. Also No. 641,527, Class 11. Hair-drying appliances.—H. D. Steiner, 66, Grosvenor Street, Bond Street, W.1.

**Design** (black octagon bearing white curves). No. 634,969, Class 9. Electrical instruments and apparatus and fittings, none being included in other classes, electric signalling and alarm apparatus, telegraph and telephone systems and apparatus, public address apparatus, sound recording and reproducing apparatus, photoelectric apparatus, measuring, recording and testing instruments, ozonizing apparatus, electric conductors, conduits and connectors, etc.—Guy R. Fountain, Ltd., Tannoy Works, Canterbury Grove, West Norwood, S.E.27.

**Design** (thistle with letters "S.S.E."). No. B637,958, Class 9. Electrical apparatus not included in other classes.—Scottish Switchgear & Equipment, Ltd., 700, Argyle Street, Glasgow.

**TELEMUZAK**. No. B640,029, Class 9. Instruments, apparatus, systems and parts thereof (not included in other classes) for the production, transmission, reception, etc., of signals of sound wave frequency, carrier wave signals modulated at sound wave frequency or television or other image signals.—Central Rediffusion Services, Ltd., Carlton House, Lower Regent Street, S.W.1.

**VIDEOSONIC**. No. 641,655, Class 9. Radio and television apparatus and parts thereof not included in other classes.—Pye, Ltd., St. Andrew's Road, Cambridge.



# CONTROL



## VERITYS LTD.

ASTON, BIRMINGHAM 6

Air Break  
Star-Delta Starter

Sales Headquarters :

**BRETENHAM HOUSE, LANCASTER PLACE, W.C.2**

# MARTINDALE

## Super Blowers

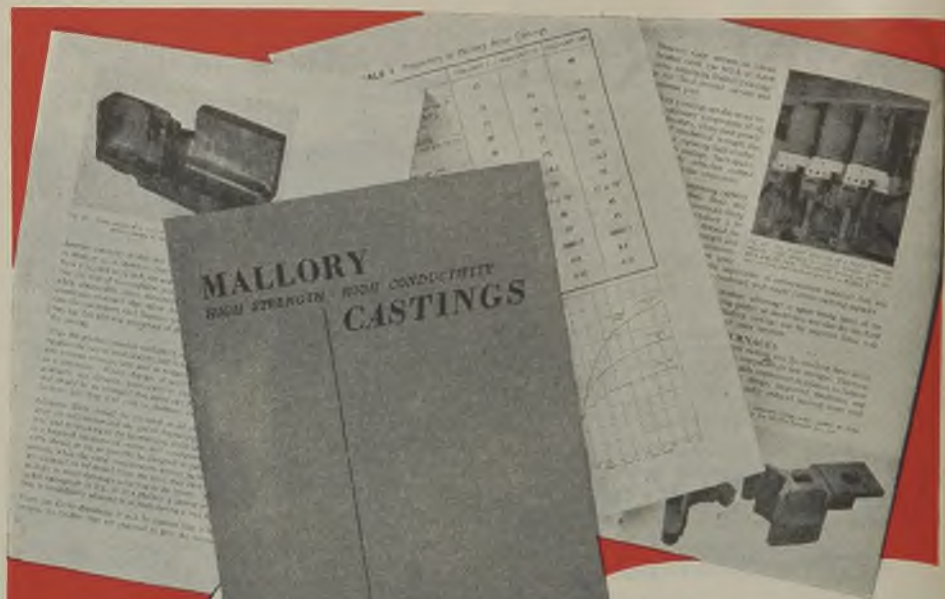
- THREE MODELS:
1. "MILL TYPE"
  2. "STANDARD"
  3. "BLOW-ER CLEAN"



The most efficient, light weight, portable blowers ever built. Martindale Super Blowers are precision built, and carefully balanced to eliminate vibration. Armatures, windings and field coils are impregnated to withstand use in tropical climates and under the most exacting industrial conditions. Write for particulars. Martindale Super Blowers are guaranteed for twelve months against faulty workmanship and material.

**MARTINDALE ELECTRIC CO. LTD., WESTMORLAND ROAD, LONDON, N.W.9.**

Phone : Colindale 8642. Grams : "Commstones, Hyde, London."



## This will tell you

This 28-page booklet describes the properties and applications of Mallory Castings. It explains how the development of Mallory high conductivity copper alloys has provided electrical engineers with cast materials that retain the high current-carrying capacity of copper, but combine with it the strength and hardness of steel. A copy of the booklet will be sent free on request. It explains how by using Mallory Castings, the designer is given a freer hand by the removal of the limitations common to the older cast materials.

### CONTENTS

Properties of Mallory Alloys  
 Applications of Mallory Castings  
 Considerations in the Design of Castings  
 Workshop Practice with Mallory Castings  
 Mallory Alloy Forgings  
 Bibliography

# MALLORY

**JOHNSON, MATTHEY & CO. LIMITED**

Controlling MALLORY METALLURGICAL PRODUCTS LTD.

73-83 Hatton Garden, London, E.C.1

Telephone: HOLborn 9277

## STOCKS AND SHARES

**S**TOCK Exchange markets have been under the domination of New York influences to an extent greater than at any time since the outbreak of war. The Wall Street Stock Exchange, which is a gambling area by comparison with our own more sedate investment market, indulged in a wild bout of selling, described in private cables as hysterical. Prices were driven down for reasons partly concerned with domestic, partly with international affairs. The flatness caused widespread depression in the London Stock Exchange markets, where many prices were lowered, purely in sympathy with the fall in others that owe some relationship to American conditions. British Government stocks successfully resisted the transatlantic call, and, in other departments, a slight rally in Wall Street was promptly reflected by upward reactions in London.

### Price Fluctuations

Prices gave way fairly sharply on Wednesday and Thursday last week, when Wall Street was especially flat, but they responded readily enough to the subsequent partial recovery. The most vulnerable spots were those to which speculation has been attracted. Amongst these, the radio group was rather prominent and E. M. I. gave way to 30s. 6d., from which the price hardened to 31s. Cossor, with Radio & Television, gave a little ground. E. K. Cole remained steady. Pye deferred eased 'off to 36s. 6d.

General Electrics have receded to £5, Associated British Engineering to 45s., Westinghouse Brakes to 75s. Tube Investments at 6 are 3s. 9d. down. Veritys are dull at 8s. On the other hand, Thorn Electrics at 32s. 6d. are  $\frac{1}{2}$  higher.

### Home Electricity

The market for home electricity supply shares keeps very steady. Shares in the London companies are in continual demand, and the Provincial group is well supported by investment—mainly from local areas. It is evident that proprietors of ordinary shares in these companies view with satisfaction the developments that have occurred, not only in connection with the "global" sum allotted under the Coal Bill to the companies concerned, but, also, from the way in which the steel position is being dealt with.

### Nationalization

The Government has not abandoned its intention to nationalize the iron and steel industry, but has modified its intentions to the extent that the industry is to be reconstructed and reorganized before the ultimate aim of nationalization is carried through. This gives the iron and steel business something of a breathing space. Whether electricity and gas will be treated in a similar manner remains to

be seen, but from the way in which electricity supply share prices are supported, it would appear that investment does not expect any early nationalization of the industry.

London Passenger Transport "C" has gone back to 60 $\frac{1}{2}$ , British Electric Traction to 1120. A rise of  $\frac{1}{8}$  in West Riding Automobile shares to 47s. 6d., makes a welcome exception to the general drabness.

### Interim Dividends

South London Electric Supply Corporation has resumed the payment of interim dividends. The 3 per cent interim now declared is the same as it was before the war. At 31s. the shares are on a yield basis of 4 $\frac{1}{2}$  per cent. Bournemouth & Poole Electricity Supply is maintaining the interim dividend at 5 per cent. For last year, the total was brought up to 12 $\frac{1}{2}$  per cent, which was still 1 $\frac{1}{2}$  per cent below the pre-war level. At 64s. the shares yield £3 18s. 2d. per cent.

### Market Features

Burco, Ltd., ends its financial year this month. Last year the dividend for the year was declared early in November, when the payment was raised from 15 to 20 per cent, out of earnings equal to over 40 per cent on the £105,000 ordinary capital. A sharp rise has taken place recently in the price of the 5s. shares, which jumped in the course of a day from 24s. to 26s. 3d. At the latter price the yield on last year's distribution is £3 16s. 0d. per cent. Electric wash-boilers are among the most important of the household appliances made by the company, which has been a consistent dividend payer for many years. A weak feature in the miscellaneous market was a fall of 3s. to 22s., in Lightfoot Refrigeration.

### Cable & Wireless

Cable & Wireless ordinary stock fell 3 points to 109, and the preference lost 4 at 115 in the share-out which occurred last week. News of important new orders secured by Marconi's Wireless Telegraph is of interest to English Electric shareholders, who recently approved this company's acquisition of the Cable & Wireless interest in Marconi's. These orders include the installation of a complete broadcasting and telecommunication system in Iraq. English Electrics are unchanged at 61s. 6d.

### Walsall Conduits

The interim dividend of 20 per cent declared by Walsall Conduits is at the same rate as that paid since the registration of the company in 1936, since when the total annual distribution has been made up with unbroken consistency to 55 per cent. The same figure in shillings is the current price of the 4s. shares, which, therefore, yield a round 4 per cent. A strong balance sheet testifies to the conservative character of the distribution. The company's capital is £350,000, of which £200,000 is in 5 per cent preference shares.

# NEW PATENTS

## Electrical Specifications Recently Published

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

**ADEL** Precision Products Corporation.—“Installation tool for conduit clips.” 4228/44. March 16th, 1943. (580014.)

Akt. Ges. Brown, Boveri & Cie.—“Electric switch contacts.” 671/45. December 27th, 1943. (579957.)

Akt. Ges. für Technische Studien.—“Method for regulating the output of thermal power plants and arrangement for carrying out this method.” 25974/44. December 29th, 1943. (579954.)

S. E. Alley.—“Steam superheating arrangements for fire tube boilers.” 18020. September 21st, 1944. (579915.)

Automatic Telephone & Electric Co., Ltd., R. Taylor and G. T. Baker.—“Telephone systems and automatic switches for use therein.” 2861. February 16th, 1944. (580010.) “Telephone systems and automatic switches for use therein.” 27676/45. February 16th, 1944. (Divided out of 580010.) (580040.)

R. W. Bailey and Metropolitan-Vickers Electrical Co., Ltd.—“Gas producers.” 17883/40. January 19th, 1941. (579967.)

N. C. Barford.—“Electron discharge devices.” 19666. November 24th, 1943. (579893.)

British Insulated Cables, Ltd., J. C. Quayle and P. Jones.—“Time delay electric switching arrangements.” 16915. September 5th, 1944. (580023.)

British Solenoids, Ltd., and S. J. Tyrrell.—“Thermionic valve holders.” 14568/43. November 17th, 1944. (579890.)

British Thomson-Houston Co., Ltd.—“Supercharger control systems.” 11324/43. July 13th, 1942. (580007.) “High-frequency transformer arrangements.” 6231/44. April 9th, 1943. (580017.) “Electric flashing lamps.” 5475/44. March 26th, 1943. (580055.)

British Thomson-Houston Co., Ltd. (General Electric Co.)—“Magnetrons.” 15741. September 24th, 1943. (579987.)

British Thomson-Houston Co., Ltd. (General Electric Co.)—“Ignition systems.” 3574. February 25th, 1944. (580012.)

British Thomson-Houston Co., Ltd., and C. J. Milner.—“Electron discharge devices.” 1271. January 25th, 1943. (580004.)

British Thomson-Houston Co., Ltd., H. R. Ruff and H. K. Bourne.—“Electric discharge lamps.” Cognate applications 14080/39 and 1896/40. May 11th, 1939. (580000.)

British Thomson-Houston Co., Ltd., K. J. R. Wilkinson and T. H. Scott.—“Construction and operation of triggered spark gaps.” 4378. April 1st, 1942. (580003.)

Burndept, Ltd., R. P. Richardson and R. W. Lewis.—“Construction of electric dry cells.” Cognate applications 15299/43 and 17085/43. September 17th, 1943. (579986.)

Cinema-Television, Ltd., and S. S. West.—“Apparatus for detecting and/or locating by

electrical means masses of buried material which are not homogeneous with their surroundings.” 5886. March 30th, 1944. (580015.)

C. H. W. Clark and Steatite & Porcelain Products, Ltd.—“Electrical potential sensitive resistances.” 3524. February 25th, 1944. (579994.)

“Pressure sensitive resistance devices.” 3525. February 25th, 1944. (579995.)

A. G. Crossland.—“Electric lamp holders.” 19116. October 5th, 1944. (579917.)

J. M. Dodds, G. J. Scoles, M. E. Haime, R. F. Archer and Metropolitan-Vickers Electrical Co., Ltd.—“Electric frequency dividers.” Cognate applications 28604/39 and 14400/40. October 24th, 1939. (579963.)

Electro Manganese Corporation.—“Anodes adapted particularly for use in the electro-winning of manganese.” 17801/43. January 16th, 1943. (579891.)

English Electric Co., Ltd., G. F. Tagg and R. K. Whitehead.—“Electric prepayment meter mechanism.” 3640. February 28th, 1944. (579996.)

Equipment & Engineering Co., Ltd., and H. B. Swift.—“Demagnetizing devices.” 11438. June 15th, 1944. (579911.)

Ferranti, Ltd., E. J. Whitmore and W. R. J. Mayes.—“Mounting of electrodes in electric discharge devices.” Cognate applications 17138/43 and 19895/44. October 18th, 1943. (579988.)

General Electric Co., Ltd., and E. H. Nelson.—“Electric high-pressure gaseous discharge lamps.” 8950. May 10th, 1944. (580072.)

General Electric Co., Ltd., V. J. Francis and W. R. Stevens.—“Apparatus for producing flashes of light.” 14479. May 15th, 1939. (579920.)

General Electric Co., Ltd., L. E. A. Phillips and D. W. Durrant.—“Fittings for fluorescent lamps.” 14995. October 26th, 1942. (579885.)

W. T. Henley's Telegraph Works Co., Ltd., and J. Harvey.—“Insulated wires and cables.” 18053. November 1st, 1943. (579892.)

A. Herbert, Ltd., W. R. Grove and I. R. Gibbs.—“Control gear for a reversible alternating current motor.” 5566. March 25th, 1944. (579902.)

Igranic Electric Co., Ltd., J. M. Bedford, J. A. Field and S. P. Maynard.—“Systems for varying the energization of electric circuits.” 1344. January 24th, 1944. (580044.)

International Combustion, Ltd.—“Steam generators.” 13921/44. August 21st, 1943. (579914.)

Landis & Gyr., Soc. Anon.—“Electrical installations for the regulation of physical magnitudes.” 13003/43. August 13th, 1942. (579928.)

Marconi's Wireless Telegraph Co., Ltd., and C. P. Fagan.—“Method of binding of conducting surfaces to glass, mica and so forth.” 18906. February 26th, 1943. (Divided out of 3211/43. (579989.)

F. R. Milson, Furzehill Laboratories, Ltd., and S. Smith & Sons (England), Ltd.—“Electrical frequency stabilizing systems.” 4765. March 14th, 1944. (579940.)

D. G. O. Morris and Metropolitan-Vickers Electrical Co., Ltd.—“Electric circuit arrangements for compensating undesired voltages.” 5447. April 5th, 1943. (580005.)

M-O Valve Co., Ltd., and E. M. Hicken.—“Improvements in magnetrons.” 13303. September 21st, 1942. (580041.)

M-O Valve Co., Ltd., N. L. Harris, J. W. Ryde and J. H. Shayler.—“Manufacture of cathode ray tubes.” 10519. June 18th, 1940. (579965.)

Standard Telephones & Cables, Ltd.—“High frequency cables.” 8302/44. December 24th, 1942. (579905.) “Inductor for interior slot hardening.” 7407/44. May 13th, 1943. (580019.) “Piezo electric crystal cabinet.” 6007/44. April 1st, 1943. (580057.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—“Radio receivers.” 9655. May 19th, 1944. (580077.)

