

ELECTRICAL REVIEW

VOL. CXLIII

5th NOVEMBER, 1948

NO. 3702

2444/II
CW

P. 58/48/II



23

In all ages, the finest recompense for thorough workmanship put into the making of an article is the satisfaction given to the user.



GEORGE ELLISON
LIMITED
PERRY BARR BIRMINGHAM 22B



A. S. C. M. STEEL CONDUIT

is made by:—

ALMA & CRANMORE TUBE CO. LTD

BARLOW, H. J. & CO. LTD.

ELECTRICAL CONDUITS LTD.

GENERAL ELECTRIC CO. LTD.

GRIFFITHS, ISAAC & SONS

HILDICK & HILDICK

McDOUGALL, JAMES LTD.

METALLIC SEAMLESS TUBE CO. LTD.

MONMORE CONDUITS LTD.

SIMPLEX ELECTRIC CO. LTD.

Comprising :

Credenda Conduits Co. Ltd.

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STEEL TUBE & CONDUIT CO.
(Middlesbrough) LTD.

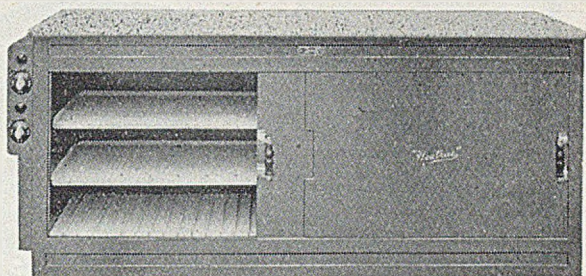
TALBOT-STEAD TUBE CO. LTD.

TIPPER BROS. (Bilston) LTD.

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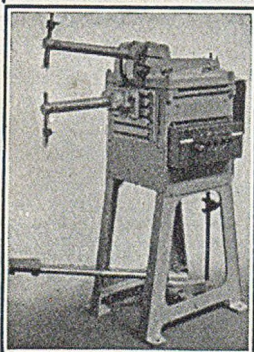
The Versatility of *Heatrae*



Whatever the purpose, Heatrae gives of its *best* in design and construction to ensure that electricity gives of its best in service. A typical instance is this Electrically-heated Hot-Cupboard—a worthy example of the art of Heatrae in doing all things exceedingly well.

HEATRAE LIMITED · NORWICH · ENGLAND

WE MAKE
ELECTRIC WELDING MACHINES



**SPOT, SEAM
AND BUTT
WELDERS**

45 years' experience

Automatic or Non-Automatic
With or without
Electric Control

The quickest and most economical method of Welding Oil Drums, Bars, Tyres, Wheel Rims, Tubes and Angles.

11 kVA Spot welder

Also manufacturers of "Westminster" Patent Scaling Machines.

The WESTMINSTER ENG. Co. Ltd.

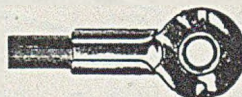
Victoria Road, Willesden Junction, N.W.10

Dynamos, Motors, Alternators & Transformers Rewound and Reconstructed. "Westminster" Brush Holders. Process Arc Lamps.

Telephone: Elgar 1372 (2 lines)

Telegrams: "Regency, Phone, London."

THE "FACILE" TERMINAL



Send for Prices and List of all kinds of Terminals

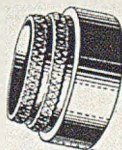
ROSS COURTNEY & CO. LTD.
ASHBROOK ROAD, LONDON, N.19

STEEL CAPS



to the specific requirements of our customers

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



M.C.L. AND REPETITION LTD
POOL LANE · LANGLEY · BIRMINGHAM
Phone: BROadwell 1115 (4 lines) and BROadwell 1757

“I’ve left
it to
LORIVAL”



L6

“Great idea that of Lorival’s — to make it in plastics! . . . No need to worry more about it now.”

Our plastic and ebonite moulding service is at present restricted to export and essential products. Our productions include parts for batteries, radio sets, water meters and sanitary

ware for *EXPORT* and mouldings for textile machinery, miners’ lamps and electrical equipment for *ESSENTIAL* industries. If you are a manufacturer concerned with the ‘two E’s’, our service — the design, tooling and quantity production of high quality mouldings — is at your disposal.



LORIVAL PLASTICS

UNITED EBONITE AND LORIVAL LIMITED, LITTLE LEVER, NEAR BOLTON, LANCs

"The Yardstick of Good Lighting"



FLUORESCENT LAMPS

in

Length	Watts	Diam.	Cap.	List★ Price	
5 ft.	80	1 1/2"	B.C.	15/6	} Natural Warm White or Daylight
4 ft.	40	1 1/2"	Bi-Pin	14/-	
2 ft.	40	1 1/2"	Bi-Pin	13/-	
2 ft.	20	1 1/2"	Bi-Pin	12/6	} Natural or Warm White
3 ft.	30	1"	Bi-Pin	13/-	
1 1/2 ft.	15	1"	Bi-Pin	11/6	

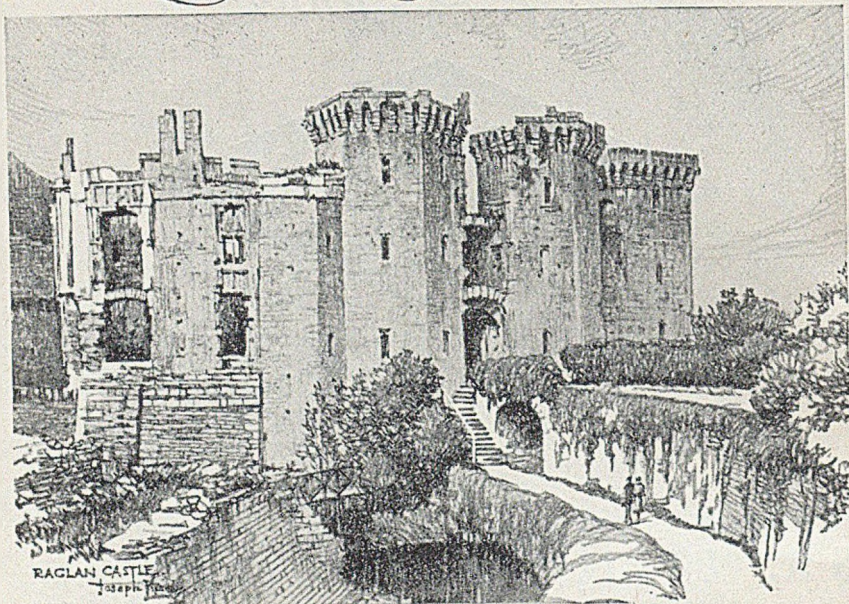
★ PURCHASE TAX EXTRA

Catalogue No. 987 giving full particulars of Sieray Fluorescent Fittings and Control Gear sent on application

A SIEMENS *Quality Product*

Advt. of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38/39 Upper Thames Street, London, E.C.4
Branches at-Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield,

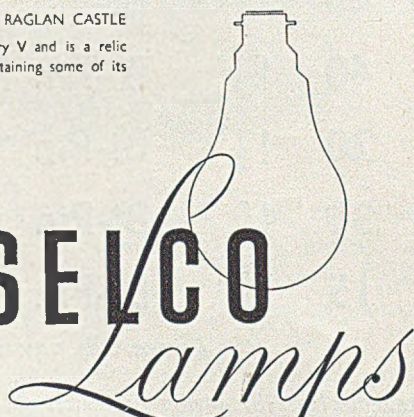
Landmarks of Britain



RAGLAN CASTLE

Founded in the reign of Henry V and is a relic of a splendid Tudor Palace retaining some of its old fortifications

CRYSELCO



Lamps

MADE IN ENGLAND

FIFTY YEARS OF
QUALITY & SERVICE

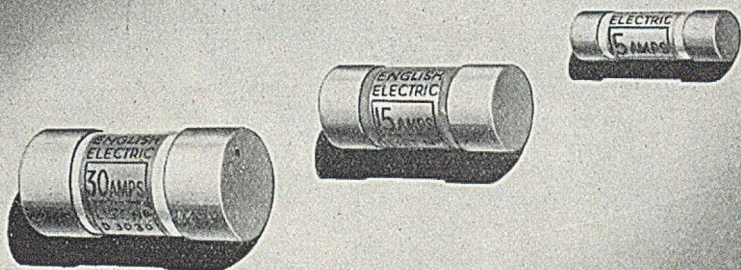
Branches

- | | | | |
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| BIRMINGHAM | BURY ST EDMUNDS | LEEDS | LONDON |
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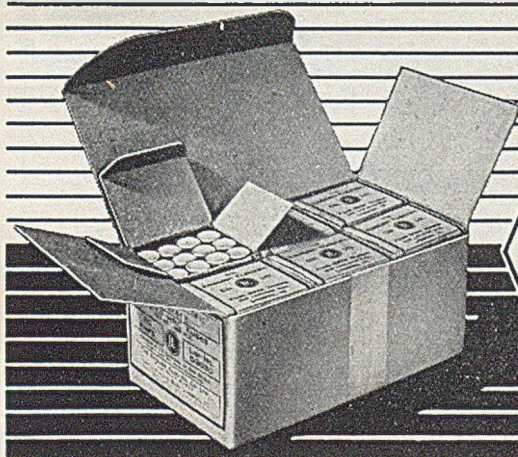


CRYSELCO LIMITED, KEMPSTON WORKS, BEDFORD

'ENGLISH ELECTRIC'



Domestic CARTRIDGE FUSE LINKS



FOR
HOUSE SERVICE UNITS
AND
KITCHEN CONTROL UNITS

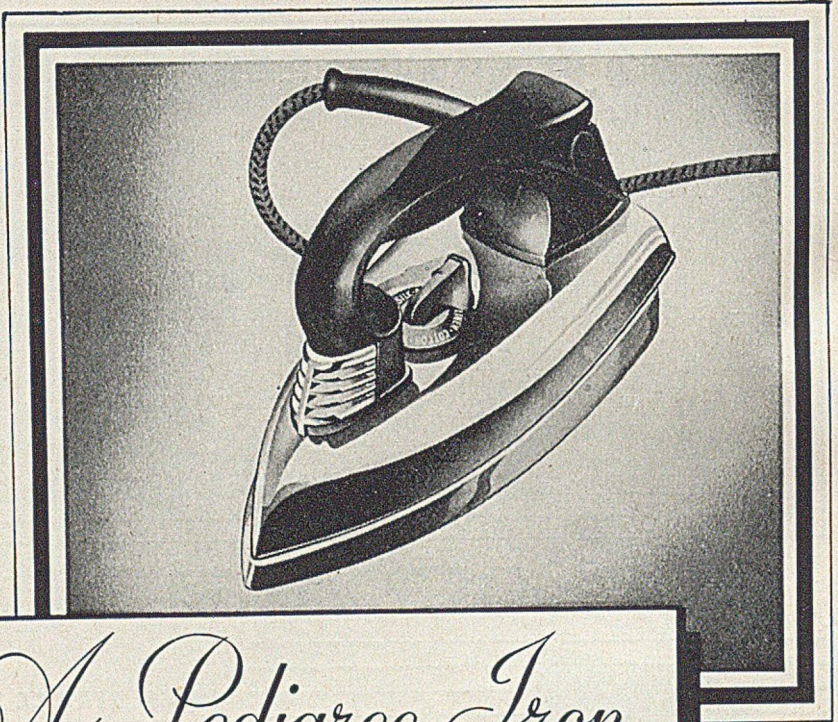
PACKED IN CARTONS CONTAINING
TWELVE CARTRIDGE FUSE LINKS
ALSO PACKAGES OF TWELVE CARTONS,
SEE ILLUSTRATION

A.S.T.A. CERTIFIED
FOR COMPLIANCE WITH
BS. 1361

NOW AVAILABLE EX STOCK OR SHORT DELIVERY FROM:—

THE ENGLISH ELECTRIC CO. LTD
FUSEGEAR WORKS—EAST LANCASHIRE RD., LIVERPOOL, 10

Works also at STAFFORD · PRESTON · RUGBY · BRADFORD



A Pedigree Iron

Premier maintain a tradition of fine workmanship and beautiful design which places their productions on a plane above all others. That is the chief reason why their electric appliances are in constant demand.



PREMIER

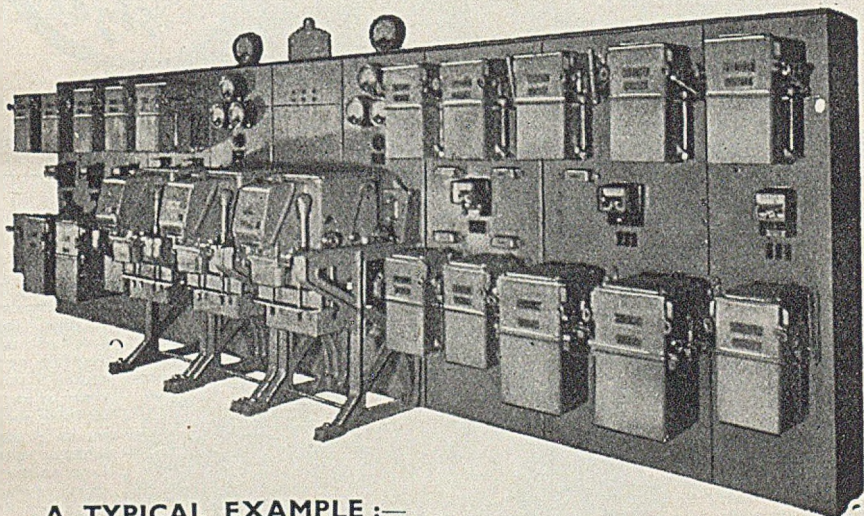
FINE-QUALITY APPLIANCES

**ELECTRIC HEATERS LTD.
BIRMINGHAM 9**

INSPIRE CONFIDENCE BY INSTALLING



SWITCH AND
CONTROL GEAR



A TYPICAL EXAMPLE:—
D210 SWITCHBOARD

This 660 volt oil-break switchgear
ranges from 100 to 1,600 amps.



M. & C. SWITCHGEAR LTD.

KELVINSIDE WORKS, KIRKINTILLOCH, GLASGOW

SALES & SERVICE: OLIVE GROVE RD SHEFFIELD. 2.

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

Jackson

OVER HALF A MILLION ELECTRIC COOKERS

*have been made
by Jackson during
the last twenty years.*

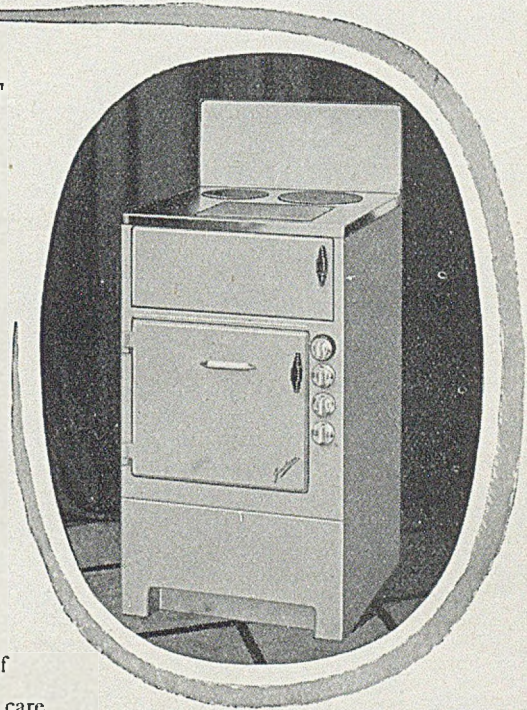
See the latest models
all built to give years of
service with the minimum of
maintenance costs. Note the care

taken in design and production to give the maximum of interchangeability
and the easiest servicing and cleaning.