Standard Telephones & Cables, Ltd., and E. C. Fielding.—“Speed-reducing torque transmission gear.” 1977. February 3rd, 1944. (580046.)

Standard Telephones & Cables, Ltd., and J. H. Fremlin.—“Electron discharge tubes and

resonant circuits therefor.” 2373. February 21st, 1941. (580002.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea, C. T. Scully and D. M. Ambrose.—“Arrangements for determining and monitoring the duration of electrical pulses.” 10211. July 21st, 1942. (579973.)

Telefon Fabrik Automatic A/S.—“Terminal members and terminal banks for electric connecting systems.” 28181/39. November 12th, 1938. (580001.)

A. Tustin and Metropolitan-Vickers Electrical Co., Ltd.—“Electric circuit arrangements responsive to the rate of change of an input quantity.” 3664. March 5th, 1943. (579979.)

G. A. Vandervell.—“Electroplating apparatus.” 6024/44. March 20th, 1945. (579941.)

Watford Electric & Manufacturing Co., Ltd., H. Coates and B. A. Vuille.—“Apparatus for controlling the maximum demand of an electric power load.” 19488. November 22nd, 1943. (Addition to 545150.) (579990.)

Western Electric Co., Inc.—“Cavity resonators.” 1673/44. February 13th, 1943. (580009.)

## 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.

Atherton.—October 8th. Electricity Department. 11,000-V ring main switchgear. (See this issue.)

Edinburgh.—September 21st. Electricity Department. Switchgear, transformers and substation equipment. (September 6th.)

October 1st. P.i. cables for twelve months. (See this issue.)

Haslemere.—Urban District Council. Electric light and power installations in houses, Sicklemill site. W. Wilson, clerk, Council Offices.

Kingston-upon-Thames.—September 30th. Borough Council. Tower wagon for street lighting purposes. (August 23rd.)

Manchester.—September 17th. Electricity Committee. Battery and charging equipment at two substations; and 660-V d.c. traction switchgear at three substations. (August 30th.)

September 18th. Electricity Department. Mercury-arc rectifier equipment for trolley-bus supply. (August 30th.)

Newcastle-on-Tyne.—September 18th. Town Council. Electric lighting maintenance and repair on various housing estates. Schedules from the city architect, 18, Cloth Market.

Southampton.—September 18th. Electricity Department. Fourteen electric refrigerators of the compressor type and of 5 to 7 cu ft capacity. (September 6th.)

September 25th. Fourteen electric refrigerators. (See this issue.)

Walsall.—October 2nd. Electricity Supply Department. Electrical stores and materials for twelve months. (See this issue.)

Wolverhampton.—October 8th. West Midlands Joint Electricity Authority. Supply, delivery, erection, testing and setting to work of two 33,000-V, 3-phase, 15-MVA feeder reactors. (September 6th.)

#### Orders Placed

Eastbourne.—Housing Committee. Accepted. Electrical installations in 30 houses on the Northbourne estate (£1,266).—Reliance Electrical Co.

Glasgow.—Transport Sub-Committee on Finance and Works. Accepted. Twenty trolley-bus chassis.—Associated Equipment Co. (twelve at £29,474, second lowest offer); Transport Vehicles (Daimler), Ltd. (eight at £19,640, lowest offer). Equipment of trolley-bus route.—Clough, Smith & Co., Ltd. (£34,120). Asbestos covered wire.—London Electric Wire Co., and Smiths.

Police Committee. Accepted. 2,500 dry cell lamps (£927).—Michael Black.

Sheffield.—Electricity Committee. Accepted. Pipework, tanks and valves in connection with new 50,000-kW turbo-alternator (£84,290).—Brightside Foundry & Engineering Co. Oil-immersed reactors (£11,676).—B.T.H. Co. Fire fighting equipment (£1,056).—Pyrene Co. Condenser tubes (£1,257).—Yorkshire Copper Works.

Southport.—Electricity Committee. Accepted. One 100-kVA transformer and one 400-kVA transformer.—Electric Construction Co. Switchboards.—Ferguson, Pailin.

York.—Electricity Committee. Accepted. Two 33,000-V feeders between Melrosegate and Acomb (£55,773).—Enfield Cables. Two 20,000-kVA transformers (£26,640) and two 10,000-kVA transformers (£18,460).—English Electric Co. 33,000-V switchgear (£35,316) for Melrosegate.—A. Reyrolle & Co.

## Contracts in Prospect

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

**Ashington.**—Factory for Byron & Co., Ltd.<sup>3</sup> London; E. Jeffcock (Contractors), Ltd., Walbottle Road, Newburn-on-Tyne.

**Aylesbury.**—Houses (46), Southcourt; R. White, architect, Ceely House, Church Street.

**Baldock.**—Permanent houses (50), Weston Way; F. D. Gentle, clerk, Council Offices.

**Banbury.**—Houses for agricultural workers (72), for R.D.C.; surveyor, Castle Wharf.

**Barrow-in-Furness.**—Houses (146), Ormsgill estate; J. N. Flitcroft, borough surveyor.

**Bradford.**—Cinema, Dudley Hill Road, Undercliffe; Undercliffe Picture House, Ltd.

**Chelmsford.**—Houses (44), Melbourne Park estate (£1,314 each); borough engineer.

**Corby.**—Temporary prefabricated houses (50), Rockingham Road; surveyor, The Jamb, Corby, Northants.

**Coseley.**—Houses (50), Woodcross estate (£70,054); J. Webb, builder, Ivy House Lane.

**Deudraeth.**—Houses (48), in three parishes, for R.D.C.; L. Ellis, clerk, Council Offices, Penrhyndeudraeth.

**Durham.**—Completion of a laboratory block at Durham University; G. Lazenby & Son, contractors, Ferryhill.

**Easington (Co. Durham).**—Temporary houses (50); R. G. Finlay, 28, West Sunnyside, Sunderland.

**East Ham.**—Dwellings (49), Langdon estate and other sites; chief housing officer, Town Hall.

**Ellesmere.**—Houses (30), Oswestry Road (£37,093); T. B. Gorst & Son, Ltd., builders, Belmont, Chester Road, East Saltney.

**Enfield.**—Permanent houses (214), Bullsmore Lane site; F. Lee, engineer and surveyor, 7, Little Park Gardens.

**Fareham.**—Houses (64), Salters, Warsash and Titchfield; surveyor, Westbury Manor.

**Glasgow.**—Factory and offices, Alexandra Parade; Collins Mantles, Ltd.

Factory, Heatherknowe; Peat Industrial Research (Scotland), Ltd.

**Godalming.**—Houses (40), Silo Wood and Aaron's Hill (£46,667); Johnson & Sons, builders, Liphook, Hants.

**Hackney.**—Houses (19) and 28 flats, Sandringham Road estate (£74,865); J. M. Hill & Sons, Ltd., Wembley.

**Harrogate.**—Permanent houses (96); borough surveyor, Municipal Offices.

**Hornchurch.**—Houses (20), Hacton Farm estate; surveyor, Council Offices, Billet Lane.

**Hove.**—Houses (100), Sunninghill housing estate; T. R. Humble, borough surveyor.

**Huddersfield.**—Houses (32), Dalton estate; borough architect, High Street Buildings.

**King's Lynn.**—Permanent houses (78), Gaywood Park estate (£86,725); Jaques & Greeves, builders, Doncaster.

**Lanchester.**—Additions to Lanchester Isolation Hospital (£8,000); Guy Hurd, architect, Shotley Bridge, Co. Durham.

**Leamington Spa.**—Permanent houses (100), Kingsway estate; H. Fedeski, chartered architect, Town Hall Annex.

**Liverpool.**—Radio and metal products factory, Fazakerley; Frank Murphy (London), Ltd.

**Llandudno.**—Dwellings (42), Herkomer Road and King's Avenue; J. A. Edwards, Town Hall.

**Norwich.**—Houses (48), Lakenham estate (£55,297); R. G. Carter, Ltd. Drayton.

**Ogwen.**—Permanent houses (56), Glasinfryn, near Bangor; R. T. Jones, architect, Midland Bank Chambers, Bangor.

**Oswestry.**—Houses (60), at various sites; S.T. Walker, council's architect, James Cond Building, Charlotte Street, Birmingham, 3.

**Poplar.**—Three-storey flats (48), Abbott Road; borough engineer and surveyor, Town Hall, Bow Road, London, E.3.

**Portsoy.**—Houses (55); W. Mackie, architect, 393, Union Street, Aberdeen.

**Salford.**—School, Cross Lane, for Education Committee; R. Carlyle & Co., Ltd., builders, Manchester, 16.

**Seaton Valley.**—Houses (30) at Shiremoor, for the U.D.C.; C. F. Thompson & Co., builders, Hobart Terrace, Whitley Bay.

**Sheffield.**—Houses (44), Parson Cross estate (£53,084); W. Redmile & Son, Ltd., builders, 29a, Cockshutt Drive.

**Tain (Ross-shire).**—Houses (26), Glebe site; Alex. Ross & Son, architects, 28, Queensgate, Inverness.

**Ulverston.**—Factory extensions (£25,000); Ashley Accessories, Ltd., Morecambe Road.

**Wardle.**—Houses (162), Ashbrook estate, for U.D.C.; J. Gerrard & Sons, Ltd., builders, Swinton, Manchester.

**Warwick.**—Police houses (26), in various areas of the county; C. H. Elkins, architect, Shire Hall.

**West Ham.**—Dwellings (126), north of Victoria Dock Road, E.16; T. E. North, borough architect, 100, West Ham Lane, E.15.

**Weston-super-Mare.**—Permanent houses (50), Bournville estate; H. L. Lloyd, borough engineer, Town Hall.

**Wetherby.**—Houses (38), in five parishes; Jones & Stocks, architects, 7, Blenheim Terrace, Leeds, 2.

**Whickham (Co. Durham).**—Additional wing at the nurses' quarters at the Whickham and District Memorial Hospital; Cackett, Burns Dick & McKellar, architects, 21, Ellison Place, Newcastle-on-Tyne.

**Whitley Bay.**—Houses (400) on the Seatonville estate; E. Roberts, U.D.C. surveyor.

Rebuilding 24 terrace houses, Ocean View; B. Peel, Ltd., builders, East Mill Works, Tynemouth.

**Wigtown.**—Houses (72), North Back Street, and Agnew Crescent; A. Young, architect, Millburn, Newton-Stewart.

**Willington (Co. Durham).**—Houses (112), Crook and Willington U.D.C.; T. A. Page, Son & Hill, 75, King Street, South Shields.

*Stands up to  
Polluted  
Atmosphere  
and Fog*

**T**O overcome these insidious enemies of High Tension System operation calls for long and intimate experience of the problems involved. It entails intensive tests and trials carried out in laboratories equipped with the most modern plant and facilities.

*This insulator incorporates the very latest developments in design for combating foul air and fog—and like all Bullers products, stands up to its job.*

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**ESPECIALLY WITH OSRAM**



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**THE WONDERFUL LAMP**  
 A S.E.C. PRODUCT



# CLASSIFIED ADVERTISEMENTS

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

**THE CHARGE** for advertisements in this section is 2/- per line (approx. 7 words) per insertion; **ONLY OFFICIAL AND GOVERNMENT ANNOUNCEMENTS CAN NOW BE DISPLAYED**—30/- per inch. Where the advertisement includes a Box Number this counts as six words and there is an additional charge of 6d. for postage of replies.

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

Original testimonials should not be sent with applications for employment.

## OFFICIAL NOTICES, TENDERS, ETC.

### COUNTY BOROUGH OF WALSALL ELECTRICITY SUPPLY DEPARTMENT

**T**HE Electricity Supply Committee invite tenders for the supply of the undermentioned materials and apparatus of British manufacture, to be delivered as and when required during a period of twelve months commencing 1st January, 1947: House Service Meters; Earthenware Conduits; Troughing Tiles; Bonding Clamps; Feeder Pillars and Substation Panels; Underground Link Boxes and Covers; Transformers (oil-immersed, self-cooled, 100 to 500 kVA); Cast Iron Manhole Frames and Covers.

Forms of tender, together with the general conditions of contract (which include the Corporation's usual fair wages and conditions of labour clause) and specifications may be obtained upon application (which should specify the form required) to the undersigned.

The tenderers must state whether they are entitled to use the seal of the National Scheme for Disabled Men.

Tenders, enclosed in plain sealed envelopes, and endorsed as instructed in the tender form, must be delivered to the Town Clerk, Council House, Walsall, not later than Wednesday, 2nd October, 1946. Tenders not complying with the foregoing will be rejected and the Committee does not bind itself to accept the lowest or any tender.

D. HOLT,

Engineer and Manager.

Upper Bridge St.,

Walsall.

5th September, 1946.

2522

### COUNTY BOROUGH OF SOUTHAMPTON ELECTRICITY DEPARTMENT

#### Electric Refrigerators (Amended Advertisement)

**T**ENDERS are invited for the supply and delivery of Fourteen Electric Refrigerators of from 5 to 15 cubic feet storage capacity.

Conditions of contract specification and form of tender may be obtained from Mr. W. G. Turner, Borough Electrical Engineer, Civic Centre, Southampton, by application and on payment of one guinea, which will be refunded on receipt of a bona fide tender. Additional copies may be purchased at a cost of 10s. 6d. each.

Sealed tenders, in plain envelopes marked "Electric Refrigerators," must be delivered to the undersigned not later than Wednesday, 25th September, 1946. The Council does not bind itself to accept the lowest or any tender.

H. RONALD H. MEGGESON,

Civic Centre, Southampton.

Town Clerk.

6th September, 1946.

2505

### CITY AND ROYAL BURGH OF EDINBURGH ELECTRICITY DEPARTMENT

**T**HE Lord Provost, Magistrates and Council of the City of Edinburgh invite tenders for Paper Insulated Cables to Specification No. 204 for twelve months commencing 1st January, 1947. Specifications may be obtained at the Engineer's Office, Dewar Place, Edinburgh, from Thursday, 12th September, 1946.

Sealed tenders endorsed "Tenders for Paper Insulated Cables, Electricity Dept., Specification No. 204," must be delivered to the undersigned not later than 10 a.m. on Tuesday, 1st October, 1946. The Town Council shall not be bound to accept the lowest or any tender.

J. STORER,

City Chambers, Edinburgh.

Town Clerk.

12th September, 1946.

2542

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

### ATHERTON U.D.C. ELECTRICITY DEPARTMENT

**T**ENDERS are invited for the supply and delivery of 11,000-volt Ring Main Switchgear for several new substations. Specifications, conditions and form of tender may be obtained from the Electrical Engineer & Manager, Electricity Dept., Factory St., Atherton, Manchester.

Tenders, in plain sealed envelopes endorsed "High Tension Switchgear," to be delivered to the undersigned not later than 8th October, 1946. The Council does not bind itself to accept the lowest or any tender.

S. G. BLAKEBOROUGH,

Clerk to the Council.

Town Hall,

Atherton, Manchester.

2519

### SITUATIONS VACANT

#### KINGSTON-UPON-HULL EDUCATION AUTHORITY

##### Municipal Technical College

Acting Principal: F. Walker, M.C., B.Sc.

**R**EQUIRED, as soon as possible, a Senior Assistant for Electrical Engineering at the above-named College. Applicants should hold a degree or equivalent qualification in Electrical Engineering and should have had industrial experience.

Salary in accordance with the Burnham Scale, 1945, i.e., £600 per annum, rising by annual increments of £25 to a maximum of £750 per annum, together with allowance for training.

Particulars of appointment, and application forms (which must be returned within fourteen days of this issue) can be obtained from the Director of Education, Education Offices, Guildhall, Kingston-upon-Hull, on receipt of a stamped, addressed, foolscap envelope.

2527

#### NORWICH CORPORATION ELECTRICITY DEPT.

##### Assistant Mains Engineers

**A**PPPLICATIONS are invited for two appointments as Assistant Mains Engineer in the rural area. The post is subject to the provisions of the Local Government Superannuation Act, 1937, and the salary will be in accordance with the N.J.B. Schedule, Class H, Grade 8B.

Applicants must have had some experience of the construction, operation and maintenance of an overhead distribution system, and should preferably be Graduates or Associate Members of the Institution of Electrical Engineers. Applications, stating age, experience and qualifications, must be received by the undersigned not later than the 30th September, 1946.

JOHN A. SUMNER,

City Electrical Engineer.

Electricity Offices,

Duke Street,

Norwich.

2501

#### WOLVERHAMPTON AND STAFFORDSHIRE TECHNICAL COLLEGE

**A**PPPLICATIONS invited for full-time appointment as Lecturer in Physics. Burnham Technical Scale salary for assistants, £300 to £525 per annum by annual increments of £15; commencing salary in accordance with experience. Additions to scale for degree (£15 on minimum, £30 on maximum) and for time spent in approved study or training (maximum addition £45 for five or more years). Further particulars from F. Lonsdale Mills, Clerk to Governors, Education Offices, North St., Wolverhampton. 2446

### CENTRAL ELECTRICITY BOARD (SOUTH-EAST AND EAST ENGLAND DISTRICTS)

#### First Assistant Control Engineer

**T**HE Central Electricity Board have a vacancy for a First Assistant Control Engineer at their Control Centre in London. Requisite qualifications are technical attainments up to Grad.I.E.E. standard and practical training in or suitable for the electricity supply industry.

The commencing basic salary will be £435 per annum. To the basic salary will be added a temporary salary adjustment in accordance with the arrangements in force from time to time. At present this temporary salary adjustment is £62 8s. per annum. There is also a London area allowance of 5%, with a minimum of £25 per annum on basic salaries below £500 per annum.

Applicants should state their age and give full particulars, with dates, of education, technical training, experience, degrees, diplomas, etc. The selected applicant will be required to undergo a medical examination and, if approved, will be required to join the Board's Superannuation Scheme.

Applications must be submitted, in writing, to the District Manager, Central Electricity Board, Aldwych House, London, W.C.2, and be received by him not later than 21st September, 1946. 2484

### COUNTY BOROUGH OF BOLTON

#### Appointment of Electrical Engineer and Manager

**A** PPLICATIONS are invited for the position of Electrical Engineer and Manager from engineers who are Corporate Members of the Institution of Electrical Engineers and who have had wide experience in the operation of a Selected Generating Station and in the administration, distribution and commercial work of an electricity undertaking.

The salary will be at the rate of £1,600 per annum, plus bonus.

The appointment will be terminable on either side by three months' notice in writing; will be subject to the provisions of the Local Government Superannuation Acts and the successful candidate will be required to pass a medical examination.

Applications, together with the names of three persons to whom reference may be made, must be delivered to me in a sealed envelope endorsed "Electrical Engineer and Manager" not later than 23rd September, 1946. Relationship to any member or senior officer of the Council must be disclosed and canvassing will be a disqualification.

PHILIP S. RENNISON, Town Clerk.

Town Hall, Bolton. 2407

### THE YORKSHIRE ELECTRIC POWER COMPANY

#### Mains Technical Assistant

**A** PPLICATIONS are invited for a Mains Technical Assistant to be appointed to the head office staff. Applicants must have had a sound technical training and experience in the construction of underground and overhead mains for operating at voltages up to 66 kV, and must be capable of making all necessary calculations and preparing schemes for extension and development of transmission and distribution networks, and of investigating interconnection, stability and other technical problems associated with extensive systems and multiple generating stations. Applicants must be Corporate Members of the I.E.E. and preferably over 30 years of age. Salary according to qualifications and experience.

Applications, stating age, qualifications and full particulars of experience, to be addressed to GM/GH, The Yorkshire Electric Power Co., Bramhope, nr. Leeds. 2441

### LINCOLNSHIRE JOINT CANCER COMMITTEE

#### Radiotherapy Centre, Scunthorpe

**A** PPLICATIONS are invited for the post of Technician in the Physics Department. The duties include the running of a well-equipped workshop, instrument making, laboratory work, darkroom work, X-ray plant maintenance and the manufacture of radium applicators. Applicants must be fully trained and skilled in the operation of the usual workshop machinery. Electrical engineering qualifications and experience in any other aspects of the work would be advantageous. Salary, i.e., 3375 x £15—£450. Applications, giving full details of qualifications and experience and accompanied by copies of two testimonials, should reach the Director, Radiotherapy Centre, Memorial Hospital, Scunthorpe, not later than Oct. 7th, 1946. 2481

### COUNTY BOROUGH OF BURY

#### Appointment of Electrical Engineer and Manager (Amended Advertisement)

**A** PPLICATIONS are invited for the appointment of Electrical Engineer and Manager at a salary in accordance with the Agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers, dated the 9th July, 1941; on the present unit assessment of the undertaking this will be £1,208 14s. rising by two annual increments to £1,422 per annum.

Candidates should be Corporate Members of the Institution of Electrical Engineers or possess equivalent technical qualifications, and preferably have had recent experience in the administration and management of an electricity supply undertaking and experience of a selected station operating under the Electricity (Supply) Act, 1926.

Forms of application and conditions of appointment will be forwarded on request. Applications must be delivered to me not later than Saturday, 28th September, 1946.

EDWARD S. SMITH,

Municipal Offices, Town Clerk.  
Bank Street, Bury.  
5th September, 1946. 2489

### BOROUGH OF BECKENHAM ELECTRICITY DEPT.

**A** PPLICATIONS are invited for the following appointments in the Electricity Showrooms:—

(a) Lady Assistant with previous experience of similar work

(b) Junior Lady Assistant or Trainee, preferably with technical training in electrical housecraft.

The salary will be according to age under the General Division Scale of the National Joint Council, particulars of which will be furnished on application to the Borough Electrical Engineer. The appointments will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidates will be required to pass a medical examination.

Applications, giving full details of qualifications and experience, accompanied by copies of recent testimonials, must reach the Borough Electrical Engineer and Manager, Town Hall, Beckenham, not later than mid-day on Monday, 30th September, 1946. Canvassing in any form will be disqualified.

C. ERIC STADION,

Town Hall, Beckenham, Kent. Town Clerk.  
4th September, 1946. 2476

### CROWN AGENTS FOR THE COLONIES

#### Colonial Government Appointments

**A** PPLICATIONS from qualified candidates are invited for the following post: Senior Accountant required by the Government of Nigeria for the Electricity Branch of the Public Works Department for one tour of 18 to 24 months, with possible permanency. Salary £750 rising to £920 a year. On salary of £750 separation allowance for married men is between £60 and £180, according to number of children. Free quarters and passages. Liberal leave on full salary. Candidates should be Members or Associates of the Institute of Municipal Treasurers and Accountants or the Institute of Cost and Works Accountants, or hold an equivalent qualification; have had wide experience in electricity finance and accounts, and be capable of assuming responsibility, management and organisation of the accounting staff of a group of electricity undertakings.

Apply at once, by letter, stating age, whether married or single, and full particulars of qualifications and experience, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/13462 on both letter and envelope. 2453

### BOROUGH OF AYLESBURY ELECTRICITY DEPT.

#### Lady Demonstrator

**A** PPLICATIONS are invited for the above appointment at a salary of £240 plus war bonus (at present £48 2s.) per annum. Applicants should be experienced in demonstrating all classes of domestic electrical appliances and capable of giving cooker lecture demonstrations. The post is superannuated and the appointment is subject to the successful candidate passing a medical examination.

Applications, stating age, experience and qualifications, to be sent to the undersigned not later than the 5th October, 1946.

F. BENT, M.I.E.E., A.M.I.Mech.E.,

Electricity Offices, Borough Electrical  
Exchange Street, Engineer and Manager.  
Aylesbury, Bucks. 2485

**COUNTY BOROUGH OF BRIGHTON ELECTRICITY DEPARTMENT**

Chief Constructional Assistant

**A**PPPLICATIONS are invited from Chartered Civil or Mechanical Engineers for the above position. The person appointed will be directly responsible to the Electrical Engineer and Manager and will act as his chief assistant in the carrying out of large power station works.

Applicants must have had extensive experience in the carrying out and supervision of civil engineering and building works and plant installation as well as the staff control and office administrative duties associated with the execution of large projects. Some experience of dock and harbour works will be considered an advantage.

The appointment will be subject to (a) the scheme of conditions of service of the National Joint Council for Local Authorities' Administrative, Professional, Technical and Clerical Services; (b) the provisions of the Local Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination. The salary will be £1,000 per annum, plus war bonus, at present £59 16s. per annum.

Applications, with copies of two recent testimonials and, additionally, the names of two persons to whom reference may be made, are to be sent to Mr. H. Pryce-Jones, M.Eng., Engineer and Manager, Brighton Corporation Electricity Department, Electric House, Castle Square, Brighton, 1, endorsed "Chief Constructional Assistant," and received by him not later than noon on Monday, 23rd September, 1946. Canvassing, either directly or indirectly, will disqualify.

J. G. DREW.

Town Hall, Brighton, 1. Town Clerk.  
September, 1946. 2418

**COUNTY BOROUGH OF HASTINGS ELECTRICITY DEPARTMENT**

Plumber-Joiners

**A**PPPLICATIONS are invited for posts as Plumber-Joiners in the above Department. Applicants must have had experience in jointing of high and low tension paper-insulated, lead-covered 11-kV cables and connection of pillar boxes, F.H.T. and L.T. switchgear.

Conditions of service and pay will be in accordance with D.J.I.C. Schedule, No. 11 (South Coast) Area, at present 2s. 4½d. per hour for a 47-hour week.

Applications, stating age, experience and present employment, accompanied by two recent references, endorsed "Plumber-Joiner," should be sent to the undersigned as soon as possible.

J. SAVAGE,

12 & 13, York Buildings, Borough Electrical Engineer and Manager.  
Hastings. 5th September, 1946. 2445

**BOROUGH POLYTECHNIC, S.E.1**

Head of Dept. of Electrical Engineering and Physics

**T**HE Governors invite applications for the above post. Salary, Burnham, Head of Department, Grade 3. The department is large and provides advanced instruction in electrical engineering, radio and telecommunications, in addition to other branches of electrical technology.

Candidates must possess a degree and be not more than 45 years of age, and have had adequate teaching and industrial experience. Special consideration will be given to applicants with an honours degree and also to those possessing research experience and qualifications.

An application form and further particulars may be obtained by applying to the undersigned enclosing a stamped addressed foolscap envelope. Applications must be received not later than Monday, 7th October, 1946.

DOUGLAS H. INGALL, Principal. 2431

**BRADFORD EDUCATION COMMITTEE**

Technical College, Bradford

**A**PPPLICATIONS are invited for appointment as Head of the Department of Electrical Engineering in the College. The scale of salary attached to this appointment will be £900 to £1,000 per annum.

Further particulars of the appointment and forms of application may be obtained from the Director of Education, Town Hall, Bradford, and completed forms should be returned to the Principal of the College within two weeks from the date of publication of this advertisement.

THOS. BOYCE, Director of Education. 2464

**SHEFFIELD CORPORATION ELECTRICITY DEPT.**

**A**PPPLICATIONS are invited for the following positions:

**POWER INSTALLATIONS ENGINEER.** Applicants must have had a sound technical and practical training in electrical engineering, either with a manufacturing electrical engineering firm or with an electricity supply undertaking and must be Graduate or Corporate members of the Institution of Electrical Engineers or possess equivalent technical qualifications.

Considerable experience in the preparation of power installation schemes and specifications for large works comprising motors, switchgear, furnaces, etc., together with the ability to tender for and supervise the installation of such schemes is essential.

Applicants must possess a thorough knowledge of the care and maintenance of works electrical plant, including the rewinding of motors and the repair and maintenance of switch and starting gear, together with experience of all applications of electrical development normally undertaken by a supply authority.

The salary will be in accordance with Class M, Grade 8A, of the National Joint Board Schedule, commencing at £597 per annum.

**INSTALLATION ENGINEER.** Applicants must have had a sound technical training and considerable practical experience in the installation and maintenance of all classes of electrical installations for lighting, heating and power and must at present be holding a supervisory position of responsibility in the electrical contracting or supply industry. Ability to prepare estimates and specifications for all classes of installation work, to supervise the carrying out of such work and to efficiently control staff is essential, together with experience of development work in the domestic, commercial and industrial applications of electricity.

The salary will be in accordance with Class M, Grade 9A, of the National Joint Board Schedule, commencing at £478 per annum.

Both appointments will be subject to the provisions of the Local Government Superannuation Act, 1937, and applicants must have previous local authority service carrying transfer value within the meaning of the Act or otherwise be not more than 40 years of age. The selected applicants will be required to pass a medical examination.

Applications, on forms to be obtained from the undersigned, are to be returned to me not later than Monday, 23rd September, accompanied by copies of not more than three recent testimonials. Canvassing or any communication to a member of the Council, either directly or indirectly, is prohibited and is a disqualification.

JOHN HEYS,

Town Hall, Sheffield, 1. Town Clerk. 2417

**BOROUGH OF BRIGHOUSE ELECTRICITY DEPT.**

E.H.T. Plumber-Joiner

**A**PPPLICATIONS are invited for the above position from Plumber-Joiners experienced on cables up to 11 kV. Conditions of service and rates of pay will be in accordance with the J.I.C. Schedule (No. 2 Area). The present rate is 2s. 4½d. per hour. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and to the passing of a medical examination.

Applications, stating age and experience and accompanied by copies of not more than two recent testimonials, should be received by the Electrical Engineer, Huddersfield Road, Brighouse, not later than Monday, the 30th September, 1946. Canvassing, directly or indirectly, is prohibited, and candidates should state in their application whether to their knowledge they are related to any member of, or the holder of any senior office under, the Council.

ERNEST H. CLEGG,

Town Hall, Brighouse. Town Clerk. 2462  
3rd September, 1946.

**METROPOLITAN ELECTRIC SUPPLY CO. LTD.**

Appointment of Substation Shift Engineer

**A**PPPLICATIONS for the above are invited from men having good general and technical education, and with recent experience in the operation of large rotary converting substations.

Salary and conditions of service will be in accordance with N.J.B. Scale, Class E, Grade 8b.

Applications, giving full particulars of training, experience and position held, together with copies of recent testimonials, should be sent to the Secretary, Metropolitan Electric Supply Co. Ltd., 18, Stratford Place, London, W.1, endorsed "Substation Shift Engineer." 2470

**CITY AND COUNTY BOROUGH OF BELFAST  
ELECTRICITY DEPARTMENT**

**A**PPPLICATIONS are invited for the following positions:

(a) **ASSISTANT POWER STATION SUPERINTENDENT.** Applicants must have a sound engineering training, have a University degree in electrical engineering and/or be Corporate Members of the Institution of Electrical Engineers, and have had at least five years' experience of power station practice. They must not be more than 40 years of age on the 1st October, 1946.

The salary for the position is in accordance with Grade 5, Class J, of the National Joint Board Schedule of Salaries for Technical Engineers on the staff of Authorised Undertakers. The scale is £651 for the first two years, £666 for the third and fourth years and £682 after the fourth year.

(b) **POWER STATION CHEMIST.** Applicants must have experience of feed water treatment and boiler water conditioning for 650 lbs./sq. inch 850° F. plants, testing coals and oils and combustion control. It is desirable that applicants have a University degree in Chemistry. They must not be more than 40 years of age on the 1st October, 1946.

The commencing wages for the position are £8 14s. 10d. per week, being in accordance with Grade 8B, Class J, of the National Joint Board Schedule of Salaries for Technical Engineers on the staff of Authorised Undertakers. The scale is £456 for the first two years, £466 for the third and fourth years and £477 after the fourth year. Upon completion of twelve months' satisfactory service the position will be established on the Salary List.