Examine the oven of the 194J and you will appreciate the exceptional cooking
capacity—eight to twelve people easily catered for in a standard type of cabinet.

Inspect the finish of the enamel and you will understand why Jackson cookers 20
years old still retain their splendid appearance.

Ask any Maintenance Engineer who has thousands to look after and you will learn
why Jackson have made and sold over Half a Million electric cookers.



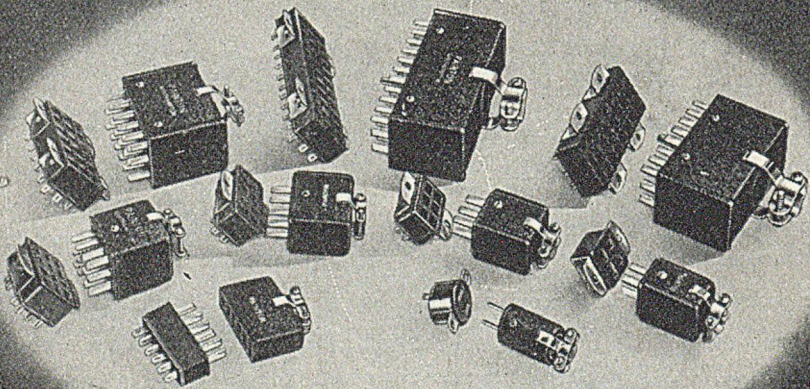
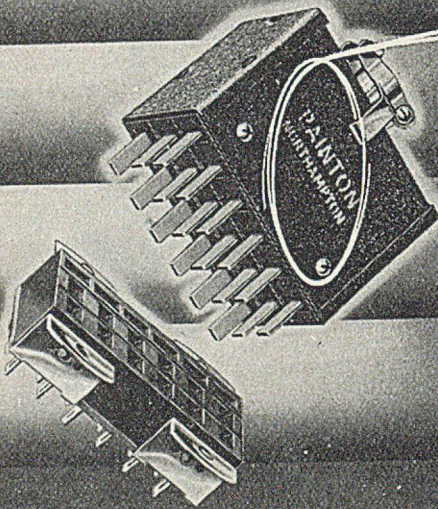
THE JACKSON ELECTRIC STOVE CO. LTD.

143 SLOANE STREET, LONDON, S.W.1.

Phone: SLOane 6248

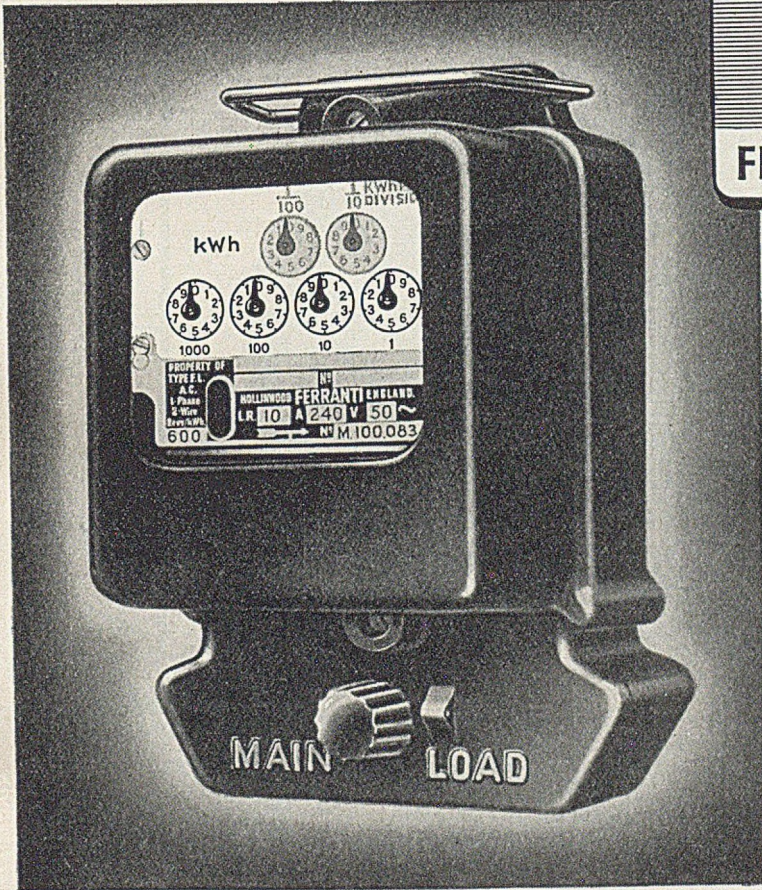
synonymous with

PLUGS & SOCKETS



PAINTON & CO LTD KINGSTHORPE NORTHAMPTON

Ferranti



Meters



FM88

FERRANTI LTD., Hollinwood, Lancs.

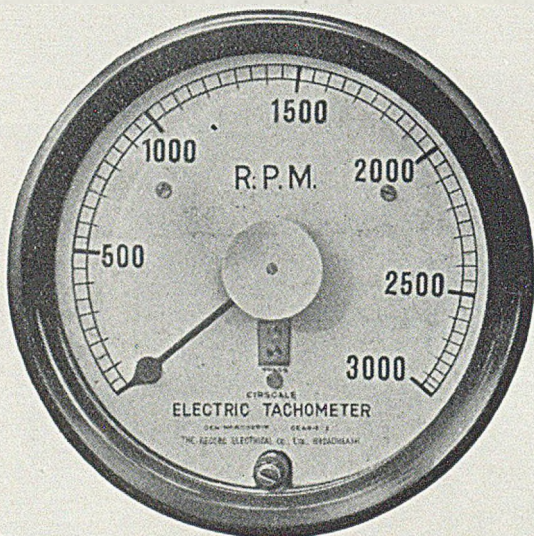
London Office: Kern House, Kingsway, W.C.2.

5TH NOVEMBER, 1948

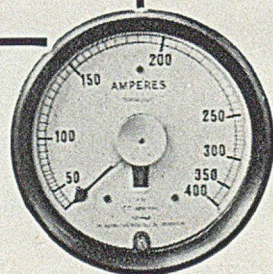
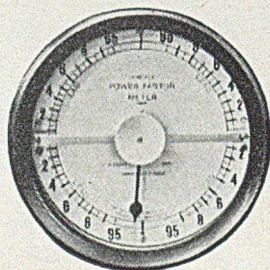
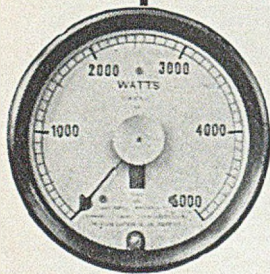
11

The case for uniformity...

The new Record pressed steel instrument cases are designed for interchangeability and uniformity of appearance, while maintaining strength and durability. Full open dials ensure ease of reading. Flush or projecting pattern.



"Cirscale" is the Registered Trade Name of the Record Electrical Co. Ltd., and applies exclusively to their instruments.

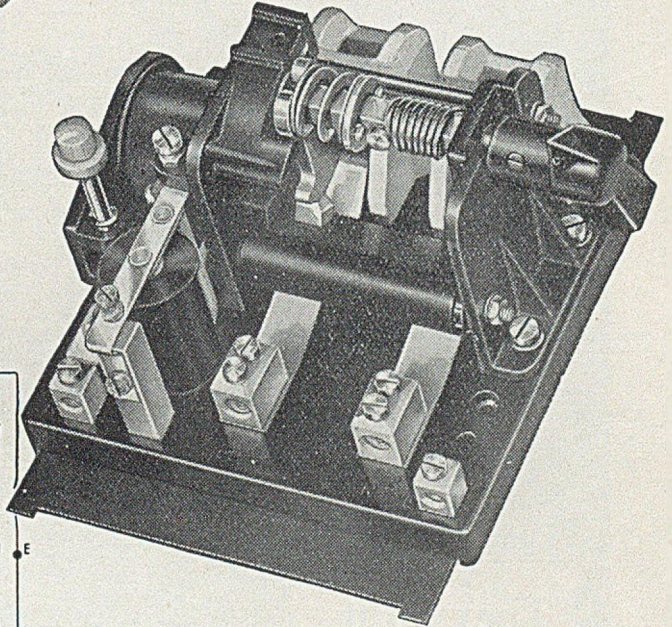
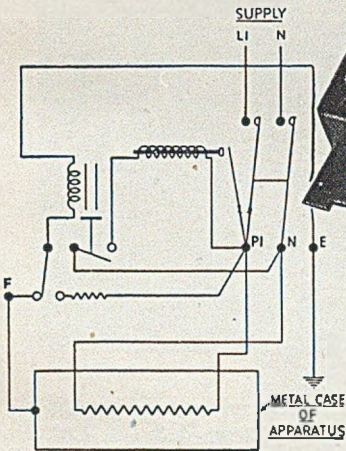


THE RECORD ELECTRICAL CO. LTD
BROADHEATH, ALTRINCHAM, CHESHIRE
Telephone: Altrincham 3221/2/3. Telegrams: "Infusion," Altrincham
London Office: 28 Victoria Street, S.W.1. Telephone: Abbey 5148

ROBUST

yet sensitive..

DIAGRAM OF CONNECTIONS :



The design of the HENLEY Earth-Leakage Circuit-Breaker incorporates an entirely new method of operation with a complete absence of toggles and delicate mechanism. The full mains voltage is utilized to operate the Circuit-Breaker by means of an integral relay system. Complies with B.S. 842-1939. Full details in Booklet P./53A.

HENLEY

EARTH-LEAKAGE CIRCUIT-BREAKERS

(VOLTAGE OPERATED)



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



They do it
our way
 using
ALCHO-RE
 Paste Flux

If you have a soldering problem our Technical Department will gladly advise as to the best methods and materials to use. Ask for a representative to call or send particulars to the address below.

This photograph, reproduced by kind permission of Messrs. William Steward & Co. Ltd., Albany Street, London, N.W.1, was taken in their Armature Rewind Shop. It shows the connections of a strip wound armature being soldered to the risers. The flux used is 'Alcho-re', a resin base flux specially prepared for the soldering of electrical and radio assemblies and for all work where absolute freedom from corrosion is essential. The use of 'Alcho-re' means faster soldering and better penetration into joints. For high speed motors Fry's H.T.3 High Temperature solder is recommended.

FRYS METAL FOUNDRIES LIMITED, Tandem Works, Merton Abbey, London, SW19

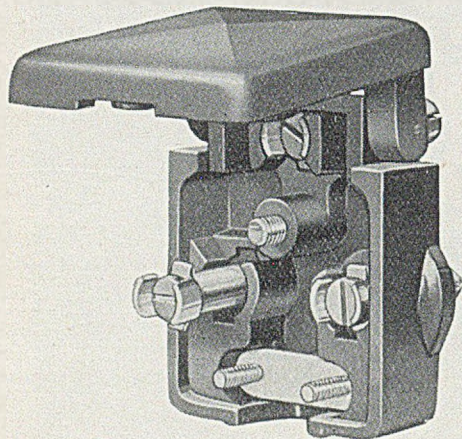
**EVOLUTION
REVOLUTION**



SWITCHGEAR *by*

REYROLLE
HEBBURN CO. DURHAM ENGLAND

A NEW IDEA in plug design

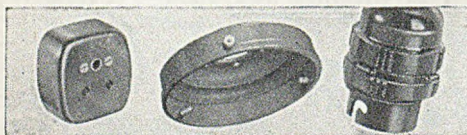


THE hinged cover with single captive fixing screw—positive, non slip connections to removable terminal pins . . . these are features which make the A.B. HINGED PLUG unique.

New ideas always have extra sales value and it is ideas like these, combined with an unusually high standard of quality, that are rapidly moving the whole range of A.B. electrical fittings ahead of the front rank.

Our informative 'EP' brochure gives details and prices of a range of fittings to which new and unique units are continually being added.

AB ELECTRICAL COMPONENTS



SHUTTERED
3-PIN SOCKET 3; 4 & 4" GALLERIES C.G. LAMP HOLDERS

Switchmakers with a long record of versatile service to the electrical and radio industries, we manufacture a wide range of standard types, and take especial pride in our ability, at short notice, to produce prototypes to your own requirements.



Metal Products Ltd., Great South-
West Road, Feltham, Middlesex

He must break it—



Why let pilfering of your electric lamps add to your overheads? By means of this simple locking device, lamps cannot be removed until they burn out or are broken. A trial order will convince you.

LOX-ALL LAMP ELECTRIC LOCKS

Full details gladly supplied by
CHECKLOX : 169 PICCADILLY,
LONDON, W.1. Phone : REGent 1900

"MASTICO"

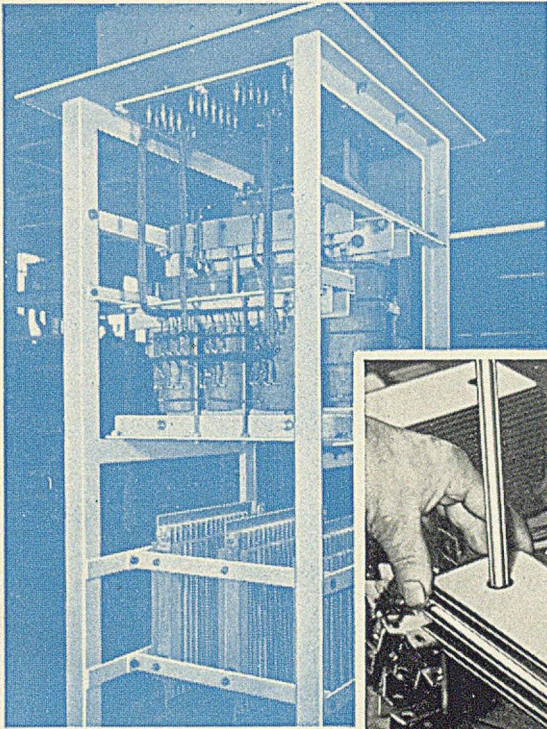
AIR DRYING
INSULATING
VARNISH

for

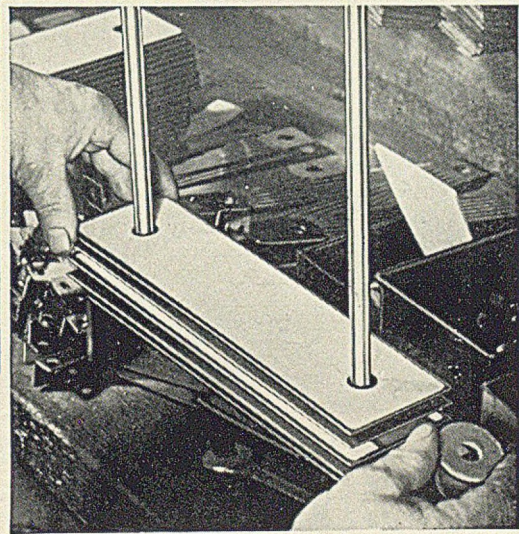
ELECTRICAL PURPOSES

conforms to the requirements of
the British Standards Specification
No. 634/1935.