(c) **MAINS ENGINEER.** Applicants must have a sound engineering training, have a University degree in Electrical Engineering or be Corporate Members of the Institution of Electrical Engineers. They must not be more than 40 years of age on the 1st October, 1946.

The salary for the position is in accordance with Grade 5, Class J, of the National Joint Board Schedule of Salaries for Technical Engineers on the staff of Authorised Undertakers. The scale is £651 for the first two years, £666 for the third and fourth years and £682 after the fourth year.

(d) **ASSISTANT TECHNICAL ENGINEER.** Applicants must have a sound engineering training, have a University degree in Electrical Engineering or be Corporate Members of the Institution of Electrical Engineers. They must not be more than 40 years of age on the 1st October, 1946.

The commencing wages for the position are £8 2s. 11d. per week, being in accordance with Grade 9, Class J, of the National Joint Board Schedule of Salaries for Technical Engineers on the staff of Authorised Undertakers. The scale is £425 for the first two years, £435 for the third and fourth years and £445 after the fourth year. Upon completion of twelve months' satisfactory service the position will be established on the Salary List.

(e) **GENERAL ENGINEERING DRAUGHTSMAN.** Applicants must have a sound general engineering training. Experience in the layout of Central Station generating plant is essential. Applicants must not be more than 40 years of age on the 1st October, 1946.

The salary for the position is in accordance with Grade 8B, Class J, of the National Joint Board Schedule of Salaries for Technical Engineers on the staff of Authorised Undertakers. The scale is £456 for the first two years, £466 for the third and fourth years and £477 after the fourth year.

Preference will be given, in each case, to ex-Service candidates possessing the required qualifications.

Applications must be made on official forms, which can be obtained from the City Electrical Engineer and General Manager, Electricity Department, East Bridge Street, Belfast, and, with copies of not more than three recent testimonials, should be lodged with the Town Clerk, City Hall, Belfast, not later than 4 p.m. on Friday, 27th September, 1946. Canvassing, oral or written, if proved to the satisfaction of the appointing authority, will disqualify.

City Hall, Belfast.  
6th September, 1946.

**JOHN DUNLOP,**  
Town Clerk. 2516

**CENTRAL SUSSEX ELECTRICITY LIMITED  
& ASSOCIATED COMPANIES**

**A**PPPLICATIONS are invited for the following positions (Superannuation Scheme): High Tension Joiners; Overhead Linemen; Electrical Fitters.

Wages, etc., in accordance with the D.J.I.C. No. 11 Area, Apply, with copies of references, to H. Dixon, M.I.E.E., Engineer and Manager, Electricity Offices, Haywards Heath. 2517

**BOROUGH OF LUTON ELECTRICITY  
UNDERTAKING**

**Industrial Power Engineer**

**A**PPPLICATIONS are invited for the above-mentioned appointment. Candidates must possess a wide knowledge of the use of electricity for various industries, have practical experience of and be able to give sound advice on industrial equipment and installations. Experience of the preparation of estimates and specifications is desirable. Corporate or Graduate Membership of the Institutions of Electrical or Mechanical Engineers will be an advantage. The successful candidate will work under the direct supervision of the Consumers' Engineer.

Salary in accordance with the National-Joint Board Schedule, Class J, Grade 8B (present salary £456, rising to £477 per annum). The successful candidate will be required to pass a medical examination and to contribute to the Corporation's Superannuation Scheme.

Applications, giving age, details of training and experience, present position held, and accompanied by copies of three recent testimonials, should be delivered not later than Friday, 27th September, 1946, to C. T. Melling, M.Sc.Tech., M.I.E.E., M.I.Mech.E., Borough Electrical Engineer, Electricity Offices, St. Mary's Road, Luton. Canvassing directly or indirectly will be a disqualification.

**W. H. ROBINSON,**  
Town Clerk.  
5th September, 1946. 2521

**CROWN AGENTS FOR THE COLONIES**

**Colonial Government Appointments**

**A**PPPLICATIONS from qualified candidates are invited for the following post:—

**ELECTRICAL INSPECTOR OF WORKS (TEMPORARY)** required by the Sierra Leone Government Public Works Department for one tour of 18 to 24 months in the first instance. Salary according to age, qualifications and war service in the scale £500, rising to £600 a year. On salary of £500 separation allowance for married men of between £84 and £204 a year according to number of dependants, and for single men cost of living allowance of £40 a year. Outfit allowance £60. Free passages and quarters. Candidates, not over 40 years of age, must have served a recognised apprenticeship and have had good practical experience in an electricity supply undertaking operation on 3-phase alternating current system. They should have had experience of the jointing and maintenance of high tension underground cables, low tension overhead lines and transformers. Some mechanical experience an advantage.

Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/14431 on both letter and envelope. 2497

**COUNTY BOROUGH OF PRESTON ELECTRICITY  
UNDERTAKING**

**Assistant Power Station Chemist**

**A**PPPLICATIONS are invited for the position of Assistant Power Station Chemist from suitably qualified persons (male or female). Candidates must have had experience with coal testing, gas analysis and boiler feed water treatment. Preference will be given to applicants who have had previous experience in a large power station.

The salary and conditions of service will be in accordance with the National Joint Board Schedule, the salary being as per Class J, Grade 9a (at present £389-£408 p.a.). The selected candidate will be required to pass a medical examination and to contribute to the Council's Superannuation Scheme under the provisions of the Local Government Superannuation Act, 1937.

Applications, stating age, and giving full particulars of technical qualifications and experience, accompanied by not more than three testimonials, are to be endorsed "Assistant Chemist" and received by the undersigned not later than Saturday, 28th September, 1946.

**G. A. ROBERTSON, M.Sc. (Tech.),**  
M.I.E.E., M.I.Mech.E.,  
Borough Electrical Engineer. 2458  
40/41, Lune Street,  
Preston.  
3rd September, 1946.

**A**RMATURE Winder (Male), with experience of D.C. machines up to 25 h.p. Hackney district. Write, stating age, wage and details of experience, to—Rox 2369, c/o The Electrical Review.

ASSOCIATED MUNICIPAL ELECTRICAL ENGINEERS  
& ELECTRICAL POWER ENGINEERS' ASSOCIATION

NOTICE—BOLTON CORPORATION

Appointment of Electrical Engineer and Manager

THE Standing Joint Committee of the above Associations desire to point out that the above post is not advertised in accordance with the Agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers (Electricity Supply Industry). According to this Agreement and the latest available data (subject to any adjustment which may be necessary under the interpretation of the Agreement) a commencing salary should be paid, under Clause 10, of £1,916 15s. for the first year, rising to £2,255 in the third year, and thereafter subject to adjustment above or below in accordance with the National Agreement.

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

(Signed) Joint Secretaries—

A. M. E. E.—A. F. MACALISTER.  
E. P. E. A.—J. F. WALLACE.

2408

A fully-qualified Electrical Engineer required for a section of a large iron and steel works in North Lincoln. The section includes the generating station. Experience necessary in some or all of the following: Planning, specification, installation and maintenance work as applied to heavy industry, electrical manufacture, including technical and commercial work. Reply, stating fully details of education, training, experience, qualifications and present salary. to—Box 2391, c/o The Electrical Review.

APPLICATIONS are invited for the position of Winding Shop Foreman with a progressive electrical engineering firm in East London specialising in motor repairs of all sizes, both A.C. and D.C. Applicants must have wide experience in, and be fully conversant with, the following: (a) Taking particulars of windings and obtaining former sizes; (b) Methods and materials for insulating; (c) Armature and stator winding of all sizes; (d) Coil winding of all sizes, including heavy bare strip; (e) Shop organization, rate fixing and control of mixed labour. Applicants should state age, qualifications and experience, and if selected to interview their travelling expenses will be refunded. Apply—Box 2278, c/o The Electrical Review.

APPOINTMENT of Development Engineer. Established firm of electrical and mechanical engineers operating several large repair works request applications from suitably qualified persons for the above appointment. Experience must include handling and repair of heavy, slow and high speed machines, A.C., D.C. and medium sized transformers. Knowledge and use of modern insulating materials, winding methods, modifications involving phase, voltage and speed changes, chored windings, etc., is essential. Applicants with initiative and drive, from 30-38 years of age, are invited to submit career details with full information on present appointment and salary. The person appointed will be given full control of the works and area concerned during the manager's absence. This post offers scope for near future promotion.—Box 2500, c/o The Electrical Review.

ARMATURE Winder or good Improver required, used to all types of motors. Knowledge of dismantling and assembly of motors a good advantage. Apply to—Messrs. Charles H. Harwood & Co. Ltd., 32, Meyrick Road, Willesden, N.W.10. 114

ARMATURE Winders, A.C. and D.C., wanted for good class repair shop, special terms to good men with initiative, East Yorkshire.—Box 2351, c/o The Electrical Review.

ARMATURE Winders for rewinding and repair of all types of A.C. Motors, fractional h.p. to 150 h.p. Knowledge of voltage change and conversion work an advantage but not essential. Modern factory, good conditions, canteen, etc. Apply—Labour Officer, Courtaulds Ltd., Clayton-le-Moors, Accrington. 2392

ARMATURE Winders and Improvers required, A.C. and D.C., top rates, good working conditions.—Electrical Power Repairs (Gillingham) Ltd., Strover Street, Gillingham, Kent. 9385

ARMATURE Winders and Improvers urgently required. Top rates and good conditions.—Box 113, c/o The Electrical Review.

ARMATURE Winders and Improvers wanted for general repair work, A.C. and D.C., top rates.—Phillips & Sons Electrical Ltd., 40, Waterford Road, S.W.6. 9496

ASSEMBLY Shop Superintendent required for production of electricity meters and mechanisms. Applicants must have had a comprehensive experience in instrument and meter manufacture, be acquainted with modern methods of production, capable of tactfully controlling and training raw male and female labour to full efficiency in the assembly operations. Only applicants with the above qualifications, strict disciplinarian, and good time keeper will be considered for this sound position by a well established company in South London. Please state age, experience and salary required.—Box 2520, c/o The Electrical Review.

ASSISTANT Electrical Engineer for planning and development of new installations in iron and steel works. Age 28/35, with sound technical qualifications and good practical engineering and maintenance experience, preferably gained in iron and steel works.—Box 2457, c/o The Electrical Review.

ASSISTANT Foreman for winding department, A.C., D.C. Motors, fractional to 500 h.p. Permanent progressive position to suitable applicant.—Higgs Motors, Witton, Birmingham. 106

AUTOMOBILE Dynamo and Starter Armature Winder, able to undertake fr. h.p. motor rewinds. Fully experienced and able to take charge of any established department. Permanency and good prospects. Write, stating age, experience and salary required, to—Box 2463, c/o The Electrical Review.

BUYER required for electrical equipment manufacturers. Must be fully experienced, progressive and capable of fully controlling department and produce results. Knowledge of general engineering products an advantage. Only first-class men with good connections need apply, with the fullest details of experience, salary required, etc.—Box 2477, c/o The Electrical Review.

CABLE Technical Engineer required by Electrical Cable Manufacturers in South Africa. Applicants should possess good technical and scientific qualifications, and be capable of designing cables in conformity with customers' requirements. Experience in paper insulated, and dry core telephone cables essential. Write, stating experience, qualifications, age, salary required, to—Box 2507, c/o The Electrical Review.

CHIEF Draughtsman required for drawing office staff of six products: electrical motors, generators, rotary transformers, motor alternators up to 10 k.w., all frequencies, all voltages, including high tension. Salary according to ability, south-east London district. Reply stating experience, technical training and salary required to—Box 2309, c/o The Electrical Review.

CHIEF Storekeeper required, London area. Applicants should have had good storekeeping experience in an engineering stores (preferably electrical), should be capable of using initiative and must have had experience in supervising stores personnel. Please state, in confidence, age, experience and salary desired.—Box 2416, c/o The Electrical Review.

CLERICAL Assistant required for stores office. Must have good knowledge of electrical material.—London Electrical Co., 92, Blackfriars Road, S.E.1. 104

CONTRACTORS Clerk. Vacancy occurs for clerk with experience of rendering accounts, and general clerical duties. Excellent opportunity for future advancement. Details in writing with salary required to—Staff Manager, F. H. Wheeler & Co. Ltd., 39, Victoria Street, S.W.1. 2529

CONTRACTORS' Engineer wanted to take charge installation dept. of well established electrical engineers on N.E. Coast. Must be fully experienced and energetic. Perm. post to right man.—Box 9560, c/o The Electrical Review.

CORRESPONDENCE and Sales Order Clerk required for London office. Experience in sales allocation and knowledge of heating trade essential. Write—Box K.72, Wiltings, 362, Gray's Inn Road, W.C.1. 2482

DESIGNER for A.C. and D.C. motors and generators. Works and designing experience with D.C. machines up to 100 h.b.p. essential. Salary according to qualifications and experience. Manchester area.—Box 2438, c/o The Electrical Review.

DOMESTIC appliance manufacturers require Comm. Rep. for East and S.E. London and Essex. Details to—Box 2353, c/o The Electrical Review.

DRAUGHTSMAN, preferably with experience of electrical control gear, required by London manufacturers. Elderly man willing to give part or full time would suit. Full details of experience and salary required to—Box 2399, c/o The Electrical Review.

DRAUGHTSMAN required by manufacturers of Electric Motors in London area. Good prospects for suitable man.—Box 2316, c/o The Electrical Review.

**DRAUGHTSMAN** required for power transformer work. Apply in writing, stating age and experience, to South Wales Switchgear Ltd., Treforest, Glam. 2515

**DRAUGHTSMAN** required for switchgear control work on Cubicle and Flat Back types of A.C. and D.C. Switchboards. Full particulars of experience, technical training and salary required to—Erskine, Heap & Co. Ltd., Lancashire Switchgear Works, Manchester 7. 2339

**DRAUGHTSMAN** required for work on test equipment and measuring instruments. Write, giving full particulars of experience and salary required, to—Taylor Electrical Instruments Ltd., Slough, Bucks. 9513

**DRAUGHTSMEN** required by engineering firm N.W. London area. Applicants must have previous experience in design and development of light electro-mechanical equipment from schematic sketches of specifications and must be able to prepare detailed drawings. Previous experience in tele-communications equipment or small electro-mechanical components an advantage and a knowledge of their electrical application desirable. Write, giving full particulars of past experience, age and salary required.—Box 2496, c/o The Electrical Review.

**DRAUGHTSMEN** required by switchgear engineers. Experienced in contract work, protective gear diagrams or design. Applications in writing, with full particulars, to—Ferguson, Pailin Ltd., Manchester, 11. 86

**DRAUGHTSMEN** required for cable works practice in South Wales area. Write, stating age, experience and salary required, to—Box 2506, c/o The Electrical Review.

**DRAUGHTSMEN** and Improvers, experienced in electrical motor work an advantage, but not essential. Apply, stating age, experience and salary required to Lancashire Dynamo & Crypto Ltd., Personnel Officer, Acton Lane, N.W.10. 2513

**DRAUGHTSMEN** Designers required for Yorkshire, with experience in one or more of the following:—  
(a) Compact gear layouts from 5 to 100 h.p. (b) Plating and structural work for conveyors. (c) Electrical control gear. State age, experience, qualifications and salary required.—Box 2508, c/o The Electrical Review.

**ELECTRICAL Engineer**, age not over 35, required for large modern industrial plant in West Africa. Must be qualified technically and practically in the installation, operation and maintenance of industrial generating plant, switchgear, transmission and distribution equipment, all types of electric motors, factory, office and household appliances and wiring. Salary from £700 per annum, separation and children's allowances married men. Tours of 21 months' duration, free passages, furnished quarters, membership to pension fund. Apply, giving full particulars of training and experience, to—Box 1280, c/o Charles Barker & Sons Ltd., 31, Budge Row, London, E.C.4. 2247

**ELECTRICAL Engineer** for the Trafford Park district, experienced in dealing with contracts, also technical and commercial correspondence relating to all classes of A.C. and D.C. rotating machinery and appropriate ancillary equipment. Write giving full details of experience, age and salary required.—Box 2460, c/o The Electrical Review.

**ELECTRICAL Engineer** with B.Sc. honours and degrees, age 25-30, for light and heavy current engineering. Some experience in mechanical design. Apply in writing to Personnel Manager, Philips Lamps Ltd., 45, Nightingale Lane, S.W.12, stating age, experience, salary reqd. 2480

**ELECTRICAL Engineer**, with sound electrical and mechanical knowledge of equipment and machinery, also overhead line installations, and maintenance. Shares in the company would be considered. State wages required, age and experience, also not less than three references to be accompanied with application, to—H. G. Watkins & Co. Ltd., Electrical and Radio Engineers, The Square, Corwen, Merionethshire, North Wales. 9585

**ELECTRICAL Switchgear Engineers** to serve as Circuit Designers on diagram section. To prepare diagrams, supervise and check draughting of detail diagrams. Senior men with 3 years' recent experience in diagram work, and holding the Higher National Certificate or equivalent qualifications.—Ferguson, Pailin Ltd., Higher Openshaw, Manchester, 11. 2488

**ELECTRICIANS** for installation and maintenance work. Used to screwed conduit work and contactor control gear of all types as used on machine tools. Modern factory, good conditions, canteen, etc. Apply—Labour Officer, Courtaulds Ltd., Clayton-le-Moors, Accrington. 2393

**ENGINEERS** and Draughtsmen are invited to apply to a large electrical engineering firm in the Midlands which has vacancies in the switchgear department for Technical Sales, Contract, Costing and Design Engineers; also experienced Technical Engineers capable of handling large projects for generation, transmission and distribution. Vacancies also exist for Draughtsmen for circuit diagram and general work.—Box 69, c/o The Electrical Review.

**ENGINEERING** and Laboratory Assistants required in engineering dept. of light engineering firm in North London area. Applicants should have the Higher National Certificate in mechanical or electrical engineering and should state salary and experience in full.—Box 2437, c/o The Electrical Review.

**ESTIMATING Electrical Engineer** with experience in preparing quotations for A.C. and D.C. motors, generators and appropriate control gear, etc., and conversant with current B.S. specifications, required for an old-established works in Trafford Park. Write giving full details of experience, age and salary required.—Box 2461, c/o The Electrical Review.

**ESTIMATOR**, knowledge light structural steelwork and sheet metal work, lighting standards, overhead transmission carrying poles. Apply in writing, stating age, experience and salary, to—Poles Ltd., Tyburn Road, Erdington, Birmingham. 2452

**EXPERIENCED Representatives** required by electrical wholesalers for Surrey, Sussex and Hampshire. Own car essential. Remuneration on salary, commission and expenses basis.—Box 9558, c/o The Electrical Review.

**EXPERIENCED Winding Shop Foreman** to take complete charge of f.h.p. winding department. Must be good organiser, practical, energetic and used to modern production methods. To the right man the position offers endless scope and possibilities for advancement. Applicants should be over 35 years of age, preference being given to individuals who have held a similar position for 5 years or more. Reply, giving full details, to—Box 2467, c/o The Electrical Review.

**FIRM** in London area require several Senior Draughtsmen for their transformer dept. Experience on large high-voltage units an advantage but not essential. Very good salary and excellent prospects to suitable men. State age and experience.—Box 2352, c/o The Electrical Review.

**FIRM** of electrical contractors in Scotland requires a Manager. Must be qualified electrical engineer with commercial experience and organising ability. Capable of taking full charge. Excellent opportunity to man of initiative. State full particulars of experience, salary required, and give references.—Box 9526, c/o The Electrical Review.

**FOREMAN Working Electrician** wanted, South Kensington district. Permanent job for suitable man.—Box 2468, c/o The Electrical Review.

**HEATING Sales Engineer** required by firm of electrical heating equipment manufacturers for Midlands area. Sales experience and knowledge of heating/electrical technique preferable. Salary £400/£500 p.a. according to qualifications, plus expenses. Reply with full information to—Box V.58, Willings, 362 Grays Inn Road, W.C.1. 2436

**ILLUMINATING Engineer** required for South Africa. Must be well versed in modern lighting technique, hot and cold cathode fluorescent tubes.—Box 2443, c/o The Electrical Review.

**IMPERIAL Chemical Industries Ltd.** Applications are invited for the position of Shift Charge Engineer in the company's power stations in Runcorn and Widnes. Applicants, who should not be less than 35 years or more than 45 years of age, must have had a sound practical and technical training in mechanical engineering and good experience of the shift operation of modern steam power station equipment, including turbo alternators and water tube boilers of not less than 10,000 kW and 50,000 lbs steam/hour capacity respectively. Generous commencing salary. Applications, which must give the applicant's date of birth and full details of qualifications and experience, including a list in chronological order of posts held, should be addressed to—Staff Manager, Imperial Chemical Industries Ltd., General Chemicals Division, Cunard Building, Liverpool, 3. 2239

**INDIA.** Representative required by important British manufacturers of electrical and radio products. Electrical qualifications and ability to negotiate contracts at high level essential requirements. Knowledge of India an asset. This appointment calls for more than a salesman as it involves the whole implementation of the company's policy in India. Commensurate salary of approximately 1,200 rupees per month and expenses. Liberal touring arrangements. Full details of age, education, qualifications and experience to Box 2450, c/o The Electrical Review.

**INSPECTOR** required by manufacturers of small and medium size A.C. Motors in London area. Sound knowledge of testing and detail inspection essential. Good prospects for suitable man.—Box 2315, c/o The Electrical Review.

**INSTRUMENT Makers** required N.W. London area. Applicants must have considerable previous experience in model making for development of electro-mechanical apparatus and must be capable of working to sketches and instructions in addition to fully detailed drawings. Write, giving full particulars of past experience, age and salary required.—Box 2495, c/o The Electrical Review.

**I**STRUMENT Maker, possessing coil-winding experience, and two I.M. Improvers, for model shop in N.W. Wiltshire.—Box 2440, c/o The Electrical Review.

**I**STRUMENT Makers required for model shop in N.W. Wiltshire. Only men fully skilled on machine and bench need apply.—Box 2439, c/o The Electrical Review.

**I**NTelligent Girl or Boy required for electrical show-rooms (London).—Box 2384, c/o The Electrical Review.

**M**ANAGER required for electrical contractors' business near London. Must be qualified electrical engineer with commercial experience. Apply, stating details of experience, age, etc.—Box 9578, c/o The Electrical Review.

**M**ANAGER or Manageress of good appearance and personality required for high-class electrical and radio retail and art goods business, 30 miles from London. Must be thoroughly capable and able to take full control. Write with particulars, stating age, experience and salary required.—Box 115, c/o The Electrical Review.

**M**ETER Repairer (Mechanic) required. Must be thoroughly experienced in the repairing and testing of all types of quarterly and prepayment meters. No. 9 Area J.I.C. conditions. Wages 2s. 4d. per hour. Applications, with copies of recent testimonials, to—Borough Electrical Engineer, Electricity Offices, Gardiner Street, Gillingham, Kent. 2492

**M**ICHELIN Tyre Co. Ltd., Stoke-on-Trent, require Senior Draughtsman with good experience of installation electric machines, cables, switchgear, L.T. and H.T. Minimum qualification, Ordinary National Certificate. Electrical. Write Labour Office in confidence, stating salary required for 44-hour week. 2302

**O**VERSEAS Employment. Workshop Foreman required to take charge maintenance shops of open cast mine, Gold Coast Colony. Applicants should be prepared undertake supervision maintenance work any part of mine using excavators, conveyors, crushers, electrical generating plant and transport vehicles. Good all-round man essential. Salary £55-£60 per month. Free passages, quarters and medical attention. Adequate leave and kit allowance. Appointment subject to agreement, renewable annually. Write in first instance, giving details age, training and experience, to—Box 2851, c/o Whites Ltd., 72/78, Fleet Street, London, E.C.4. 2475

**P**ROGRESS Clerk required by electro-mechanical shop equipment manufacturers, London area. Experience in similar capacity essential. Commencing salary £260 to £312 per annum, according to experience. Write, giving full details age, experience, in confidence.—Box 2523, c/o The Electrical Review.

**P**UBLICITY Assistant required, age about 30, for engineering company in North West for preparation of catalogues and other technical literature, press articles, and editing of works magazine. Writing ability essential, technical background preferred. Age, qualifications and salary required to—Box 2502, c/o The Electrical Review.

**Q**UALIFIED Electrical Engineer possessing a comprehensive knowledge of electrical installation work in all types of buildings, including factories, hospitals, schools, cinemas, etc., and fully conversant with the recognised wiring systems and all relevant regulations governing this type of work. Must possess knowledge of building construction and be capable of reading architects and engineers' drawings. Able to prepare complete electrical specifications and illumination schemes. Previous experience in a consulting engineer's office or with a leading wiring contractor an advantage. Write, stating age, experience and salary required, to—Box 2835, c/o White's Ltd., 72, Fleet Street, E.C.4. 2435

**Q**UALIFIED Electrical Engineer possessing good personality and initiative. Capable of giving advice in the designing of electrical installations in buildings and fully conversant with all recognised wiring systems and the I.E.E. wiring regulations. Knowledge of building construction an advantage. Write, stating age, experience and salary required, to—Box 2832, c/o White's Ltd., 72, Fleet Street, E.C.4. 2434

**P**LUMBER-Jointer required. Must be thoroughly experienced in high- and low-tension jointing up to 11 kV, and installing feeder pillars, link boxes and substation switchgear. No. 9 Area J.I.C. conditions. Wages 2s. 4d. per hour. Applications, with copies of recent testimonials, to—Borough Electrical Engineer, Electricity Offices, Gardiner Street, Gillingham, Kent. 2491

**P**REECE, Cardew & Rider, Consulting Engineers, 8 & 10, Queen Anne's Gate, London, S.W.1, require an Engineering Assistant in their London office. Qualifications: Age 30 to 40 years, university degree in electrical engineering, general training in electrical and mechanical engineering, and experience with an electricity supply authority. Salary according to qualifications and full particulars. Applications by letter, stating age and full particulars. 2478

**R**EQUIRED for North London district. Armature Winder, used to repair and breakdown work; Maintenance Electrician, used to power installation and general works repairs. Write stating age and experience.—Box 9565, c/o The Electrical Review.

**S**ALES Manager required for controlling sales in the home and export markets by firm in the London area manufacturing domestic electrical appliances. Applicants must be of high standing and have good connections and be capable of handling large turnover. Applicants must be of good appearance and be able to control representatives. Age between 30 and 35. Good salary with excellent prospects. Write stating full particulars to—Box 2451, c/o The Electrical Review.

**S**ENIOR Draughtsman, for London office of leading engineers and contractors, shop apprenticeship, all-round experience power plant and/or boilers, turbines, condensing plant, pipework, modern h.p. systems. Also Senior with experience electrical side of generating stations, substations, switchgear, etc. Education to Higher National standard. State age, salary, all details experience. Travelling expenses refunded if interviewed London. Write—Box 596, c/o Judgs, 47, Gresham St., London, E.C.2, 2444

**S**ENIOR Draughtsman required for large variety of rotating electrical machines of small and medium size. State age, experience and salary required.—W. Mackie & Co. Ltd., 129, Lambeth Road, London, S.E.1. 2310

**S**ENIOR Technical Sales Engineer required for London office of South Wales Switchgear Ltd. Previous sales experience not necessary, but first-class switchgear engineering knowledge essential. Apply in writing, giving full particulars, to—South Wales Switchgear Ltd., Treforest, Glam. 2388

**S**IMPLEX Electric Co. Ltd. require additional Sales Representative for water heating dept., London area. Preference given to applicant with established connection; permanent and progressive position. Apply, stating age and experience, to—"The Director," 217/219, Tottenham Court Road, W.1. 2469

**S**KILLED Armature Winder required for India. £45 per month plus ten per cent. share of Bombay concern's profit. Fare paid out and home after four year period. Must be single man with full tradesman apprenticeship.—Box 2524, c/o The Electrical Review.

**S**UPERVISOR required for electrical contractors' business near London. Must be fully qualified, able to estimate for all types of electrical installations and supervise the carrying out of such work. Apply, stating full details of experience, age, etc., to—Box 9579, c/o The Electrical Review.

**T**IME Study Engineer or Ratefixer with experience of light electrical and/or radio assembly work and small machined parts. Good prospects for a keen energetic man. Slough district. Write, giving full details of training and experience and state age and salary required, to—Box 2526, c/o The Electrical Review.

**W**ANTED immediately, Junior and Senior Draughtsmen, experienced in E.H.T. switchgear layout and/or diagram work.—Box 2442, c/o The Electrical Review.

**W**ELL-known Electrical Engineering Company have vacancies for suitable lads, over 16 years of age, with matriculation or general school certificate, for apprenticeship in the above industry. Good rates of pay and living accommodation provided.—Box 101, c/o The Electrical Review.

**W**ORKING Charge Hand for switchgear assembly, S.W. London. State experience, age, wages required.—Box 2525, c/o The Electrical Review.

**W**ORKING Foreman required to take charge of electric motor fitting and assembly shop. Must be conversant with all types of motors (fractional and upwards), switchgears, etc. S. London district. Write, stating age, exp. and salary required.—Box 9568, c/o The Electrical Review.

**Y**OUNG Sales Engineer required by London manufacturers of electrical control gear. Full details of experience and salary required to—Box 2400, c/o The Electrical Review.

#### APPOINTMENTS FILLED

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

**A**SHINGTON Coal Co. Ltd.—Electrical Engineer; Box 490, c/o Dawson's—Junior Mains Engineer; County Borough of Eastbourne—Junior Mains Draughtsman; Uttoxeter U.D.C.—Junior Asst. All applicants thanked.

#### SITUATIONS WANTED

**A**RMATURE Winder, girl, 22, skilled A.C. or D.C. fractional to 20 h.p., repair or production.—Box 9586, c/o The Electrical Review.