W. H. KEYS LTD.
WEST BROMWICH



**WHERE
THEY USE
BAKELITE
LAMINATED**



L.13

**No. 13—THE WESTALITE
RECTIFIER by the
Westinghouse Brake
and Signal Co. Ltd.**

Our larger photograph shows the Westalite Rectifier which is designed for a 3-phase A.C. input at 400/500 volts 50 cycles, providing a D.C. output of 1,000 amperes at 7 2 volts. BAKELITE Laminated is adopted for the main terminal board, insulating terminal panels, and, in the form of tubes, provides the insulating covering for the mounting spindles on which the rectifier elements are

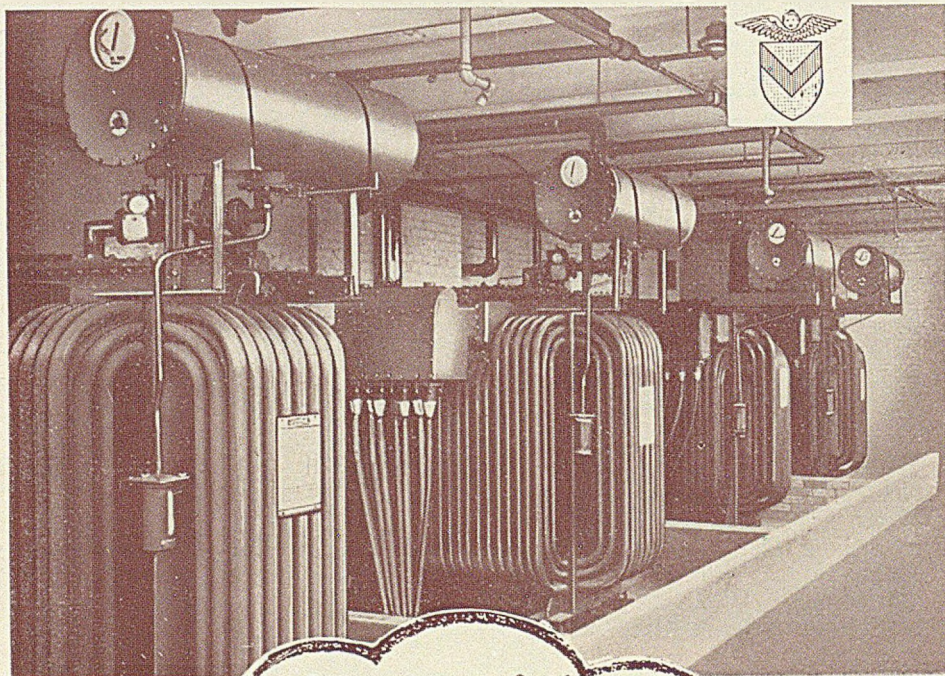
assembled. The building up of the 24-element stack on BAKELITE Laminated tubes is shown in the smaller photograph. In addition to its high efficiency as an electrical insulator BAKELITE Laminated is tough, easily machined with ordinary wood and metal working tools, and resists heat, oils and acids. It is available in sheets up to 4" thick, and rods and tubes.

TREFOIL
BAKELITE  **PLASTICS**
REGD. TRADE MARKS

Essential Materials for Essential Work

BAKELITE LIMITED · 18 GROSVENOR GARDENS · LONDON · S.W.1

In centres of British industry



*Metrovick
transformers
carry the load*

NEWPORT, Mon., county borough.
On River Usk. Industries: coal, iron, steel,
chemicals and glass. Population 89,198.



**METROPOLITAN
Vickers**



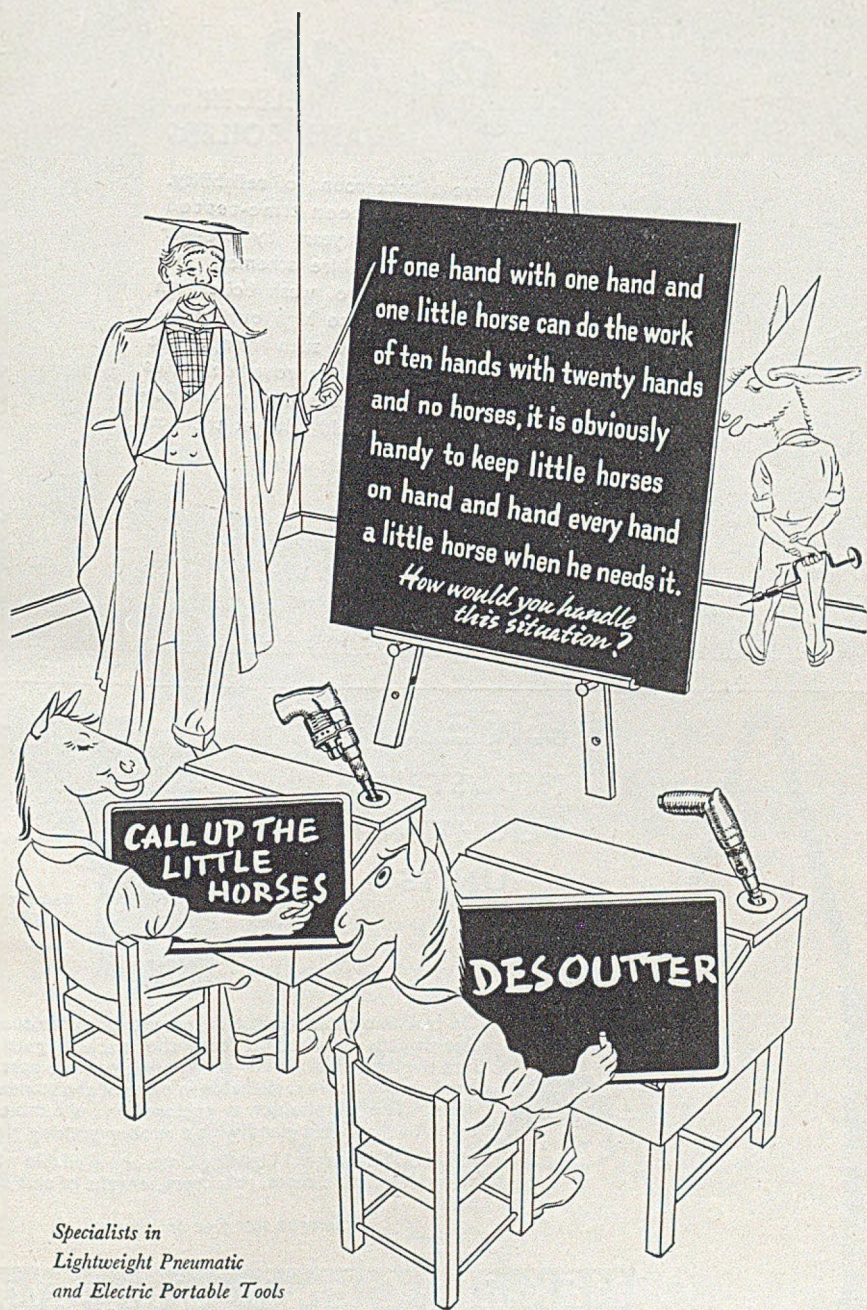
ELECTRICAL CO. LTD.
TRAFFORD PARK ... MANCHESTER 17.

EFA 803

Switch to

METROVICK
Lighting

when daylight fades



*Specialists in
Lightweight Pneumatic
and Electric Portable Tools*

DESOUTTER BROS. LTD., THE HYDE, HENDON, LONDON, N.W.9. TELEPHONE: COLINDALE 6346-7-8-9

C.R.C. 194

5TH NOVEMBER, 1948

19

HOUSING NEEDS
MET AT ONCE

THE
BOILER
WITH A
BACK-
GROUND

Burco
LTD.

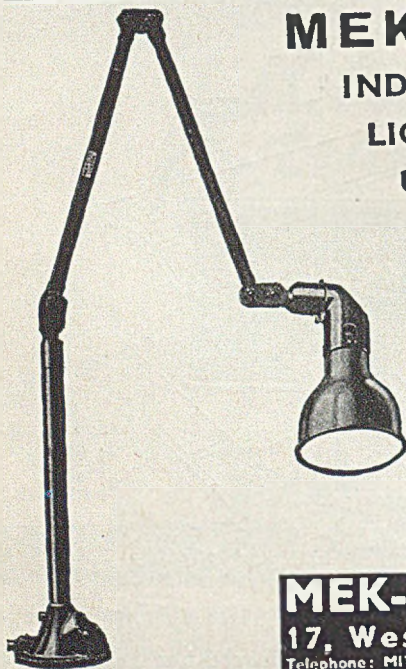
Burco
ELECTRIC
WASH BOILERS

have a background of reliability. They have been time-tested through the years by pre-war housing and hire schemes. No other make of wash boiler can offer the same high quality and perfection at such competitive prices. With improved deliveries there is no reason why your customers should not get the best.

*Enquiries dealt with
by return*

ROSE GROVE
BURNLEY

MEKELITE INDUSTRIAL LIGHTING UNITS

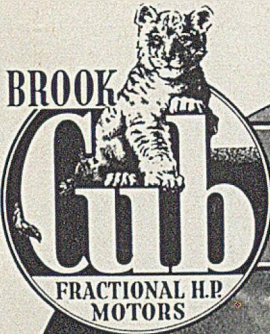


Sudsproof
head

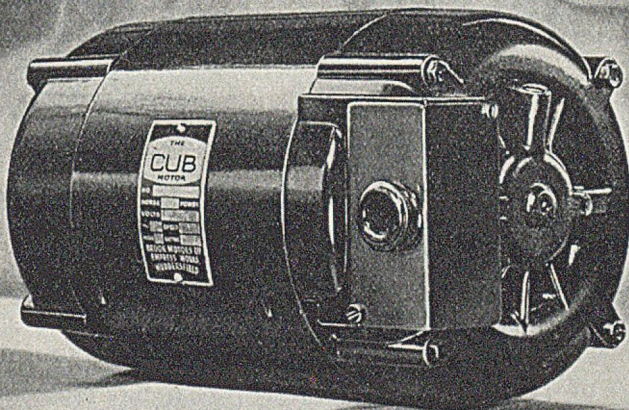
On machine tools trouble is sometimes experienced due to suds splashed up from the machine getting into the lampholder. For such conditions the special head shown above is available in place of the standard head. The lampholder is enclosed and the cable is taken in through a gland with a rubber packing ring. MEKELITE Industrial Lighting Units are available with many alternative bases, reflectors, lengths of arm and pillar.

Catalogue sent free on request.

MEK-ELEK Engineering Ltd.
17, Western Road, Mitcham, Surrey
Telephone: MITcham 3072
Cables: MekkELEK, London



THE ECONOMICAL "FRACTIONAL"



Standard Motor without feet

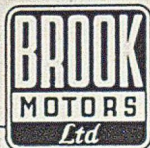
Select the right motor for your product. Standardised designs offer a number of advantages—lower cost, quicker delivery and simplified servicing.

Get Brook technical advice before you finalise your design.

PROMPT DELIVERY.

Technical Representatives at :—

LONDON BIRMINGHAM BRISTOL GLASGOW
LEEDS LEICESTER LIVERPOOL MANCHESTER
NORWICH NEWCASTLE NOTTINGHAM PLYMOUTH
SHEFFIELD SWANSEA

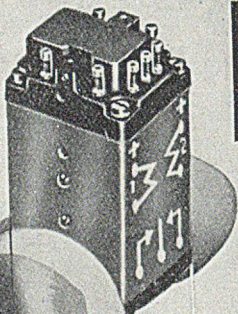


EMPRESS WORKS

HUDDERSFIELD

THE ANSWER TO THE NEED
IN INDUSTRY FOR A HIGHLY SENSITIVE MOVING COIL

Miniature Relay



EXTREME COMPACTNESS AND HIGH SENSITIVITY MAKE THE ELLIOTT MOVING COIL MINIATURE RELAY SUITABLE FOR NUMEROUS SPECIAL APPLICATIONS IN INDUSTRY

It has been designed particularly for use in low voltage circuits in aircraft, for measuring, automatic control, warning and auxiliary purposes.

Its sensitivity can be judged from the fact that the operating power for one standard model is as low as 10 microwatts. It is unaffected by working angle or changes in position, or by any normal vibration or shocks, and operates equally efficiently in tropical heat or in the low temperatures encountered in high altitude flying.

● SIZE: 1.375 ins. x .75 in. x .625 in.

● WEIGHT: 1.25 ozs.

ELLIOTT

ELLIOTT BROTHERS (LONDON) LTD.

CENTURY WORKS, LEWISHAM, S.E.13. TELEPHONE: TIDeway 3232
AND AT ROCHESTER, KENT. RESEARCH LABORATORIES AT BOREHAMWOOD

E/48007

Please to
Remember
the 5th Nov.



5th Nov
Guy Fawkes
Day

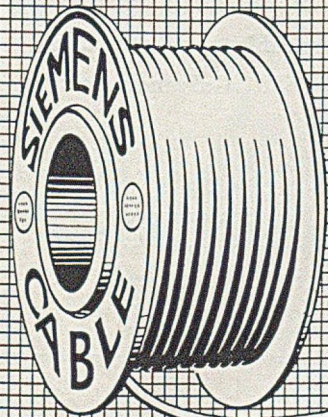
BUT YOU NEED

SIEMENS

V.I.R.

CABLES

all the Year Round



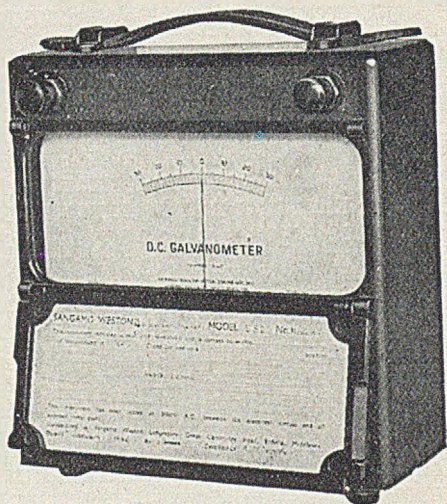
STOCKS AVAILABLE

at all Branches



of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38/39 Upper Thames Street, London, E.C.4
Branches at-Bellast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield,

**NEW
WESTON
DEVELOPMENTS**



Sensitive D.C. Galvanometers

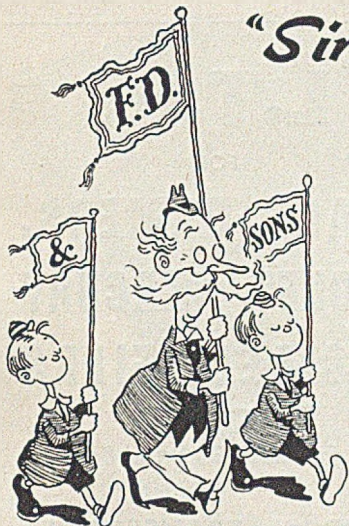
A feature of these Weston D.C. Galvanometers is their high sensitivity which is combined with rapid response characteristics and robust construction. The instruments operate on the permanent magnet moving coil principle and are supplied in six standard sensitivities. If required six sensitivities can be incorporated in one instrument, selected by means of a rotary switch. Other features of these galvanometers include a double pivot type moving system, spring loaded jewels, magnetic shielding, a 60 mm. scale with a knife-edge pointer and a neat bakelite case fitted with a hinged flap to protect the scale glass. The instruments are suitable for portable or bench use and are known as Model S82 Galvanometers.

SANGAMO WESTON LIMITED

GREAT CAMBRIDGE ROAD, ENFIELD, MIDDLESEX

Telephone: Enfield 3434 & 1242

*"Sir,
we have our standards!"*



Like our standards of behaviour, our standards of standard lines are remarkably high. Teeming with terminals, tags and eyelets, our list of standard lines can usually satisfy the most unusual, normal needs. Of course, if you want to be awkward and call for something we *don't* make as a standard line we will respect your order just as highly . . . so long as you want enough little stampings and pressings to justify the production of special tools.

F. Dowler & Sons
ASTON, BIRMINGHAM, 6

Look for the Trade Mark

CEILING SWITCH

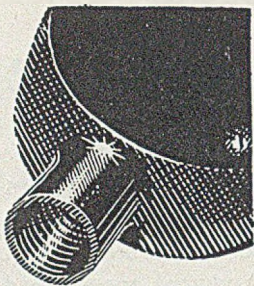
	Bakelite Base	Porcelain Base
Brown one-way	(CS 151)	(CS 251)
White one-way	(CS 152)	(CS 252)
Brown two-way	(CS 153)	(CS 253)
White two-way	(CS 154)	(CS 254)

Ashley
ACCESSORIES LTD.

**MORECAMBE ROAD,
 ULVERSTON . . . LANCs.**

Telephone : Ulverston 3333
 Telegrams : "Rotary," Ulverston





A FITTING EXAMPLE



**OF METALLIC
ACCURACY
QUALITY
CONSISTENCY**

The high standard of precision essential for ease of assembly and speedy installation proves again and again that it pays to

SPECIFY

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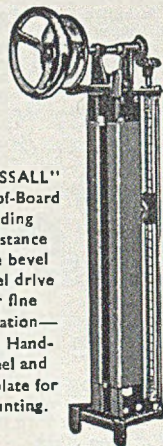
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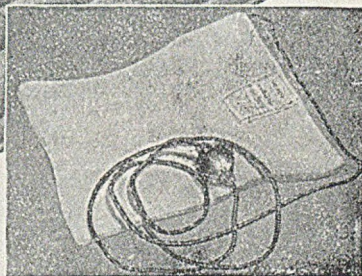
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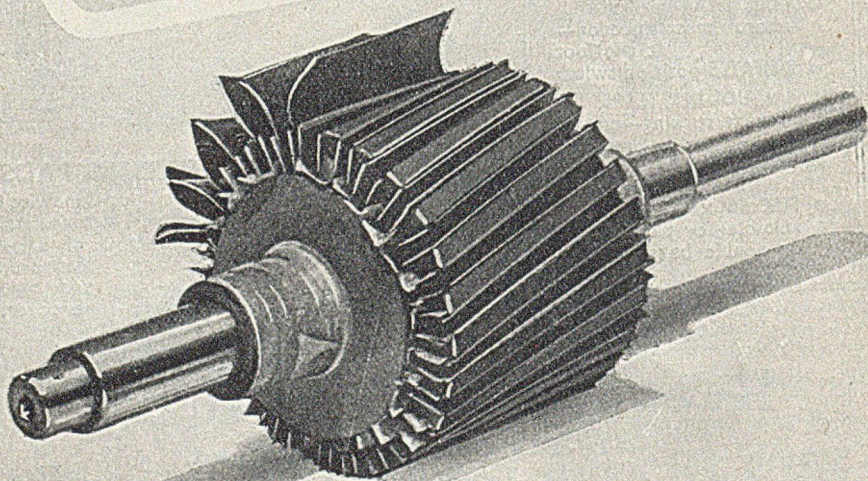


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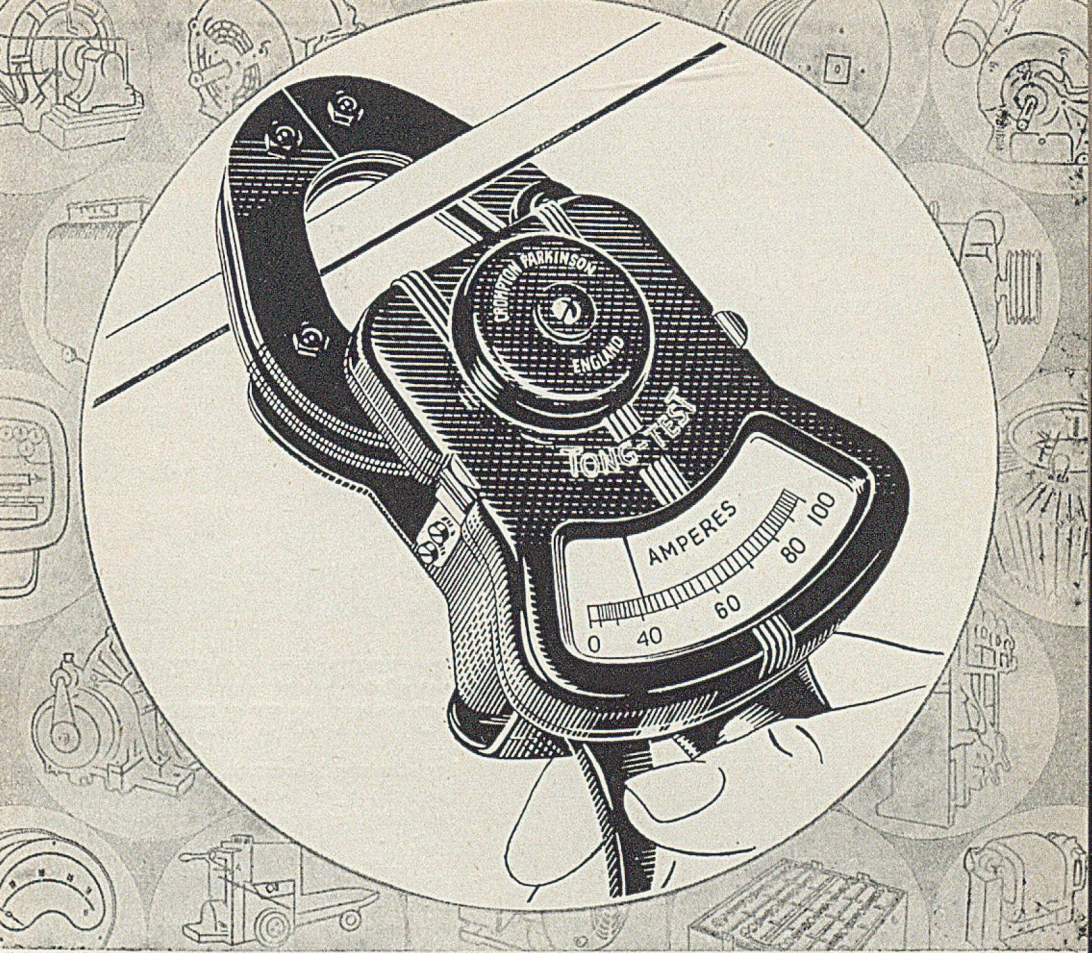
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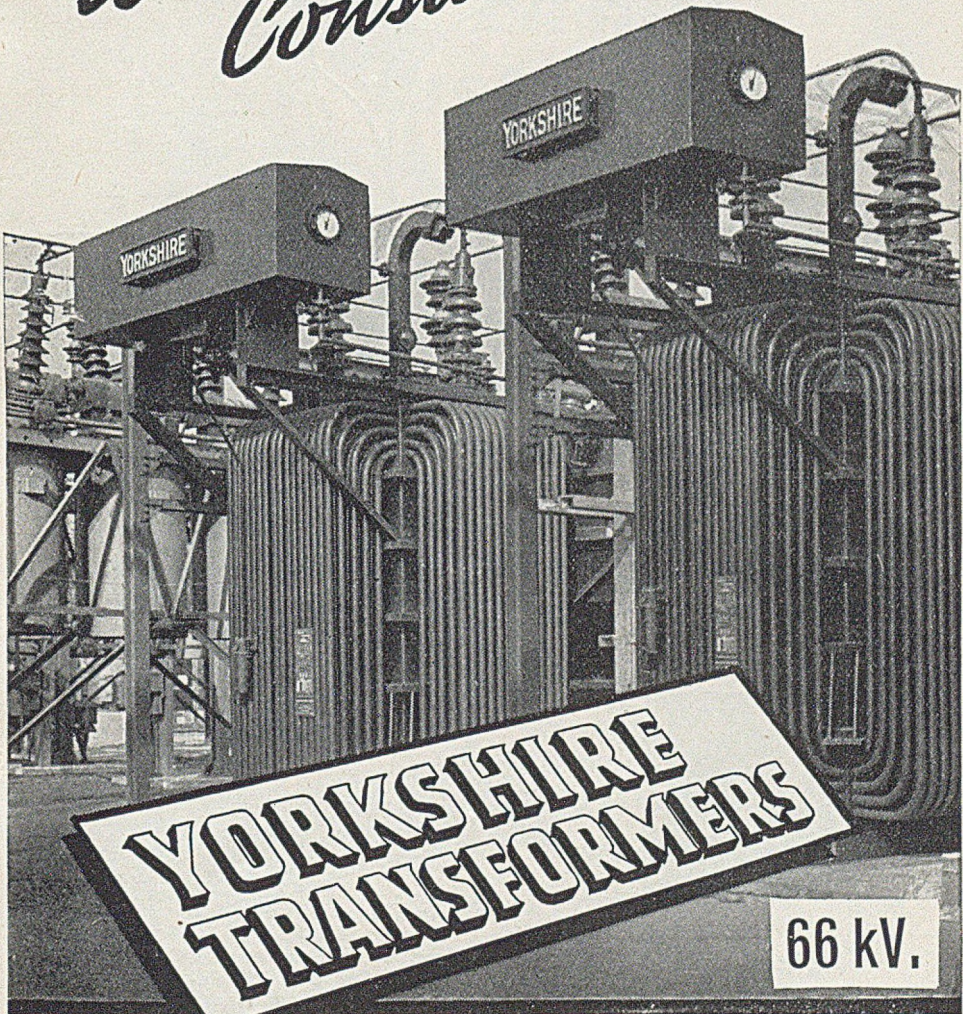
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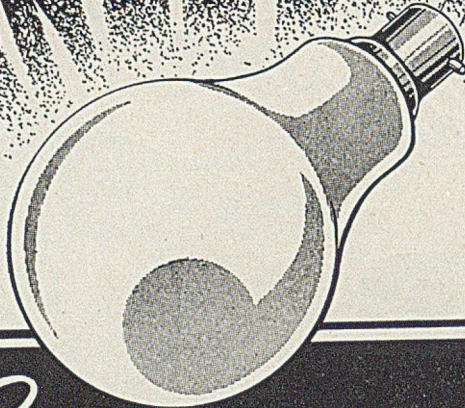
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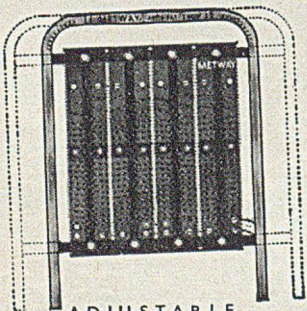
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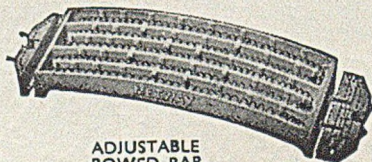


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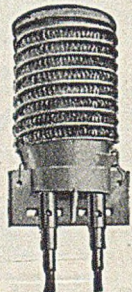