- A** Capable Engineer (36), with managerial and administrative experience, seeks responsible position London area. Fully conversant all machine tools, planning and progress, time study, rate fixing. Salary approx. £750.—Box 9538, c/o The Electrical Review.
- A** good allround Electrician, power and lighting installations, or maintenance A.C. and D.C. Sound knowledge of refrigeration service work.—H. M. Harrison, 120, Abbeville Rd., Clapham, S.W.4. Phone, Macaulay 1645.
- A** young man (25), at present Section Engineer on production of light Diesels in large Midlands factory, desires change of position. Would accept reasonable salary to gain executive experience.—Box 9525, c/o The Electrical Review.
- A** BLE, active and versatile Electrical Engineer (42), sound technical knowledge and wide practical experience, wishes to negotiate for responsible permanency with established concern, central or N. London or S. Midlands. Salary £850/£950 subject to superannuation adjustment. Installations, maintenance, sales, correspondence, technical literature, drawing. Well versed constructional and general engineering. Willing to travel when necessary. Car available.—Box 2422, c/o The Electrical Review.
- A** DVERTISER is desirous of contacting an Electrical Engineering firm, preferably London area with view of obtaining position as Works Manager or equivalent responsibility, have held similar position for several years. Well educated, mechanically and electrically, conversant with modern method, office routine and machine tools for precision work, energetic and strict disciplinarian.—Box 9534, c/o The Electrical Review.
- A** DVERTISER (50), Buyer, stock control, costing, first-class commercial background and organizer, experience all types of electrical supplies and accessories, machine and small tools, metals, steam fittings, available at early date.—Box 9478, c/o The Electrical Review.
- A** .M.I.E.E., A.M.I.Mech.E., age 32, 13 yrs.' experience in design, manufacture and application of electric motors, and in the workshop management of maintenance of diverse mech. and elec. plant, seeks responsible post, home or Dominions, on plant maintenance, works production or technical sales. Available immediately.—Box 9494, c/o The Electrical Review.
- A** .M.I.E.E. (36), with 20 years' manufacturing and development experience, chief draughtsman, dynamo, electric machinery, etc., desires advancement. London or Home Counties preferred.—Box 9521, c/o The Electrical Review.
- A** .M.I.E.E., 40, Asst. Works Engineer, 6 years, 500 personnel, chief electrician 3 years, requires post in sales field or works engineering. Any locality.—Box 9551, c/o The Electrical Review.
- A** .M.I.E.E. (41), ind. app., experienced O.H. and U.G. distribution systems, power stations. Practical, technical and commercial experience electricity undertakings. Situation desired overseas.—Box 9476, c/o The Electrical Review.
- A** RMATURE Winder, working or supervising foreman, seeks permanent and progressive post with large or small repair or manufacturing concern, 25 years' practical experience, A.C., D.C.,  $\frac{1}{2}$  to 900 h.p., used to electrical equipment repairs, also modern mass production methods of motors, etc. Willing to train male or female labour.—Box 9564, c/o The Electrical Review.
- A** SSOCIATE I.E.E., age 46, 5 years' charge factory area maintenance and installation, seeks post Coventry area.—Box 9501, c/o The Electrical Review.
- B** UYER desires change. Experienced all branches elec. and genl. engineering, especially radio and lighting.—Box 9536, c/o The Electrical Review.
- C** HIEF Electrical Artificer demobilised R.N. (27), 13 years' electrical experience, requires position with electrical manufacturer, municipal or civic supply company, N.E. Midland area. Ambitious, energetic worker. References available.—Box 9569, c/o The Electrical Review.
- C** OMMUNICATIONS Specialist, just demobbed after 3½ years' commissioned service in Electrical branch, R.N.V.R., requires job in which 17 years' wide experience this field will be used to best advantage. Experience includes development work on, and installation, operation and maintenance of, marine and aircraft W/T, R/T and D/F gear: high-speed line telegraphy (Creed perforators, column printers, etc.); teleprinters; picture telegraphy equipment; auto telephone and carrier telephony circuits; Asdic, Radar and pulse transmission techniques; modulated light comm. systems. Holds current 1st. Class P.M.G. Certificate and prefers unusual job abroad. Age 34. Minimum salary £600 p.a.—Box 9504, c/o The Electrical Review.
- C** ONTRACTORS, Qualified Manager, N.R.E.I.C., seeks opening, 25 yrs.' exp., London and provinces. Any proposition considered.—Box 9561, c/o The Electrical Review.
- C** HARTERED Engineer with 20 years' experience in all branches of transformer manufacture desires executive position. Will consider consulting work.—Box 9589, c/o The Electrical Review.
- D** PSIGNER Draughtsman, A.M.I.Mech.E., Grad.I.E.E., seeks post leading to position as electrical engineer.—Box 9550, c/o The Electrical Review.
- D** RAUGHTSMAN (26), electrical and mechanical, recently released Fleet Air Arm, seeks suitable position, South or South-West London preferred.—Box 9567, c/o The Electrical Review.
- D** RAUGHTSMAN-Designer, experienced electrical heating design, requires a position in Swansea area.—Box 9499, c/o The Electrical Review.
- E** LECTRIC Cable Manufacturers, Managing Director would accept similar responsible position overseas where ability organise and plan factory and commercial development would have full progressive scope with lucrative prospects. Communicate advertiser.—Box 2433, c/o The Electrical Review.
- E** LECTRIC Wire and Cable Manufacturers, Managing Director of wide technical manufacturing and commercial experience in the industry prepared accept similar position offering development scope and good prospects. Confidential approach to advertiser through.—Box 2432, c/o The Electrical Review.
- E** LECTRICAL and Plastics Engineer, who held the post of chief engineer for many years in an electrical engineering firm and later in a plastics firm, and who is a well-known writer of technical articles on electrical and plastic subjects, requires post as Sales Manager or Assistant Sales Manager, or Publicity Manager. Write to—Box 9477, c/o The Electrical Review.
- E** LECTRICAL Engineer, A.I.E.E., M.A.S.E.R., 25 years electrical contracting, seeks position, state requirements.—Box 9506, c/o The Electrical Review.
- E** LECTRICAL Engineer, B.Sc. Honours, requires progressive position, preferably with manufacturers of l.h.p. motors.—Box 2456, c/o The Electrical Review.
- E** LECTRICAL Engineer (25), Grad.I.E.E., Grad.I.E.C.E., etc., Lower and Higher National Certificates Electrical and Mechanical Engineering. Author of articles, papers, etc., part-time technical lecturer seeks technical and/or commercial sales position in Dublin. Would travel for a British firm.—Box 9505, c/o The Electrical Review.
- E** LECTRICAL Supervisor (43), at present own business as contractor, exp. all branches electrical installation work, estimating, costing, correspondence, as well as practical exp., seeks progressive position as Representative, sales and service, or with factor. Own car.—Box 9469, c/o The Electrical Review.
- E** LECTRICIAN, competent all systems, anywhere, disengaged.—24, Rusham Road, S.W.12. 9515
- E** LECTRO Plater and Polisher seeks responsible post. Age 42, extensive experience Sheffield trade shops as foreman from gold to chrome and hard chrome. Residing Middlesex.—Box 9562, c/o The Electrical Review.
- E** NGINEER, Electrical, Mechanical, seeks change. Wide experience stations, layouts, distribution, motor applications, light, heat, drawing office, public works, etc.—Box 9535, c/o The Electrical Review.
- E** NGINEER, graduate (32), with works apprenticeship, mechanical devices, seeks responsible design position, London area.—Box 9537, c/o The Electrical Review.
- E** X-ARM. Art. R.E.M.E., experienced all types of installations and A.C./D.C. machines, requires position as Maintenance Electrician, London area.—Box 9475, c/o The Electrical Review.
- E** X Electrical Officer R.N.V.R. (33), A.M.Brit.I.R.E.E., C. & G. Finals in communications and tech. elec.; 10 yrs.' civilian exp. maint., radio and sound, 2 yrs. A.M. instr. in communications, 4½ yrs.' Service exp. specialised electro-mech. apparatus, requires suitable position.—Box 9568, c/o The Electrical Review.
- I** NSTALLATION, Supervision, Technical Sales or similar post wanted by qualified Designer. Industrial electronic and audio frequency experience.—Box 9517, c/o The Electrical Review.
- I** NSTRUMENT Maker, 20 yrs.' experience, experimental, maintenance, repair, electrical testing, seeks situation London area. Other districts if housing accommodation can be provided.—Box 9555, c/o The Electrical Review.
- M** AN with 30 years' experience London wholesale trade, dealing with orders and assisting buying, would be glad to hear from interested houses in London and Home Counties area.—Box 9556, c/o The Electrical Review.
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#### AUCTION NOTICES

**TO** Builders and Contractors: Domestic Street, Leeds, Holbeck; Wednesday next, September 18, at 10.30 a.m. James A. Brearley will sell by auction for Messrs. H. L. Reynolds Ltd., who are acquiring new premises, under notice to quit, land being required by Leeds Corporation, their Builders' and Contractors' Plant, Saloon Cars, Shooting Brakes, viz.: 1 3-ton Electric Overhead Crane (approx. 40 ft. span); 1 5-ton Coles Diesel Electric Mobile do.; 1 2-ton Coles Petrol Electric do.; 2 3-ton Steam do. and Rail Track; 12-cwt. Portable Crane; approx. 95 tons 75 and 85 lb. Rail Stock and Crossings; Dennison 40-ton Weigh Bridge, 16' x 18'; 25-cwt. Hoist; Qty. 3 to 5-ton Blocks; 1 to 3 Sheath Blocks; Light and Heavy Steel Winches; 120 Crane Concrete Tipping Skips; New and Secondhand Concrete Mixers; Steam Jacketed Mixers and Pans; Acid Mixer; Portable Stone Breaker; 6 V.Q.B.N. Ruston Diesel Engines (reconditioned); 3 Generator Dynamos, 110 v.; Electric Motors; Dynamos and Switchgear; 100 Battery Charging Sets; Lighting Sets; "International," "Cietrac" and "Case" Engines and Spares; 10-ton Tange Hydraulic Jacks; New Electric Welding Set; Electric Petrol Pump (as new); 3 comp. 1,500-gal. Storage Tank; 500-gal. Petrol Storage Tanks; Diaphragm Centrifugal Pumps; Trailer and Portable Pumps; Lge. qty. 4" Suction and Pressure Hose; Air Receivers; 5 Compressor Drills; Blast Hole Drill Bit. 3 A.P.I.; Steam Electric Heating Convector; Gravity Feed and Mechanical Conveyors; New Rubber Conveyor Belting; Jubilee Wagons; Turntables and Rails; Lister Portable Works Trucks; 20 Works/Greenhouse Heating Boilers; 8 Steel Huts with sliding doors (48' x 36' to 144' x 36'). Lge. qty. Steel Sections and Roof Trusses; Steel Tubing and Scaffolding; Lge. qty. 6", 10" and 20" Steel Tubes and Fittings; Clips. Pipes; Reinforcing Rods; Steel Strip; Lge. qty. Galv. Piping; Reinforcing Rods; Steel; Chemical Lavatories (as new); 20 new Storage Bins; 5 Utility Shooting Brakes (brand new bodies); 1936 Dennis 14-str. Workman's Bus with lge. compartment; 1929 Hudson 22-h.p. Saloon; Fordson Wagons and Tractors; Qty. Rubber-tyred Wheels. Also Office Lino., Safe, and other miscellaneous items too numerous to detail. On view any day prior to sale during business hours. Auctioneers: Boro' Mart, Halifax (Tel. 4408). 2406

By direction of the Ministry of Works.

LEACON BRIDGE DEPOT,  
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On view Tuesday and Wednesday, 17th & 18th September.

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

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**A.C.** and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Mill Road, East Dulwich, S.E.22 (Forest Hill 2278-9). 102

**A.C./D.C.** 5-valve Superheterodyne Sensitive 3-watt Band Receiver. Excellent tone. Attractive modern cabinets in "Plastele" or polished wood, £16 16s. Usual trade terms and facilities. Early delivery. Trade only.—Morgan, Osborne & Co. Ltd., Southview Road, Wargham, Surrey. 110

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**ELECTRIC** Motors, etc. We supply all types and sizes, etc., of electrical machinery. Send your enquiries to—Be Engineering, 3, Retreat Close, Kenton, Middx. Wordsworth 4928. 42

**ELECTRIC** Motors, 1/3 h.p., 3,000 r.p.m., D.C. 110 volts. Also 220 volts. Stock delivery, £8 each.—John Steel, Clyde Mills, Bingley, Yorks. 84

**ELECTRIC** Welding Plant, Engine and Electric, A.C. driven, 300 amps. output, complete with weather-proof covers.—Box 34, c/o The Electrical Review. 18

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**1** Force-driven Fan, complete on stand, 12.5-h.p. motor direct coupled, 750 r.p.m., 440 volts, 3-phase, 50 cycles, with starter; 1 Endless Leather Belt, 5½" × 10" × 1½"; 1 M.G. Set by G.E.C. motor, 7.5 h.p., 960 r.p.m., 440 v., 3-phase, 50 cycles, complete with starter, overloads, etc., flexibly coupled to generator, 250 volts, 4 kW, 940 r.p.m., all mounted on bedplate; 1 2½ Oldham & Brookes Centrifugal Pump, 1,425 r.p.m., 66 g.p.m., 25" head, mounted on cast-iron bedplate, shaft extended with half coupling; 1 Exhaust Fan, 1-phase, 250 volts, 12" diameter, wall mounted, complete with propeller; 1 5-h.p. Motor, 400/440 volts, 3-phase, 50 cycles, 940 r.p.m., slide rails, starter and pulley; 1 10-h.p. Motor, 400/440 volts, 3-phase, 50 cycles, 940 r.p.m., slide rails, starter and pulley.—Box 2478, c/o The Electrical Review.

**1** Laurence Scott, 15 h.p., 400/3/50, totally enclosed Motor on slide rails, complete with Leonard starter with thermal overloads; 1 Lancashire Dynamo & Crypto 12-h.p., 348/3/50 Motor, complete with Met-Vic heavy duty starter with coil overloads, almost new.—Box 2350, c/o The Electrical Review.

**5** to 20 kW D.C. and A.C. Petrol & Diesel Generating Sets, some packed for shipment.—Box 87, c/o The Electrical Review.

**5** kW and 2½-kW, 230/250-volt D.C. Generating Sets, complete with 4-cylinder, 10-h.p. Austin Engines, with petrol tanks, radiators, fans and switchboards. Large number available.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 103

**6** ½-h.p., 400/3/50 Motors, 300 gross yds. of P.V.C. Systoflex Art Silk Covered, assorted sizes, 7s. 6d. per gross yds.—H. Carpenter, 36, Wellington Road, Wokingham, Berks. 9591

**20** nator with exciter, coupled on bedplate to Coventry Climax Godiva petrol engine, complete with switchboard (4 sets available).—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 2359

**25** h.p., 710-v. p.m. English Electric Motor, 400/50/3/5 D.P. squirrel cage, ball and roller brg.—M. C. Bignell, Frays Mill Works, Uxbridge (Tel. 861). 2447

**100** kW D.C. Steam Generating Set, Belliss & Morcom engine coupled to Crompton 480-volt generator, with static balancer for 220 volts, built 1925.—Red Bros. (Engineering) Ltd., Bevis Marks House, London, E.C.3, 2367

**220**-volt, single-phase Blowers, complete with starters by Thermal Engineering.—T. Porter & Co. (Salford) Ltd., Waste Works, Salford, 5. 9587

**250** kW Rotary Converters (2), with transformers and switchgear, input 6,600 volts, 3-phase, 50 cycles, output 420/210 volts; also A.C. and D.C. Motors, Switchgear, Generating Sets, Welders, etc.—Midland Counties Electrical Engineering Co. Ltd., Grice Street, Spon Lane, West Bromwich. 36

**350** lbs. D.S.C. 35-gauge and 170 lbs. 35-gauge Enamelled Wire.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 2360

**110**-volt D.C. Motors, and Motor Pumps, 1 to 7 h.p., in running order; can be seen in Gainsborough district. Reasonable prices. Full details—A.E.C., 2, Henrietta Street, W.C.2 (Tem. 2708). 2474

**500** Electric Motors, Dynamos, Transformers, Converters, etc., etc., at low prices.—S.C. Fishly, A.M.I.C.E., A.M.I.E.E., Crosswells Road, Langley, near Birmingham. Phone, Broadwell 1359. 21

**525** kW Hewitt Mercury Arc Rectifier, input 6,300 v., 3 ph., 50 cycles, output 500 v. D.C. Further details on application to—Box 2490, c/o The Electrical Review. 41

**600** amp., 8/12-volt Plating Set, motorised 400/3/50, unused, complete with starter and voltage regulator.—Electric Machinery Co., Union Street, New Islington, Manchester. 41

**600** v. Spiral Elements, 230 v., ex stock, surplus from order, 5½d. ea. Sold in 1,000 lots. Electric Heating Pads, 15" x 18", 30s. each wholesale.—Middlesex Electron Co. Ltd., Molesey 3541. 9454

**1,000** c/o Bakelite 3" Screw Lamp-holders.—Box 2537, c/o The Electrical Review. 2105

**1,000** kVA G.E.C. Transformer, 6,600/400 volts, new 1940. Offers to—British Pressed Panels Limited, Quinton Road, Coventry. 2448

**2,000** yards 4 core circular 23/36 flex, black and white (cotton).—Criterion Electric Ltd., Mount Pleasant, Alperton, Wembley, Middx. 2498

**10,000** yds. P.V.C. 7/029 Twin Braided Flat Cable, new, 100-yd. coils, £30 per 1,000 yds.—Smith & Hammond Ltd., 5, Buckingham Street, W.C.2 (Temple Bar 5063). 2486

#### ARTICLES WANTED

A number of slow speed 3-phase, 15-80-h.p. Motors, suitable for operation on 400-420 volts. Protected slip-ring preferred, but not essential.—Box 2518, c/o The Electrical Review. 2105

A.C./D.C. Motors wanted urgently, all sizes and voltages. Best prices offered.—John Phillips & Co. (Electrics), 31, Fortune Green Road, N.W.6 (Park 4722). 2539

APPROXIMATELY 80 Thermal four-pin plug-in type Starting Switches for 80-watt fluorescent lamp fittings.—Box 2366, c/o The Electrical Review. 2105

CELLULOSE Acetate Offcuts urgently wanted. Send samples and prices to—Box 107, c/o The Electrical Review. 2105

ENAMEL- or Silk-Covered Wire, 21½, 22 and 24 s.w.g. In small or large quantities. Good prices paid.—Runbaken Electrical Products, Manchester, 1. 2420

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

MERCURY (Quicksilver) wanted. Write for packing instructions. Gold, Silver and Platinum also purchased.—Collingridge & Co. Ltd., Riverside Works, Riverside Road, Watford (Tel. 5963). 20

REQUIRED: Mica Electric Iron Elements; Toaster Elements; Spirals, nichrome wire; Cotton-covered Flexes; Brass, Copper and Steel Sheets, min. size 9" x 6".