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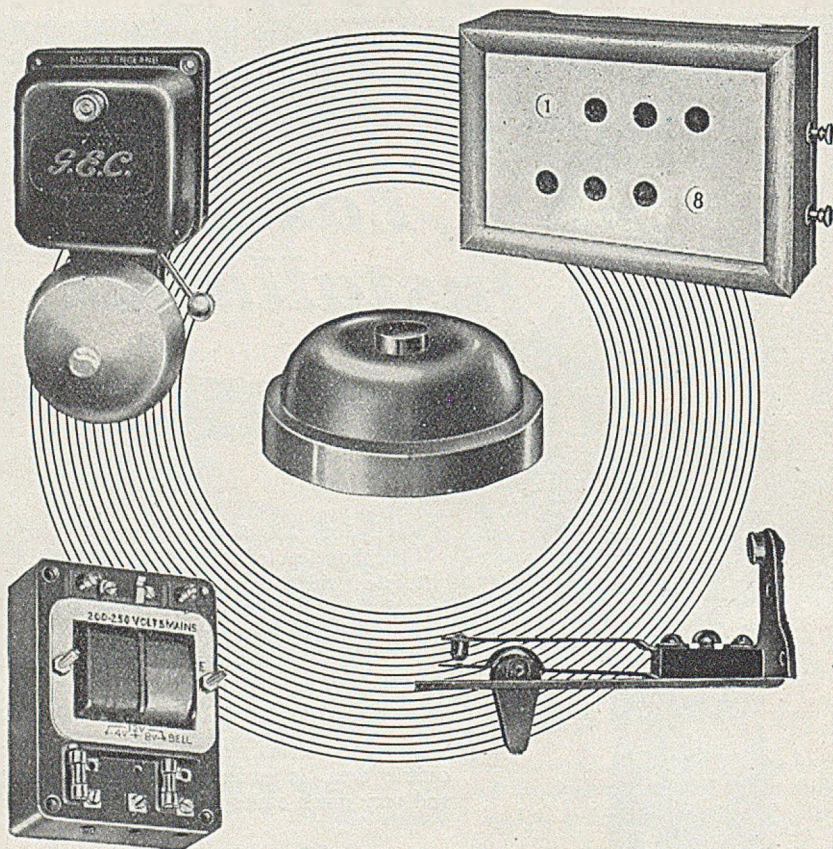
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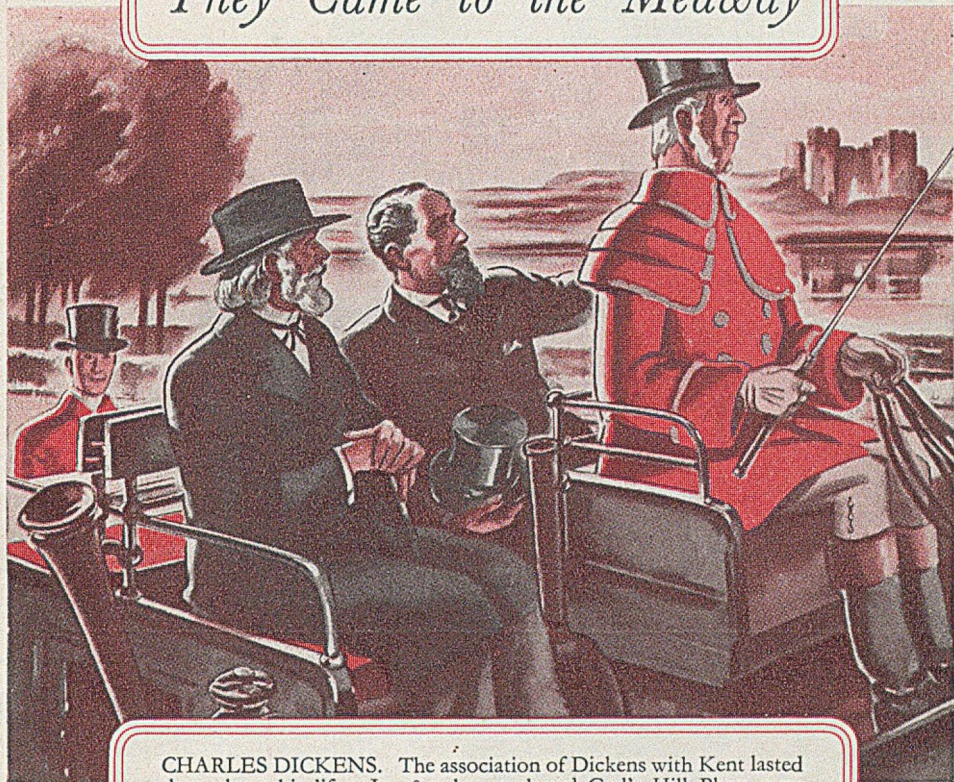
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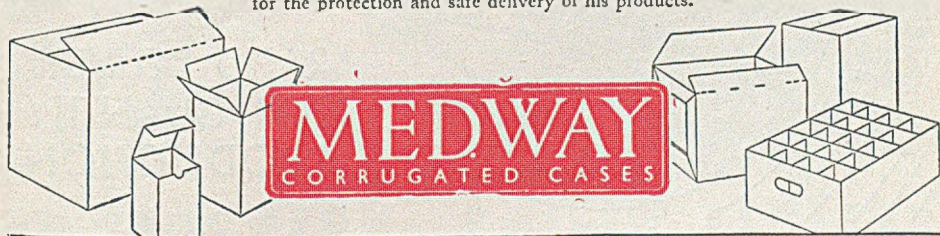
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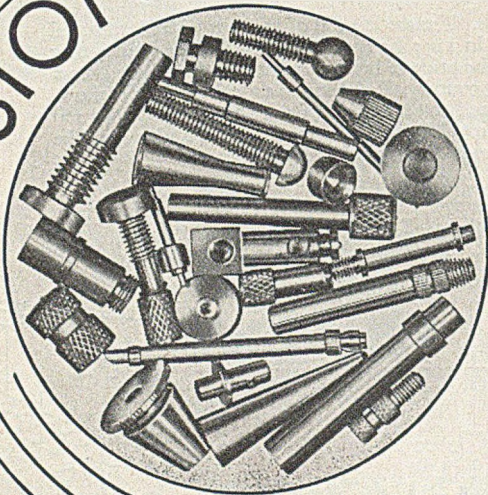
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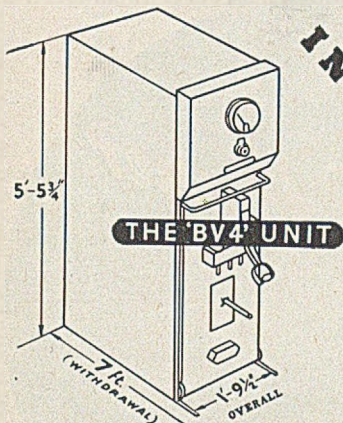
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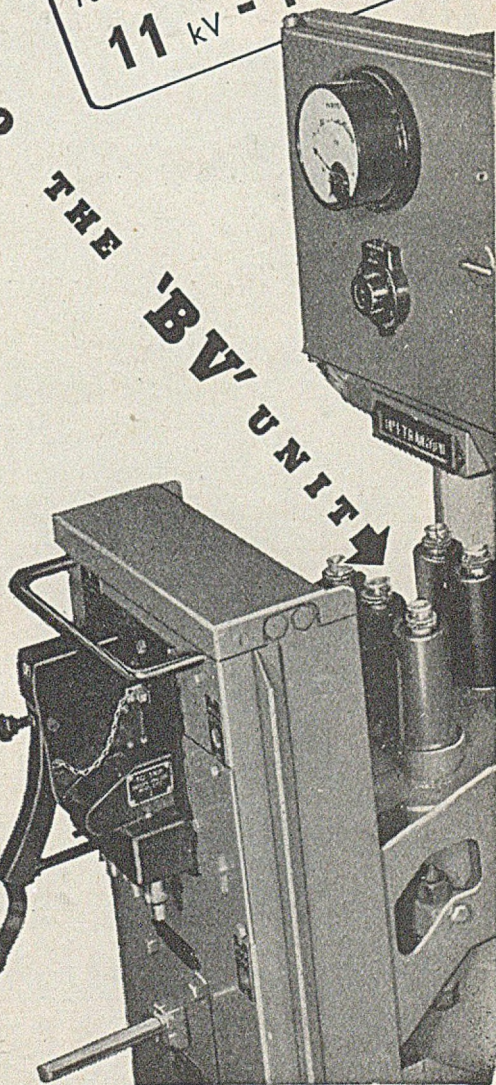
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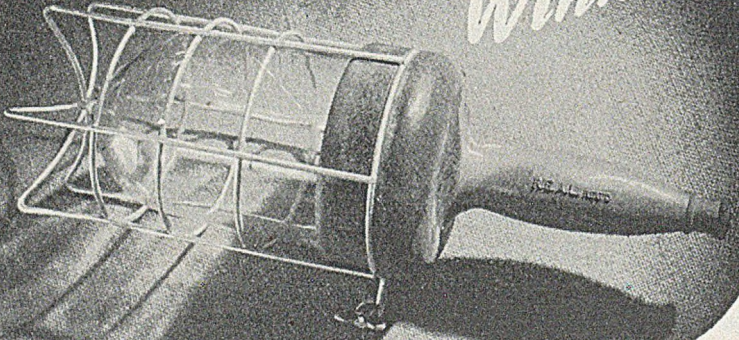
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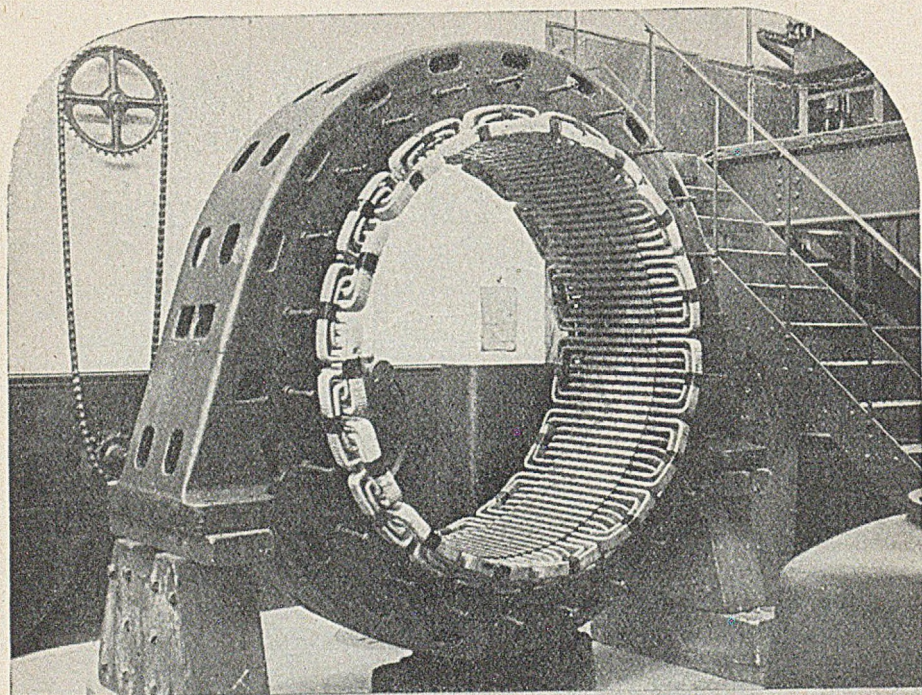
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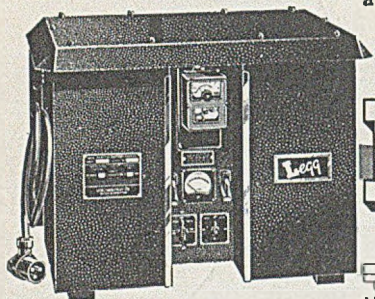
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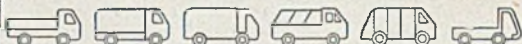
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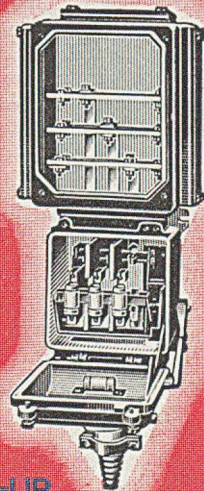
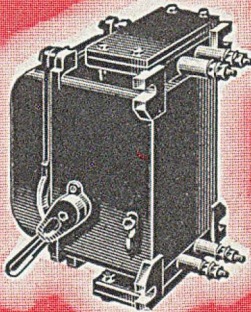
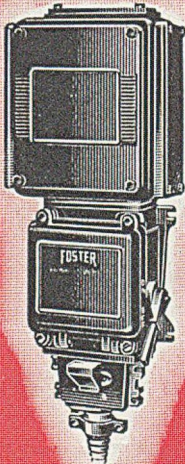
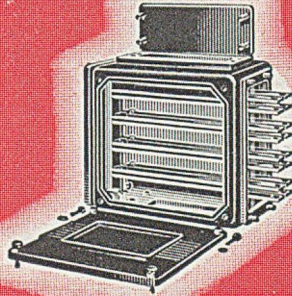
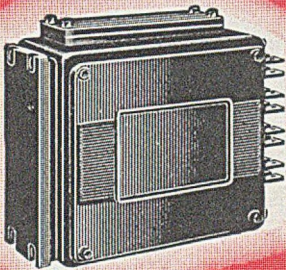
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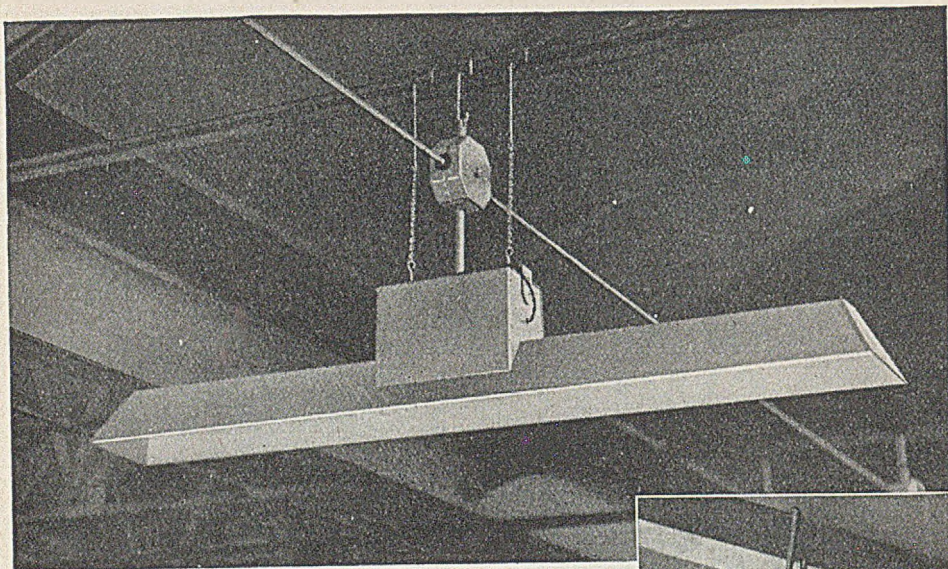


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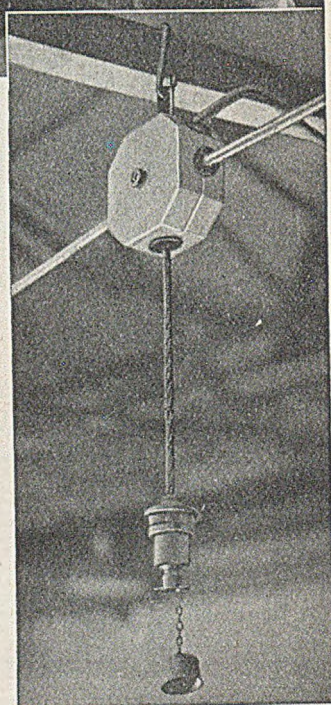


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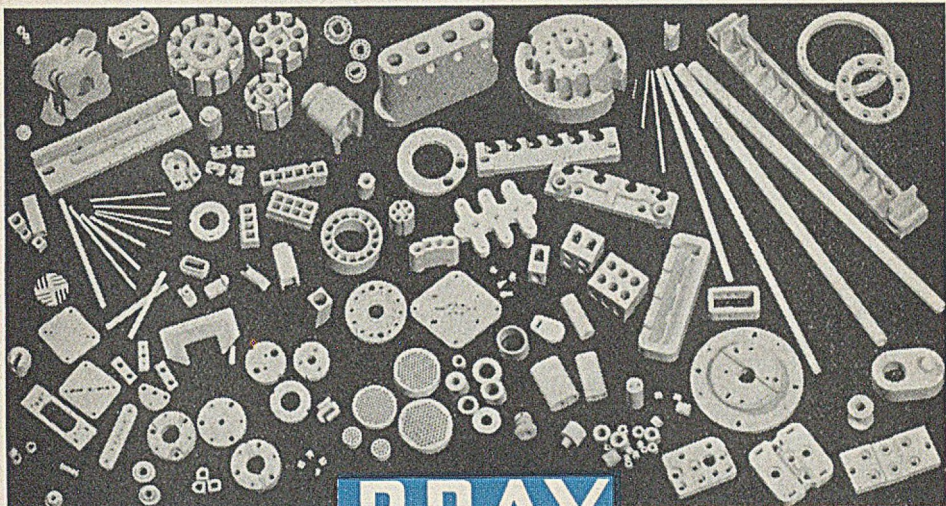
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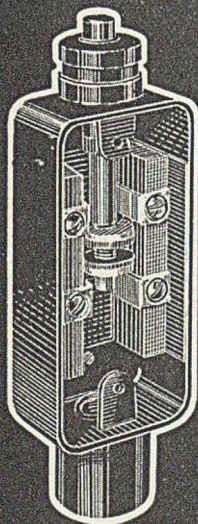
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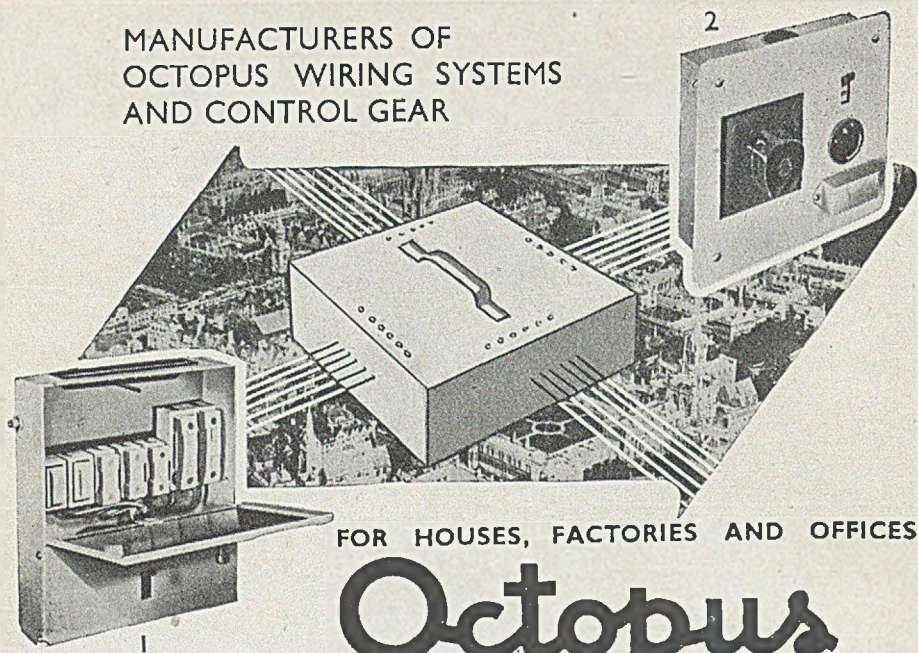
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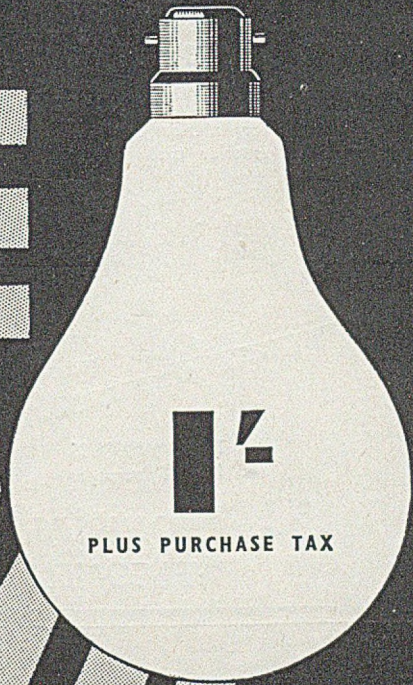
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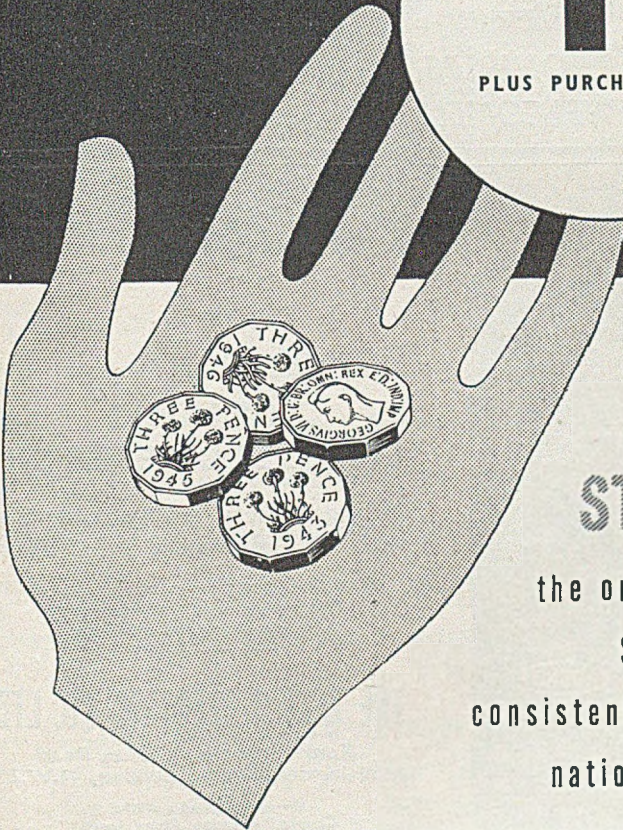
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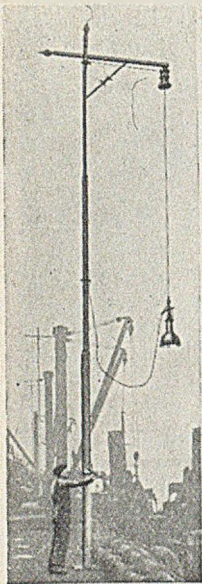
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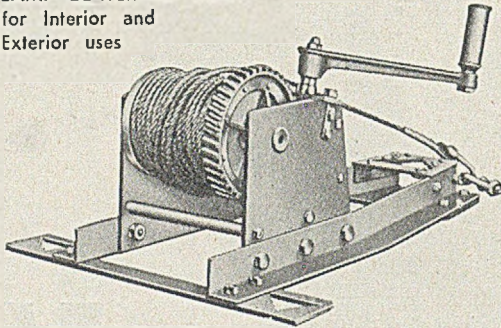
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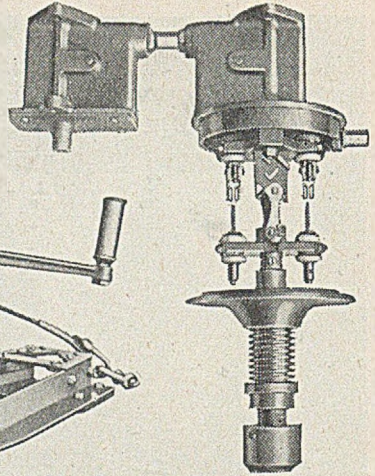
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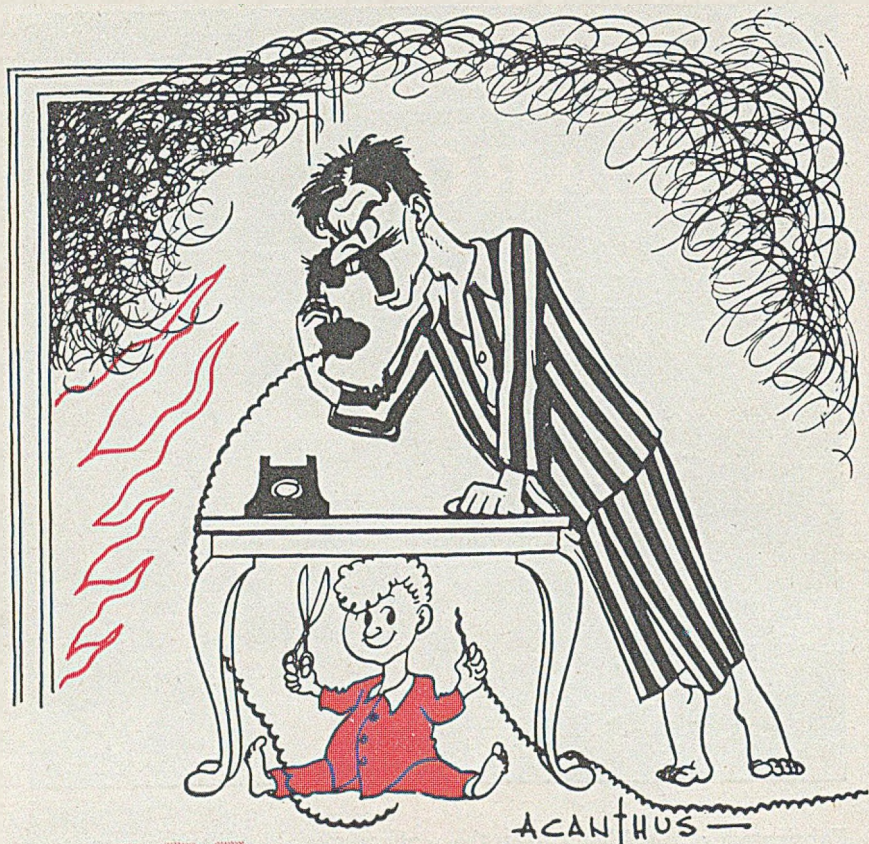
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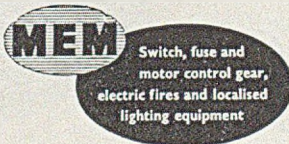
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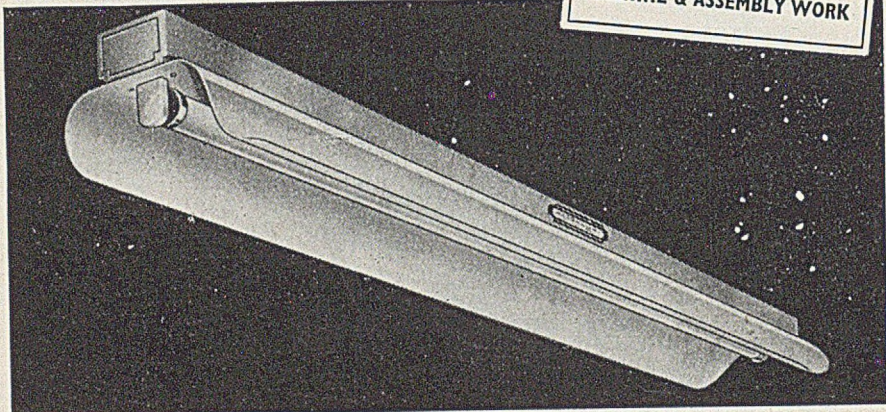


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 Industrial Editor: J. H. COSENS

5th November, 1948

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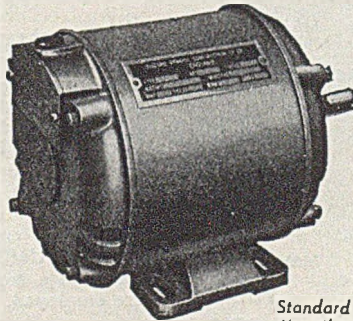
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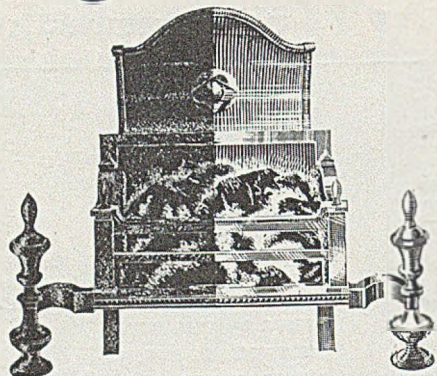
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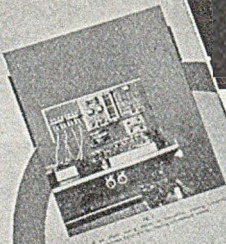
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THE OLDEST
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ELECTRICAL REVIEW

ESTABLISHED
1872

Vol. CXLIII. No. 3702
5th NOVEMBER, 1948

Meeting Future Demands

FUEL AND PLANT REQUIREMENTS

IN the absence of any sign of reaching saturation point in consumption, electricity differs from other commodities. It has so far escaped the general tendency for rapid initial development to be succeeded by a slackening rate of growth. Rather does it seem to follow a law of its own in continuing annually an exponential increase independent of extraneous circumstances. Even the war was taken in its stride, and hardly affected the upward slant of the curve of yearly outputs. Expectations formerly held in some quarters of a decline thereafter of more than a temporary nature have proved baseless.

In a paper presented to the C.I.G.R.E. in Paris last June, Mr. J. Kopeliowitch showed that the particular year taken as a reference point made little difference in reckoning the period, varying in each country, in which output would be doubled. It is significant that this trend is still observable in countries generating most power per head of population. Prices per kWh may be expected to be lower there, and this in itself stimulates further use and makes feasible certain industrial processes which depend entirely on electricity for their operation.

Public Appreciation

Growth of population and extensions to rural areas (in which, however, consumption is always relatively small) account, no doubt, for some of the increase. More is due to growing appreciation by the public of the merits of electrification for a greater number of purposes, whether in industry, commerce or transport or in

homes, where it has come to symbolize a higher standard of living.

Considerable scope is to be found in providing more motor horse-power per worker, but even in the most progressive industrial countries that figure is on the up-grade. The most important, though quite indeterminable, factor is the effect of technical progress due to applied research in introducing (with increasing rapidity) new methods, thus widening the field for electricity, or in lowering costs and improving reliability of appliances, which would have similar results.

Extent of Resources

The only obstacle we can see to the forward movement is inadequate generating capacity, which is common at present to all countries. Regarding the position further ahead, the author of the above-mentioned paper estimates that in some countries usable water-power resources will be exhausted in ten to fifteen years. Fuel oil available in the world has been said elsewhere to be only about one-eighth of the amount of coal. How far atomic power can contribute is still unknown and at present it is outside the province of engineers to decide.

On the Continent the position could be materially relieved by a more general linking up of hydro-electric stations of different types with thermal stations, thus making use of diversity of resources in different seasons of the year and diversity of demand, especially that due to the time of day and other geographical circumstances. This would entail international

transmission at up to 400 kV and the framing of tariffs to encourage off-peak use. In Great Britain when the generating plant position becomes easier, and if revised coal-price structure is such as to permit economical use of low-grade coal (the supply of which need cause no anxiety within foreseeable time), the chief difficulty, and a very real one, will probably be in securing suitable power station sites. Since new generating plant has to be ordered four or five years in advance of the load expected, its capacity should be in accordance with forecasts that envisage a percentage growth in demand certainly not less than that found in any similar period of years in the past. If that capacity on a later showing appeared likely to exceed requirements, the work could be slowed down if the units could not be sold abroad.

CONSTANT-CURRENT CONTROL LIMITS to Ward Leonard control as applied to diesel-electric ships are found when motors of different sizes are to be supplied as well. The constant-current system described on page 705 enables the main generators to be used for both purposes, thus obviating the need to carry relatively large and infrequently used auxiliary generators. Automatic control of the generator field should also tend to prevent overloading of the engines when the direction is changed from ahead to astern, the speed of response of the propulsion motors being restricted to a safe value. Limitations of torque and speed of the propulsion motors, in the event of the propellers fouling or being lifted clear of the water offer further advantages.

"CO-ORDINATION" IN FRANCE WHILE in this country the electricity supply and gas industries have been, or are being, nationalized in such a form as to be completely independent of each other (except for the limited possibilities of co-ordination resulting from the powers accorded to the Minister of Fuel and Power), the joint French Nationalization Act of April, 1946, although likewise providing for the setting up of two separate bodies, renders them financially interdependent and creates for this purpose an equalization fund. In consequence, the first annual report and accounts of the two industries are presented in joint form. Another provision of the

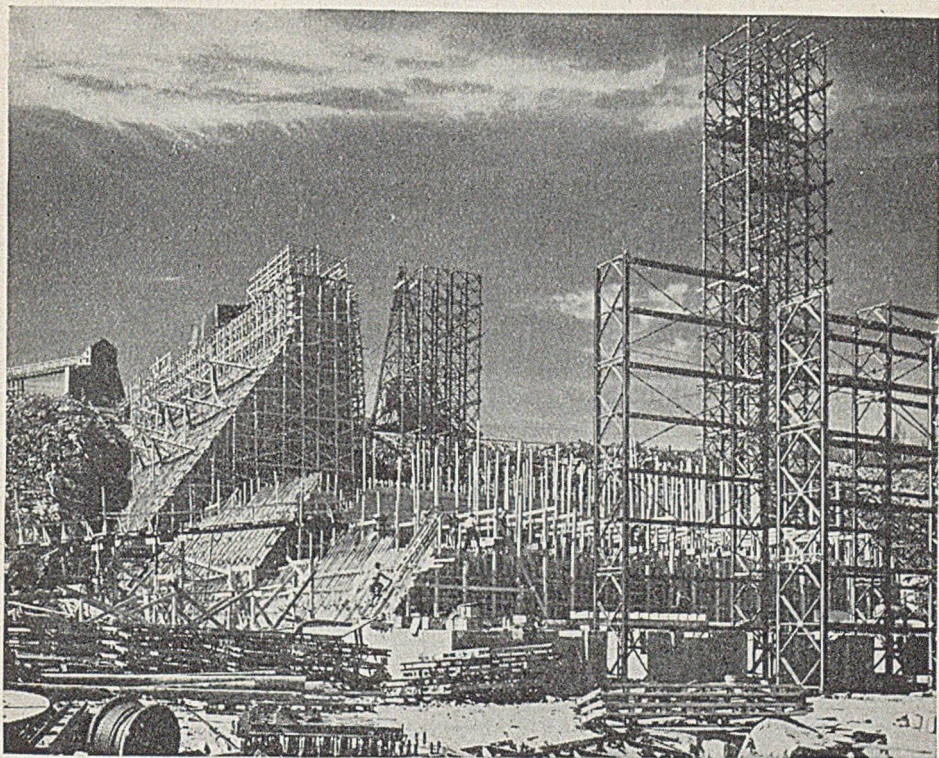
Act, according to which the boards of the two bodies should be financially independent of the Government, has not yet been put into effect. Policy with regard to wages, tariffs and loans is still decided by the Government, and from the outset the tariffs have been fixed so that electricity has to subsidize its sister service. Indeed, 13 to 14 per cent of the total annual revenue of the former goes to make up for the losses on gas—certainly not an example to be emulated.