Alu. Strip, 3" x ½"; Machinery, new and used; Timber; Glazing; Rubber Grommets; Asbestos; Switches; Iron Connectors, etc., etc. Offers to—British Diamix Ltd., Metrum Works, Beatty Street, N.W.1, Euston 5951. 44

TWO Geared Electric Motors, 1 h.p., 400 volts, 3-phase, 100 r.p.m. (or near).—E.P.R., 15, Clerkenwell Green, E.C.1 (Phone, Cle. 4019). 9571

URGENTLY required, Two Motor Generators; motor 3-phase, 230/400 volts, 50 cycles, with automatic star delta switch; generator, single-phase, 80-220 volts, 400 cycles, rating 10-12 kVA. Also one 115-volt, 3-phase, 400-cycles, 1,000-watts Generator, and one engine-driven generator, D.C. field, 20 volts, 3 amps., 1,200 watts, 1,600-2,400 cycles, output 80 or 115 volts, single-phase.—Box 2368, c/o The Electrical Review. 2105

URGENTLY wanted, 3,000-kW A.C. Turbo Set to pass out 30-lbs. pressure.—Box 2504, c/o The Electrical Review. 2105

WANTED, D.C. and A.C. ball-bearing Motors. Full details to—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 29

WANTED immediately, Open Cage, 15-h.p., 3-phase, 440-volts Electric Motor, approx. 1,000 revs., complete with Starting Box.—Box 2493, c/o The Electrical Review. 2105

WANTED, Rotary Converters, any size.—Universal, 221, City Road, London, E.C.1. 22

WANTED to be constructed, a Wind-driven Electric Power Plant to light a 10-ton sailing yacht. For particulars write—Box 2357, c/o The Electrical Review. 2105

WANTED urgently for export, one 50/75-kVA, single-phase Alternator, 220 volt, 50 cycle, 1,500 r.p.m., with exciter and voltage regulator. State price and particulars to—Box 2358, c/o The Electrical Review. 2105

1 and 2-h.p. Elect. Motors, 400/440 v. A.C. Details to—C.S. Ltd., Staffa Road, E.10. 2426

1-h.p., 230-v. A.C. or D.C. Motor.—Universal Electrical, 221, City Road, London, E.C.1. 25

5-h.p., 3-ph., and 4-h.p., 400-volt, 3-phase, 50-cycle Motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 2321

15-h.p. and 20-h.p. (or nearest), 3-phase, 400-volt, slip-ring Motors and Starters.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 2320

400 3/50 squirrel cage Motors, 3 h.p. (3), at 720 r.p.m., 7½ h.p. at 720 r.p.m., 10 h.p. at 960 r.p.m. New or good secondhand.—Fyle, Wilson & Co. Ltd., Bishop's Stortford. 2510

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MACHINING Work, for Centre Lathes up to 6½ in. centres and medium-sized milling (good grade work preferred).—The London Electric Firm, Croydon, Uplands 4871. 56

NEON Sign Glassware. Trade service, repairs, repumping, re-electroding, bell glasses and accessories. Prompt service.—Neon Illumination Service, 26, Watford Road, Leicester. 9482

NICKEL and Chrome Plating, large capacity output. Bulk quantity inquiries invited. Send full requirements and, if possible, samples to—I.E.I. (N.I.) Ltd., Lower Lodge Factory, Flax Street, Belfast, Northern Ireland. 82

PORTSMOUTH. Electric Motor repairs, rewinds and conversions, ½ to 15 h.p., all types. Good deliveries, all work tested to relevant clauses of British Specifications.—Motronics Limited, Havant Road, Farington. 9519

REWINDS: 1/10 to 10 h.p. Armatures, Stators and Rotors. All types of redesigning done. All work guaranteed.—Zephir Appliance Co., 89, Hoe Street, Walthamstow, E.17, Lar. 6005. 9572

SHOT Blasting, Metal and Paint Spraying. We are able to undertake the efficient and prompt handling of all goods sent for treatment. Large capacity available. Enquiries to—Commercial Structures Ltd., Staffa Works, Staffa Road, E.10. 112

TRANSFORMERS, 5 VA/5 kVA, coil winding, light assembly, immediate deliveries.—The Transformer & Electrical Co. Ltd., Eastern Road, London, E.17. 91

AGENCIES required for London, South of England, for the following: (1) Domestic electrical appliances; (2) Brass electrical accessories, switch plugs, etc.; (3) Conduit. Advertisers have clientele with every wholesaler in the territory mentioned. Immediate turnover can be guaranteed. Either commission or buying basis. Post-war arrangements considered.—Box 64, c/o The Electrical Review. 2105

AGENT required for Northern Ireland on commission basis for Lighting Fittings, etc. Ship Fittings a speciality.—Box 2449, c/o The Electrical Review. 2105

**AGENCIES** required by Rex Lighting & Radio Co. at 246a, King Street, Hammersmith, W.6. Tel. Nos. Riverside 2263-4. New showrooms offer excellent opportunity to display first-class domestic, electrical and radio products of every description. 2195

**AGENCIES** required, South of England, including the London area: (a) Cables; (b) Small Switchgear; (c) Transformers; or any lines suitable for distribution for wholesalers' business.—Box 40, c/o The Electrical Review.

**AGENTS** wanted everywhere to sell direct to the retail trades Electrical Floor Standards, Pendants and Shades. Would consider permanent agencies.—Box 9421, c/o The Electrical Review.

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**MANUFACTURERS' Agents**, with offices London and South Coast, wish to hear of additional lines, including Cables and Domestic Appliances, for sale to corporations, wholesalers, retailers.—Box 9376, c/o The Electrical Review.

**MANUFACTURERS' Agents** with thirty years' knowledge of trade, wish to represent one or two firms of repute in Midlands.—H. Crisp & Co., Royal Chambers, Bridlesmith Gate, Nottingham. 9575

**MANUFACTURERS** of high-class lampshades and domestic heaters, are looking for established agents to call on wholesalers for the following counties:—London, Lincolnshire, Berkshire, Staffordshire, Buckinghamshire, Shropshire, Herts, Derbyshire, Bedfordshire, Kent, Norfolk, Sussex, Suffolk, Hants.—Box 2514, c/o The Electrical Review.

**TWO** young men going to New Zealand October require agencies for Household Electrical Appliances, etc.—Box 9553, c/o The Electrical Review.

**BUSINESS OPPORTUNITIES**

A well-established Rewinding Specialist in West of England desires to contact an engineering firm with view to becoming a subsidiary.—Box 9511, c/o The Electrical Review.

**SCEMCO Ltd.**, Fluorescent Lighting Specialists, wish to contact manufacturers of electrical equipment and accessories, including "Novelty" and "Improved" appliances. Domestic fluorescent fittings and components of particular interest. When possible complete output will be taken, and full co-operation given in exchange for sole distribution rights. Replies will be treated with strictest confidence.—Man. Director, Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. 2243

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**ENGINEER**, University and A.M.I.E.E., works, sales and administrative experience, late Lieut.-Commander R.N.V.R., age 33, seeks position as assistant to Director of well-established concern, with ultimate view to taking financial interest.—Box 2541, c/o The Electrical Review.

**PATENT NOTICES**

**PATENT Agents**.—A. E. Hill, Chartered Patent Agent, 27, Chancery Lane, London, W.C.2. Tele. Chancery 8444. 65

**BUSINESSES FOR SALE AND WANTED**

**UNIQUE** opportunity for energetic qualified Electrical Engineer with £4,000 capital to acquire old-established London business from owner wishing to retire. Good prospects for further development. Reply by letter (in confidence) for interview to discuss details.—Box 2348, c/o The Electrical Review.

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**COMPANY MEETING**

**THORN ELECTRICAL INDUSTRIES**

**Transition Problems**

**THE** Annual Ordinary General Meeting of Thorn Electrical Industries Limited was held on 6th September in London.

Mr. Jules Thorn (Chairman and Managing Director) said that the year's results reflected to a certain extent the problems of change-over from war to peace-time production, a process which was by no means complete.

Overcoming all obstacles, their lamp factories had increased their output, a trend which was being maintained this year. A great deal of effort had been put into their new factory in South Wales which should begin to produce results. The outstanding quality of their lamps, the efficient sales organisation which they had built up over years and their large scale advertising had already established Atlas Lamps in the forefront of the lighting industry. Further expansion of production in the fluorescent lighting field would help to consolidate that position.

Their lamp-cap factory, as he had reported to them in the past, had been built up under difficult conditions, and he was glad to tell them that they were now transferring it to their own freehold land in Enfield. That had only been acquired since the closing of their accounts, and would not figure in the balance sheet until March, 1947.

The Ferguson Radio factory, which in the current year had been merged with their organisation, had had a very serious problem of reconversion owing to the fact that it had been entirely on war work. That factory had, apart from restarting its radio production, carried out development work on television receivers which they expected to market in the near future. They had also taken on the manufacture of their popular "Mary Ann" domestic electric appliances and had planned further to extend its range of products in that field.

The net profit of the company and its subsidiaries for the year amounted to £27,742. They recommended a dividend of 20% on the Ordinary shares.

The report was adopted. 2531



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## EDUCATIONAL NOTICES

## LONDON COUNTY COUNCIL

**E**VENING Classes in Electrical and Mechanical Engineering commence at the following Technical Institutes on 23rd September, 1946. Institutes open for enrolment from 16th September, 1946.

Hackney Technical Institute, Dalston Lane, E.8 (Tel. AMHerf. 0029).

Paddington Technical Institute, Saltram Crescent, W.9 (Tel. LADbrcke 1397).

School of Engineering and Navigation, Poplar High Street, E.14 (Tel. EAST 3161).

South-East London Technical Institute, Lewisham Way, S.E.4 (Tel. TIDeway 1421).

Wandsworth Technical Institute, Wandsworth High St., S.W.18 (Tel. BATtersea 2356).

**E**NGINEERING Careers and Qualifications. Both Government and industry have announced and emphasised that young men with technical knowledge and qualifications must receive every chance of rising to the highest posts within their capacity in post-war engineering and allied industry. Write to-day for "The Engineer's Guide to Success"—200 courses—free—which gives particulars of the first-class training supplied by the T.I.G.B. for the A.M.I.E.E., A.M.Inst.C.E., A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., B.Sc.(Eng.), C. & G., etc., examinations in which T.I.G.B. home-study students have gained 44 first places and over 1,000 passes. The Guide covers careers in all branches, Electrical, Mechanical, Radio, Aeronautical, etc.—The Technological Institute of Great Britain, 35, Temple Bar House, London, E.C.4. 77

**L**ATEST A.M.I.E.E. Results. In the recent examinations held by the Institution of Electrical Engineers 477 candidates sat who had taken B.I.E.T. courses. Of these 457 were successful in passing the examinations. We believe this record of 457 successes out of 477 entrants has never before been approached by any oral or correspondence tutorial organisation, and indicates the very high efficiency of the modern system of technical training which we have laid down. The B.I.E.T. tutorial organisation is waiting to assist you either with a short specialist course or complete training for a recognised examination. We have available a large full-time staff of instructors, while the efficiency of our extensive organisation is a byword among engineers. We guarantee—"No pass—no fee." May we send a copy of "Engineering Opportunities"? Containing a great deal of useful advice and detailed information on over 200 home-study courses and examinations, this handbook is of very real value to the ambitious engineer. Our highly informative handbook will be sent free and without obligation on request.—British Institute of Engineering Technology (established 1927—over 200,000 students), 12, Shakespeare House, 17, 18 & 19, Stratford Place, Oxford Street, London, W.1. 33

**P**LASTICS offers particularly good prospects to experienced Engineers with a sound knowledge of Plastics Technology. Authoritative home-study courses are now available in General Plastics and specialised branches of the science. Full details of these courses and the prospects in the rapidly expanding plastics industry will be found in our handbook, "Opportunities in Plastics," sent free on request.—British Institute of Plastics Technology (Dept. 301), 17, Stratford Place, London, W.1. 2854

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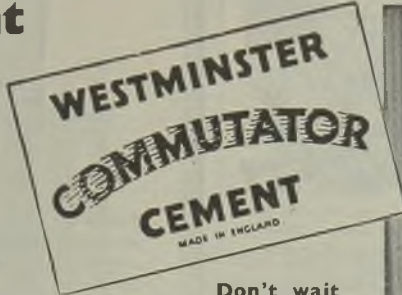
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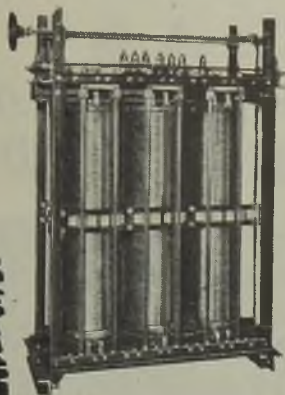
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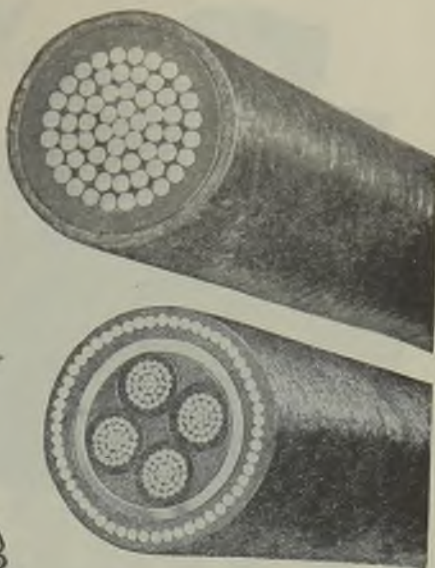
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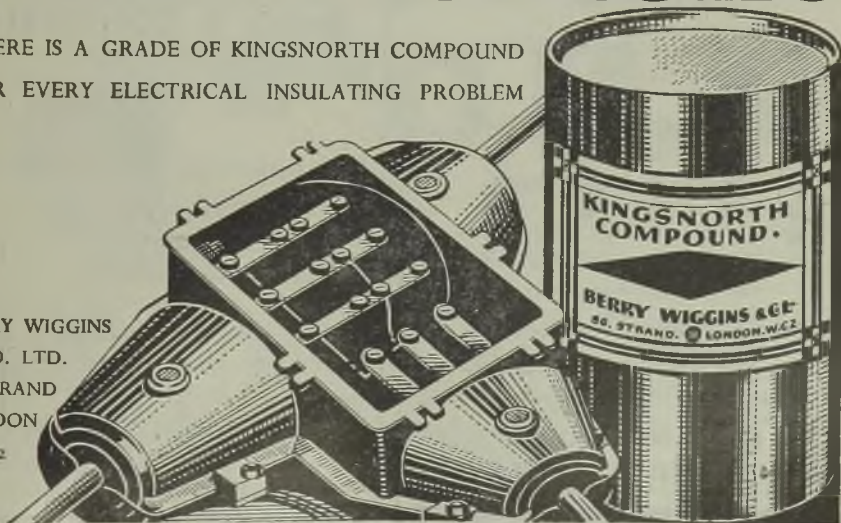