IRON AND STEEL

How the Iron and Steel Bill now before Parliament will affect the electrical industry is not yet apparent. On the face of it, those companies not directly included in the schedule of concerns to be taken over by the proposed Iron and Steel Corporation will remain untouched. Actually, too, the companies acquired will continue to exist although their capital will be held by the Corporation, and the boards and managements will be retained—at least if the members are acceptable to the new owners. But the operation of the measure will include the activities in the engineering and manufacturing fields of the acquired companies and some of these activities are electrical. The Government's explanation of the necessity of the measure and its expectations from it will be given shortly.

HIGH STEAM PRESSURES

THE present field for high-pressure steam may be limited by the economic need with grid interconnection to take the base load on the newest and most efficient generating units, the other plant being relegated progressively to two-shift working. The high-pressure plants described by Mr. W. N. C. Clinch at the joint meeting of the Institutions of Mechanical and Electrical Engineers would not easily fit into this scheme, although local circumstances appear to have justified their installations. Results would probably have been improved with pulverized fuel firing and 60,000-kW turbo-alternators at Willesden where 1,300 lb per sq in. was indicated as the maximum necessary for the best results. Teething troubles on the whole seem to have been independent of steam pressure. The author and Capt. J. M. Donaldson have certainly made a valuable contribution to mechanical engineering.



Canadian Power Developments

Programme to Add 3,000,000 h.p. of Hydro-Electric Plant

ALREADY one of the most highly electrified countries in the world, Canada has embarked on a tremendous development programme to add an estimated 3,000,000 h.p. of hydro-electric energy to the present 10½ million h.p. of developed capacity. Of this, 1,000,000 h.p. is now under construction, with 500,000 h.p. scheduled to go into production this year. These figures do not include the St. Lawrence River power development now under discussion between the Governments of the United States and Canada. If a workable arrangement is reached it is planned to build a 2,200,000-h.p. development at the Long Sault Rapids, near Prescott, Ontario, and half of the power derived from this will go to Canada.

By E. VICTOR MANSER
(Managing Editor, *Electrical Digest*,
Toronto)

The new Des Joachims plant (seen in the photo above) now under construction on the Ottawa river will have an ultimate capacity of 358,000 kW and will cost \$57.6 million

While it is apparent that electrical developments in Canada are due to make enormous strides forward in the next few years, the present most pressing problem in many parts of the Dominion to-day is the shortage of electrical energy. Southern Ontario, one of the most highly industrialized areas in the Dominion, is suffering from a severe power shortage that has necessitated the introduction of power rationing. These restrictions are giving the cities of Southern Ontario an appearance that would be familiar to those who lived in the British Isles during the war years. All outdoor advertising signs have been banned. Window lighting in retail establishments has been limited to 20 watts per linear foot up to 9 p.m., when such lights must be extinguished.

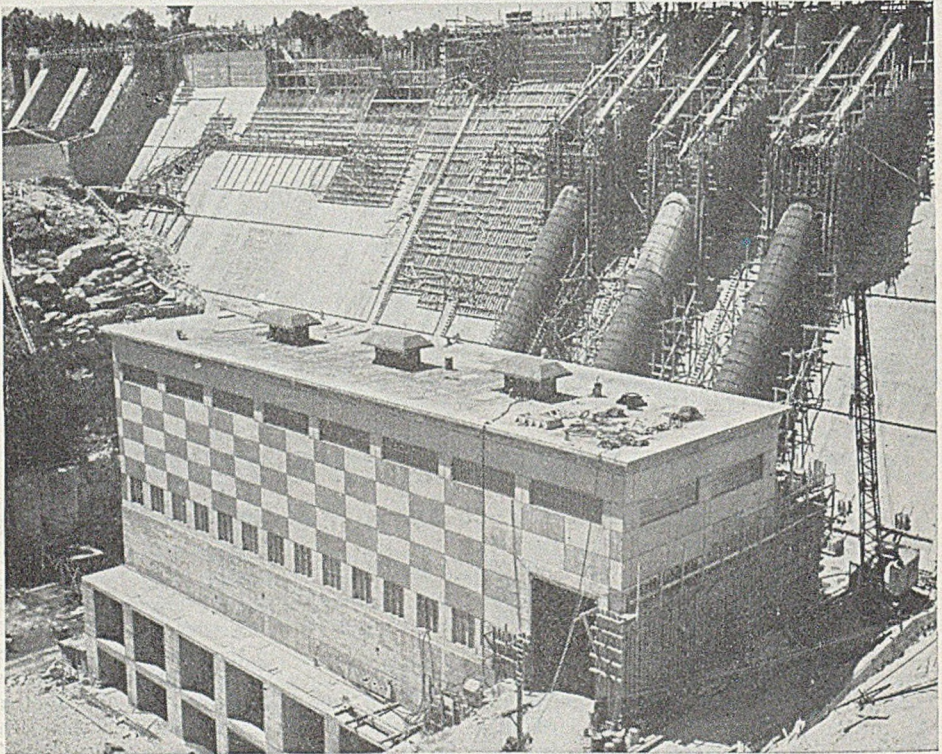
Many urban centres have turned out every second street light as a conservation measure.

In Southern Ontario a reduction of 10 per cent is being demanded by the Hydro-Electric Power Commission of Ontario during the ensuing autumn and winter months. The power shortage in Ontario is expected to last until 1950, at which time the major project of the Commission, the 480,000-h.p. development at Des Joachims on the Ottawa River north of the City of Ottawa, will come into production.

As can well be imagined, this power

that a sufficient breathing space would be allowed to begin the construction of new generating capacity. These estimates have proved sadly askew. The demand for power has never slackened but has grown steadily since the end of the war. Ontario now finds itself about 400,000 kW short in the winter months when the longer nights add heavily to the power demand.

This tremendous programme has taxed the capacity of Canada's electrical manufacturing industry and deliveries of heavy electrical equipment are running far behind. However,



Close-up view of downstream side of the dam of the 80,000-h.p. Stewartville Development on the Madawaska River with power house in foreground. The photograph was taken in July and the project was placed in operation in September

shortage has become a lively political issue with recriminations being passed backward and forward. How did it come about? Responsible engineering officials in Canada, along with most in the United States, thought that the demand for electric power would diminish with the end of war production. After a period of reconversion it was expected that loads would again grow, as they have done steadily over the past forty years, but

the construction work on dams, etc., on the huge hydro-electric projects that are a feature of our Canadian development is a lengthy task and this gives the manufacturer a considerable length of time to build the generators, turbines, etc., needed. Nevertheless it takes about fourteen months to obtain deliveries of the smaller size 200- to 500-kVA transformers, while the large units from 30,000 to 50,000 kVA take about



The DeCew Falls plant of the Ontario Hydro-Electric Power Commission, near St. Catharines, Ontario, was placed in operation last year. It generates 70,000 h.p. at 25 cycles. It was started in the autumn of 1945 and cost about \$8 million

thirty months. Deliveries of switchgear are from twelve to twenty-four months and of heavy generators from two to three years. In general, small equipment takes about four times as long and heavy equipment about three times as long as in pre-war years.

While the province of Ontario is at present undergoing the greatest period of electrical development in its history, important projects are also under way across the Dominion. Some of the larger projects are as follows: 112,000-h.p. development of the British Columbia Power Commission at the Campbell River, Vancouver Island; 28,000 h.p. was brought into production last year. A similar unit is expected to be completed this year and two additional units are scheduled for 1949.

Of the 600,000-h.p. development of the

British Columbia Electric Railway Co. at Bridge River, 186,000 h.p. is now under construction with 62,000 h.p. coming into production this autumn.

37,500-h.p. addition under construction at the Seven Sisters Plant of the Winnipeg Electric Co., Winnipeg, Manitoba.

80,000-h.p. development at Stewartville, Ontario, on the Madawaska River. This came into production in September.

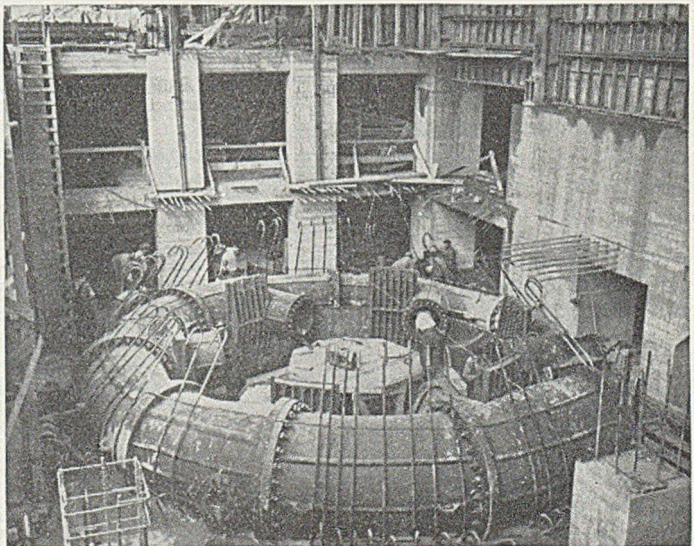
53,000-h.p. development at Aquasabon, Ontario. This is to be completed this year.

480,000-h.p. development at Des Joachims, on the Ottawa River.

First 60,000-h.p. unit to be in operation by 1950 with seven additional units to follow.

160,000-h.p. development at Chenux Rapids on the Ottawa River. Expected to be in production by 1950-51.

195,000-h.p. addition to the Shawinigan



This view shows the turbine assembly for the first 62,000-h.p. unit of the 600,000-h.p. Bridge River development of the British Columbia Electric Railway Co., which is to be put into service this autumn

Falls plant of the Shawinigan Water & Power Co., on the St. Maurice River, to be completed this year.

160,000-h.p. steam-electric generating plant being built by the Ontario Hydro-Electric Power Commission at Windsor, to be completed by November, 1951.

This tremendous programme is not being carried out without adding a strain to the Canadian economy. An interesting sidelight on this was the recent statement of a prominent member of the building supplies industry declaring that the large dams being built were robbing the country of its cement supplies and adding difficulties for other types of construction.

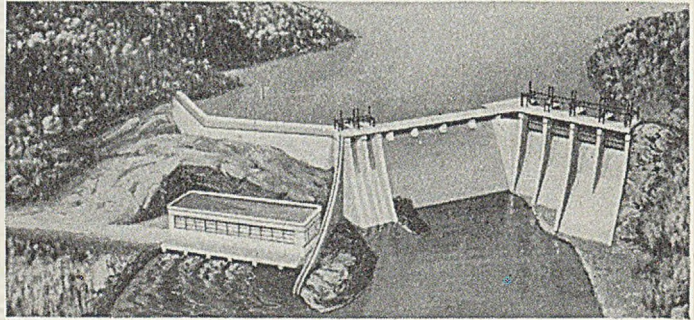
The emphasis at present in Canada is on adding generating capacity. However, many leaders of the industry consider that the problems of load building will assume their old importance in the not-too-distant future. It is felt that the present high level of industrial activity will not continue indefinitely, and that it may well happen that the great bulk of this new capacity may come into production at a time of economic recession. If it does, then promoting the use of the available power will be an important task.

Frequency Conversion

Another development that will add to the great tasks now being undertaken by the Canadian electrical industry is the historic change-over planned in Southern Ontario from 25- to 60-cycle power. At the present time 25-cycle power is used in an area of Southern Ontario extending from Windsor to just east of Toronto and extending about 100 miles north of Lake Erie. In this area it is estimated that a load of about $1\frac{1}{2}$ million kW will be required to be changed to 60 cycles. At the present time there is not enough surplus 60-cycle energy to carry out the task. All the new power developments of the Ontario Hydro-Electric Power Commission, several of which were listed previously, will be for 60-cycle power. When these come into production in the next few years the change-over programme will go

into high gear. This will remove one of the biggest headaches of Canadian electrical manufacturers; at the present time duplicate 25- and 60-cycle lines of a long list of electrical equipment are required to be stocked. Added to this advance will be the fact that 60-cycle equipment is generally lighter and cheaper to manufacture.

It has been estimated by Stone & Webster, well-known U.S. consulting engineers who were engaged by the Ontario Provincial Government to make a study of the proposals, that it will cost almost \$200 million and take



Artist's sketch of the proposed 384,000-h.p. development of the Shawinigan Water & Power Co. at Trenché, on the upper St. Maurice River, Quebec. Preliminary work has now started and the project is expected to cost about \$35 million

about fifteen years to complete. Mr. Harold Hobson, former chairman of the British Central Electricity Board, who was also engaged as a consultant by the Ontario Government, concurred in recommending the change-over. The cost of conversion is broken down into approximately \$58 million for the changing of generating and distributing capacity and \$133 million for the conversion of domestic, commercial and industrial equipment. It will provide an important market for electrical manufacturers for many years to come.

Consulting Engineers

THE annual report of the Association of Consulting Engineers for 1947-48 records the election of twenty-eight new members, raising the total to 248; there were two resignations and six members died during the year. To meet rising costs there is to be added to the present subscription, which is regarded as the basic minimum, an increment proportionate to the size of staff employed by each member. After three years' discussions the preparation of a "Who's Who" of consultants has been commenced. Thirty nominations for the services of consultants have been made so far this year.

Views on the News

By REFLECTOR

IT is astonishing how even the minor technicalities of electrical plant escape the daily press. I have seen several accounts of the opening of the Kingston power station by the King. Few of them gave the actual rating of the set which was started up. Some referred to a 150-ton machine and at least one to "generators turning at 900 revolutions per minute"—a very non-standard speed.

Grudgingly and bit by bit the Ministry of Works is acceding to the public demand for the continuance of the Trafalgar Square illuminations. First they were permitted for four days; then a week's extension was granted; now the lights are to be switched on on Wednesday and Saturday evenings—an excellent means of concentrating the extra traffic into two days. As it is announced that a more permanent installation is to be proceeded with, I think that the Minister might go the whole hog when this is completed and allow the fountains to be lit up every evening.

Some municipal authorities have decided, although they have lost their electricity undertakings, to keep their Electricity Committees in being and there are probably useful functions which these may still perform. But I see in the agenda for a Fulham Borough Council meeting a note to the effect that a meeting of the Electricity and Lighting Committee called for 6th October was not held "in the absence of any business to transact."

A different method of approach to the domestic user of light is adopted in the latest publication of the Lighting Service Bureau—"Light in the Home"—and I think it a change for the better. Formerly it was the practice to suggest a particular scheme for each room of an average house. Now it is realized that almost any form of lighting can be used in almost any type of room and the purpose of the booklet is to impart thirty ideas in the application of light for decoration and utility. These suggestions are well illustrated and simply described. It is claimed for them that although they look expensive most of them are not and they

certainly can be used to transform drab interiors into rather exciting ones. To carry out some of the schemes would involve a rearrangement or augmentation of the wiring—but most houses could do with this anyway.

I have found an interesting bit of history in "A Century of Technical Developments in Hungary" published by the Hungarian News and Information Service in London. In a reference to the Ganz concern it is mentioned that the company was asked to tender for the electrification of the London Underground.

"Ganz's plan was based on the three-phase system, using a line voltage of 3,000. The distribution from the centre was to be carried out by a number of transformers along the lines and comparatively small distributing conductors. This plan needed comparatively small capital investment and had the advantage of economical current consumption. The project met with great success and the railway experts, Sir William Preece and Major Cardew suggested that Ganz's plan should be accepted. Negotiations had already progressed when the shares of one of the Underground lines passed into American hands and consequently the order was placed with an American firm."