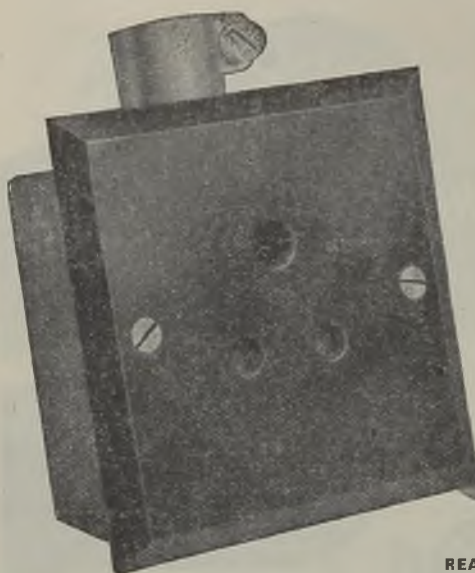
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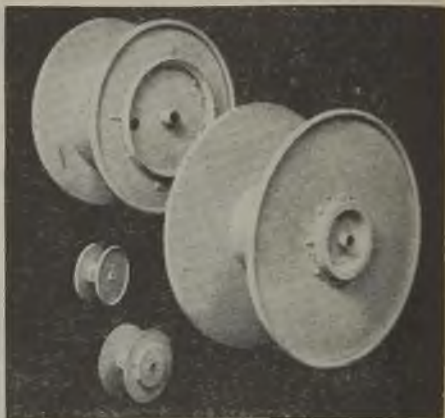
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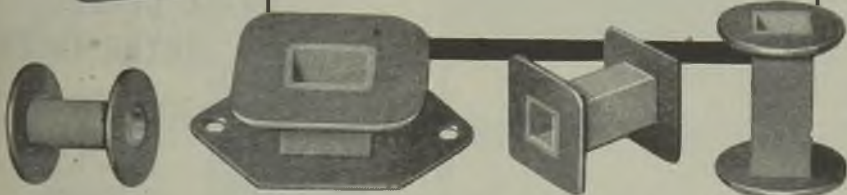
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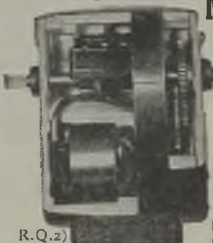
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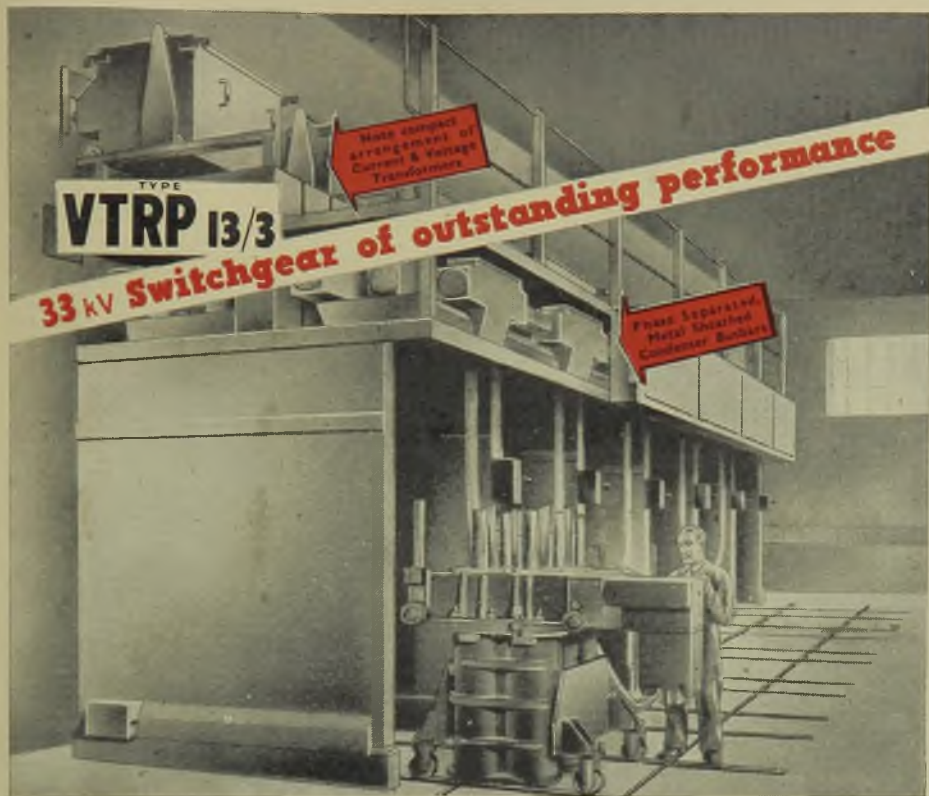
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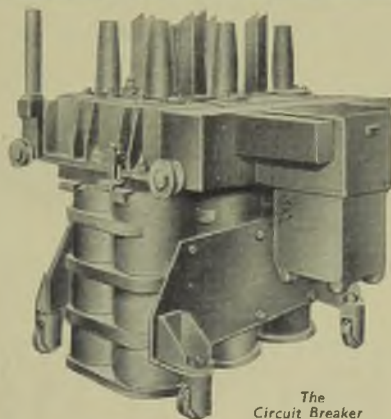
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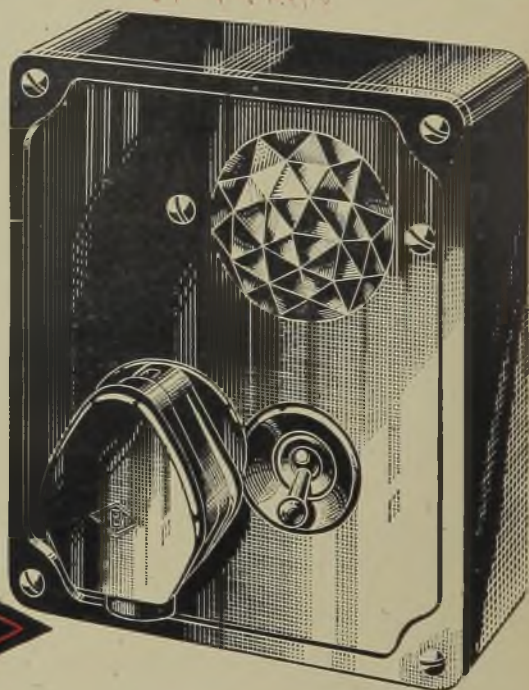
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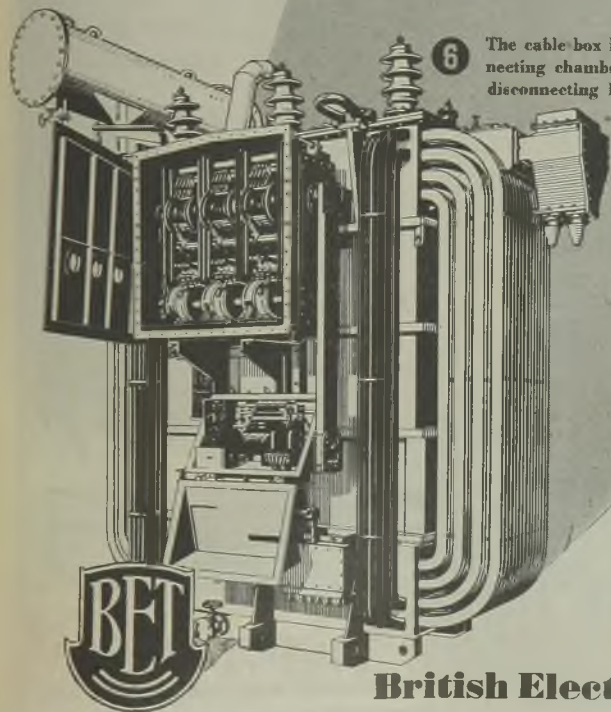
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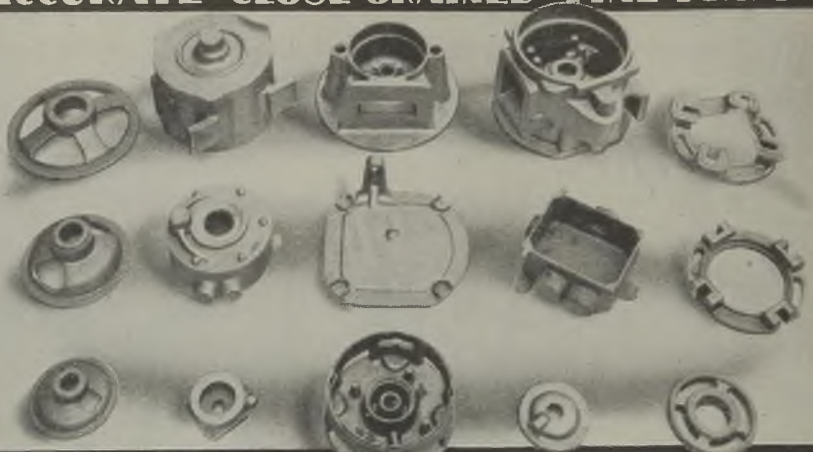
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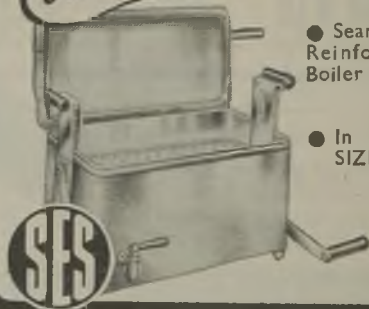
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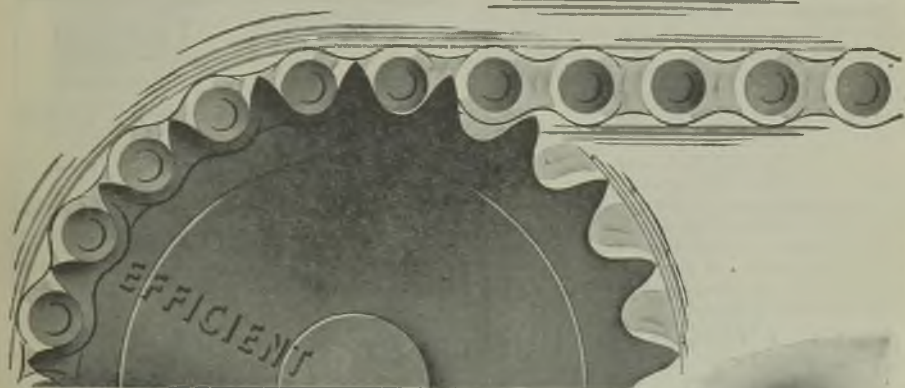
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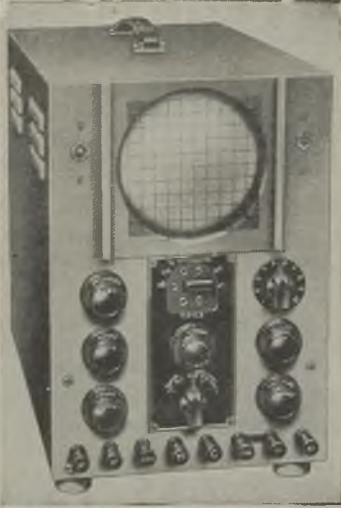
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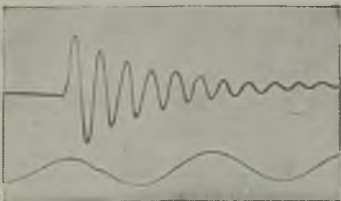
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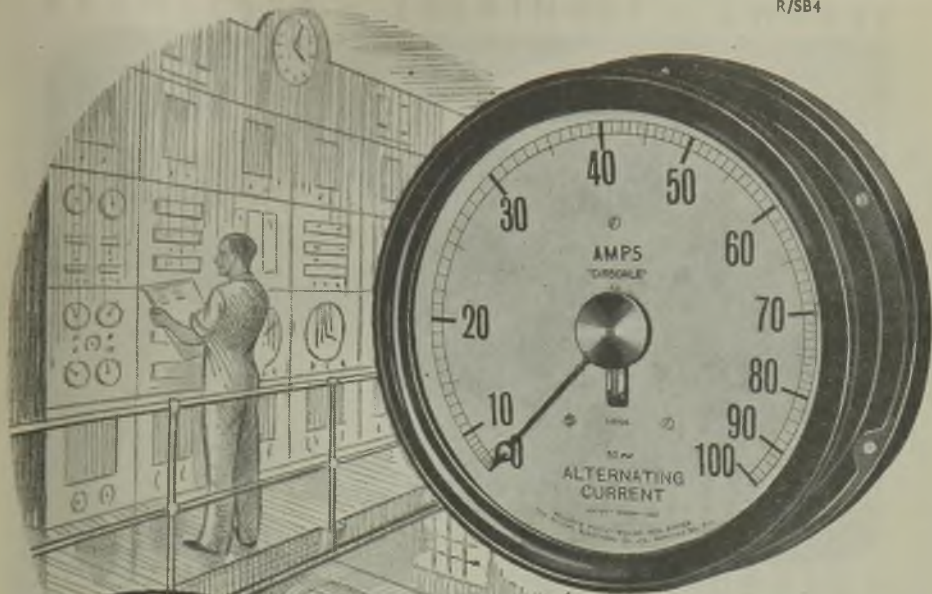
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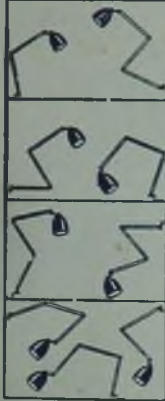
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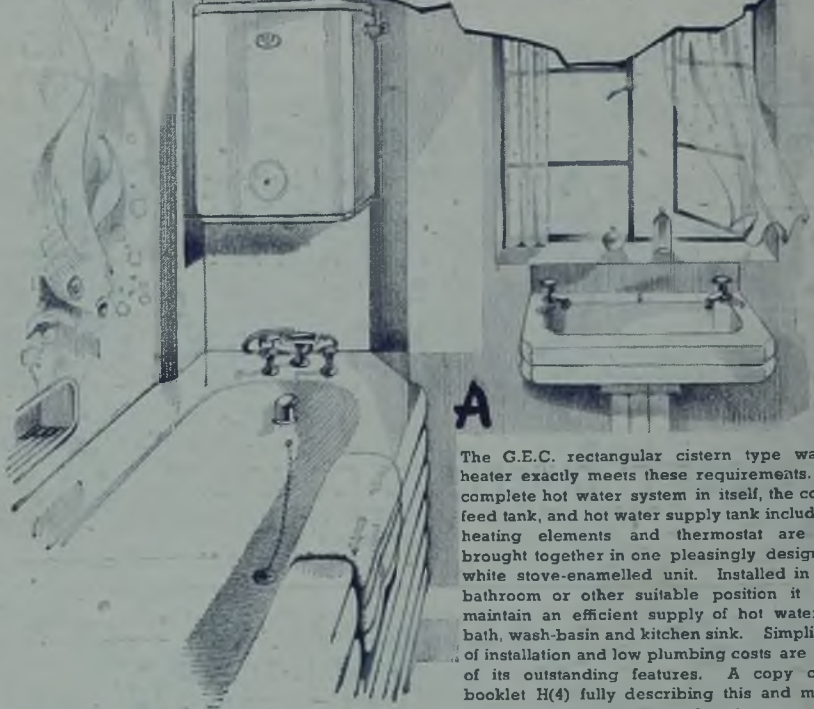
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