Electricity employees who endeavour to gain entrance to premises to cut off the supply in order to enforce payment of an account are not likely to be welcomed in. Consequently they may have to employ guile and that is what seems to have happened at Hastings recently. When a man was summoned he admitted hindering a representative of the South Eastern Electricity Board who called to disconnect his supply because, earlier, another man had called on the pretext of inspecting the meter and was cutting off the supply until the defendant stopped him. The magistrates seemed to deplore the subterfuge for they imposed a nominal fine of 5s. and refused to allow the costs of the prosecution.

The *Northern Scot* says:—"Three milestones in the history of the Fochabers lighting system were unexpectedly brought together recently." Milestones are more useful when kept apart.

The Lenz Laboratories

Re-equipment Completed

THE modernization and re-equipment of the Lenz Electrical Laboratories at the County Technical College, Stafford, has been completed and yesterday (Thursday), Dr. C. P. Snow, C.B.E., a director of the English Electric Co., Ltd., officiated at the opening ceremony.

The planning of this project was somewhat limited owing to the lack of additional floor space, but on the other hand, however, no limit was set by the English Electric Co., Ltd., who generously agreed to supply on a permanent loan basis any electro-dynamic equipment which was considered necessary.

The building itself is divided into two main laboratories, "A" and "B," laid out in a similar manner except that in laboratory "A" all apparatus required for carrying out ex-

periments in laboratory "B" is a three-phase commutator motor of the Schrage type mechanically coupled to a dynamometer and a 400-V two-phase induction motor also coupled to a dynamometer, the supply for the latter being taken from a Scott-connected transformer system.

Large Heat Accumulator

70-ton Vessel for Factory Power Station

A HEAT-STORAGE vessel, 77 ft long by 12 ft in diameter and weighing 70 tons, has been built from 1-in. thick steel plate for installation in a new generating station at the linoleum and cloth factory of Jas. Williamson & Son, Ltd. Its function will be to assist in maintaining balance between electricity and steam produced for heating the works by back-pressure plant designed to generate with an overall efficiency of 65 per cent.

The vessel will contain 300 tons of water at



General view of the Lenz Laboratories, Stafford

periments for the first two years of the National Certificate Course is mounted on a board running round three walls of the room. Each laboratory is provided with a diversity of supplies and each pair of single-phase, polyphase and d.c. machines is furnished with starting gear, fuses, contactors, controls and meters, all mounted on a movable steel-panelled desk.

In laboratory "A" there are eight sets of machines including a pair of rotary converters, two pairs of d.c. machines with a floating field system coupled to Ross-Ashworth weighing gear and a motor-alternator set arranged for alternator tests with loads of from 0.6 to unity power factor. Among the four sets in the other

laboratory is a three-phase commutator motor of the Schrage type mechanically coupled to a dynamometer and a 400-V two-phase induction motor also coupled to a dynamometer, the supply for the latter being taken from a Scott-connected transformer system.

120 lb per sq in. and 345 deg F. By passing steam into the vessel from the turbo-generators additional electricity will be generated when the steam demand is low, and when the factory requires extra steam hot water from the vessel will be available for the boiler without the use of steam for feed heating. The vessel was built in London and transported to Lancaster by Pickfords on a special road vehicle.

The arrangement formed part of the design of the new generating station by Jas. Williamson's chief engineer, and the vessel and its equipment have been supplied by Ruths Accumulators (Cochran), Ltd. G. A. Harvey & Co. (London), Ltd., built the steel shell.

High-Pressure Power Plant

PERFORMANCES AT BRIMSDOWN AND WILLEDEN STATIONS

FOUR installations commissioned between 1938 and 1944 by the former Northmet Power Co. comprise 50-MW and 60-MW sets at the Brimsdown "A" and "B" stations respectively operating with reheated steam at 930 deg F and 1,900 lb per sq in. together with two 32-MW sets at Willesden operating without reheating at 950 deg F and 1,300 lb per sq in.

The steam cycles were selected for the respective sites from considerations of cost of coal (which is rail-borne) and make-up facilities (cooling towers) for condenser circulating water. The design of the plant was largely determined by the need to accommodate the new machines and their auxiliaries in existing buildings.

At Brimsdown "A" there are two Loeffler boilers built in the United Kingdom under licence by the Mitchell Conveyor & Transporter Co. The Metropolitan-Vickers generating set consists of primary and condensing turbines with a house-service alternator directly coupled at the high-pressure end and two d.c. generators gear-driven from the low-pressure end are associated with the unified boiler control system.

The Brimsdown "B" plant is generally similar, of slightly greater rating, calculated to be more economical of coal (2 per cent) and water (7 per cent).

At Willesden there are two Cantieny natural-circulation boilers by the International Combustion Co. and three forced-circulation La Mont boilers by John Thompson Water Tube Boilers, Ltd. The two turbo-alternator sets are of Metropolitan-Vickers and English Electric makes, the generating voltage being 33 kV in all cases.

Difficulties Surmounted

An account of the various steps taken to surmount difficulties encountered in operation (anticipated, but not all inherently due to high-pressure working) is given in a paper read by Mr. W. N. C. Clinch (Controller, Eastern Division, B.E.A.) at a joint meeting of the Institutions of Mechanical and Electrical Engineers in London last week.

Plant modifications which have been and are being made are indicated; boiler and plant efficiencies are stated and comparative test results show that in practice the lower pressure (1,300 lb per sq in.) cycle without steam reheating does achieve the slightly higher thermal efficiency anticipated.

All four turbine installations have, however, demonstrated that the economic advantages theoretically available from the use of high pressures and elevated temperatures are obtainable in practice, which fact, the author claims,

marks a notable advance in British design and construction of steam power plant.

Starting and shutting down high-pressure turbines, particularly restarting after a comparatively brief shut-down, have proved to be delicate operations. The relative weights of metal in the high-pressure cylinder and rotor (about 12 to 1) render it essential to watch differential expansion much more closely than is normally necessary; barring gear is essential to this kind of machine and cylinder heating is provided for in three of the four machines.

Starting Methods

Normal starting procedure is to motor the high-pressure set from the low-pressure set, while bringing the Loeffler boilers up to pressure and temperature, heating steam being admitted at the exhaust end of the high-pressure turbine to ensure even expansion. Following a short-period shut-down for minor maintenance, the boilers being fully available, an attempt was made to re-start a machine as one tandem unit. It ran up to 1,200 r.p.m. without sign of difficulty but at 1,600 r.p.m. severe vibration developed. A heavy rub had occurred, due to the spindle being slightly bent by uneven cooling during the short shut-down period in the absence of barring facilities. The consequence was permanent deflection as the critical speed was approached. Resulting damage to the velocity wheel and rotor blading is illustrated in the paper. Each of the four high-pressure turbine rotors has in turn suffered damage from similar causes, in some cases more than once; the starting process is a most delicate operation, even under the closest supervision.

Thus there is need for not only extremely sensitive indication of radial eccentricity and axial differential expansion, but for recording instruments also. The Metropolitan-Vickers electrical supervisory control equipment now being installed for all four machines is regarded as a standard requirement, particularly when two-shift operation is envisaged, to enable the timing of speed increases to be determined without risk. This sensitivity must be overcome if high-pressure plant is to be capable of satisfactory two-shift operation and new procedure in boiler operation may be needed in this connection.

During 1947 the plant described generated 54 per cent of the Northmet Co.'s total output at 27.13 per cent overall thermal efficiency. Compared with the performance of the pre-war low-pressure steam plant, an economy of 74,000 tons of coal was effected in the year, which at the present time itself justifies the enterprise. The annual saving in overall cost of production was £295,000, inclusive of

capital charges, so that general financial considerations also justify the use of high-pressure steam cycles.

While hitherto neither cycle has been readily adaptable to two-shift working, the lower pressure cycle is more promising in this connection and the absence of reheating complication commends it as the optimum at the present state of development.

Although Capt. J. M. Donaldson (Northmet Co.) and the author (then Brighton Corporation) ventured independently upon the high-pressure project and met by chance in Czechoslovakia to examine Loeffler boiler installations, credit for the schemes described in this paper is given by the author to his predecessor.

DISCUSSION

There was a large attendance at the Institution of Mechanical Engineers, under the chairmanship of Mr. T. G. N. Haldane (president, I.E.E.) to hear the paper read.

The discussion was opened by CAPT. J. M. DONALDSON who said that corrosion of the reheater had been a big problem. That had been largely overcome, but he thought that if a powdered fuel plant had been put in there would not have been very much trouble.

MR. V. A. PASK said that experience with these pioneer plants was of immediate interest because of the large capacity of high-pressure plant which was due to be commissioned in the next few years. The general picture given in the paper was encouraging, in view of the relative absence of operating difficulties which could be attributed specifically to the employment of high steam pressures and temperatures. The only real difficulties coming within this category were in the running up of the turbo-alternators and even in that respect it was necessary to give due weight to the fact that at Brimsdown a reheat cycle was employed and that at Willesden the machine size was unduly small in relation to the initial steam conditions. If the latest type of turbine supervisory equipment had been available when the machines were installed, the starting difficulties would have been greatly reduced.

The station performance figures were disappointing, partly due to the poor availability of the boiler plant, coupled with the absence (at Brimsdown) of spare boiler capacity. It remained to be seen what could be achieved at Willesden, which was the only one of the three installations with a normal margin of spare boiler capacity.

MR. A. L. JENKINS (chief engineer, Turbine Department, English Electric Co.) gave some information about the plant installed at Balmain, Australia (*Electrical Review*, 17th October, 1947) which confirmed the author's conclusions that high-pressure plant did improve efficiency and could be designed to have good availability.

MR. J. F. FIELD (Controller, S.E. Scotland Division, B.E.A.) said it was regrettable that the Loeffler boilers had not been fired with

pulverized fuel, which omission had adversely affected the availability and, to a lesser extent, the thermal efficiency, having regard to the quality of the coal they were obliged to use. However, the failure to adopt pulverized fuel did not mask the other lesson that, if one limited the steam temperature to 950 deg F, one set a very definite limit upon the thermal efficiency to be expected from the plant. The reason was, in his opinion, the heavy parasitic losses in the small boilers and the steam-driven circulating pump which was part of the Loeffler boiler.

The main impression the paper left with him was the futility of attempting to get any more out of the Rankine cycle and he pleaded for reversion to simplicity and for a re-appraisal not only of Carnot's principle, but of Robert Stirling's invention of the regenerator. Steam engineers were still ignoring the significance of what the gas turbine makers had achieved.

MR. W. W. CAMPBELL (Merz & McLellan) thought one of the most interesting aspects of the subject was the comparison between reheating schemes and the non-reheating scheme at Willesden. The first advantage of reheating was clearly in drying up the back end and it seemed to be regarded in that light by a great many people. The other way in which to use reheat was for actually raising the mean top temperature level of the cycle. Looked at in the first way, reheat was obviously the handmaiden of high pressure whereas in the second way it might be the competitor also.

Importance of Availability

MR. J. N. WAITE (Controller, London Division, B.E.A.) said that, as one of the unfortunate people who for many years had been striving to cope with a peak load on insufficient plant, he would not look at any kind of plant if it had not a relatively high order of availability. The experiments described in the paper should be looked on purely as experiments. They should be kept down to reasonable proportions and there should be information on what they were costing. He was not condemning high-pressure plants; indeed, he was in favour of them, but they should form a relatively small proportion of the total until such time as it had been proved most conclusively that they had as high an order of availability as the plants which were already in existence.

MR. T. E. HOUGHTON (Castner-Kellner Alkali, Ltd.) wished to know whether there was any special reason for the relatively low efficiencies. There seemed to be a growing body of evidence that the reliability of such plant was not all that it should be. There was no doubt that many of the older plants gave a very much higher annual output per kW installed. It must not be overlooked that many of the improvements in the high-temperature cycles were due to boiler efficiency and if some of the older plants were redesigned to

work at higher boiler efficiency, he thought some rather startling results would be obtained.

MR. R. F. DAVIS (Internal Combustion, Ltd.) felt that the author's record completely vindicated those who had maintained their faith in the natural circulation boiler for high pressure. Knowledge of boiler circulation had increased since the Willesden boilers were designed ten years ago and a radically different design was now recommended. For instance, it had been for some time the standard practice to fit internal sleeves to all feed water connections where drums were over 2 in. in thickness and for design pressures over 500 lb per sq in. If this had been the practice ten years ago, the corrosion at the economizer tube seats, mentioned by the author, would doubtless have been avoided.

A steam and gas-turbine cycle combination with pulverized fuel firing might provide an overall efficiency of 35 per cent compared with, say, 28 per cent for a modern steam plant. An increase of this order would save 20 per cent in coal consumption.

MR. W. T. BOTTOMLEY (Merz & McLellan) said the machines at both Willesden and Brimsdown were too small to gain the full thermodynamic advantage of the respective pressures. He did not think that the high pressure at Brimsdown justified the cost when compared with low pressure. With temperatures of 900 to 950 deg F reheating had not been necessary to reduce the exhaust wetness and the tendency had been to shelve reheating. Reheating had paid for itself well before the war, when coal had been cheap; it became vitally important at present in view of the price and shortage of coal.

MR. G. A. PLUMMER (Knutsford) said that the combination of the low weight of contained water and the low weight of tube metal in the forced circulating boiler resulted in a lower fuel consumption to bring the forced circulation boiler on to the line and less heat loss on shutting down. This should be a distinct advantage in two-shift operation and, moreover, forced circulation ensured that even water temperature was maintained throughout so that steam raising could be accomplished as rapidly as desired without causing undue strain due to temperature difference.

Reduction of Capital Costs

MR. A. STUBBS considered that while a case had been made for increased steam pressure and temperature based upon fuel economy, it still remained a fact that the capital costs of power stations were high, and this applied particularly to boiler plant. It might be questioned whether the solution to this high capital cost was not the combination of the unit steam plant and the gas-turbine plant, so that the steam plant might be regarded as complementary to the gas-turbine plant rather than its competitor. There seemed to be only one real problem awaiting solution and that was dust separation after the boiler exhausts and before the inlet to the gas-

turbine. It might be that this problem would be easier the higher the pressure and temperature of the boiler exhaust gases.

MR. J. MAYER (International Combustion, Ltd.) could not agree with the author that self-draining superheaters were a necessary requirement. The drained superheater would not of itself cut down the time required to raise pressure, because that was dependent on limiting the entering gas temperature. In addition, as the temperature produced by the superheater increased so the number of banks increased and the structural problem caused by suspension and expansion became quite severe, so that it became advisable to consider the use of a divided superheater with the primary section drained and the secondary section of the pendant type. He had confidence in the satisfactory performance of such a combination.

MR. R. J. ELDERED (Merz & McLellan), referring to expansion troubles during starting up, said that the modern supervisory gear was only a palliative. The root of the trouble was, first, the difference between masses and, secondly, the fact that the normal operating condition of the turbine was with a gradient from one end to the other.

Polytetrafluoroethylene

ADVANCES in radio engineering and increasing use of higher frequencies, coupled with aeronautical requirements, have emphasized the need for a plastic insulating substance of small dielectric loss (less than that of polythene) over a wide range of frequency and one that will not soften at relatively high temperatures. A material of this kind is polytetrafluoroethylene, which is generally known as P.T.F.E., developed by Imperial Chemical Industries.

After research at the Royal Aircraft Establishment, British Mechanical Productions, Ltd., have developed a method of producing the intricate shapes needed for radio equipment.

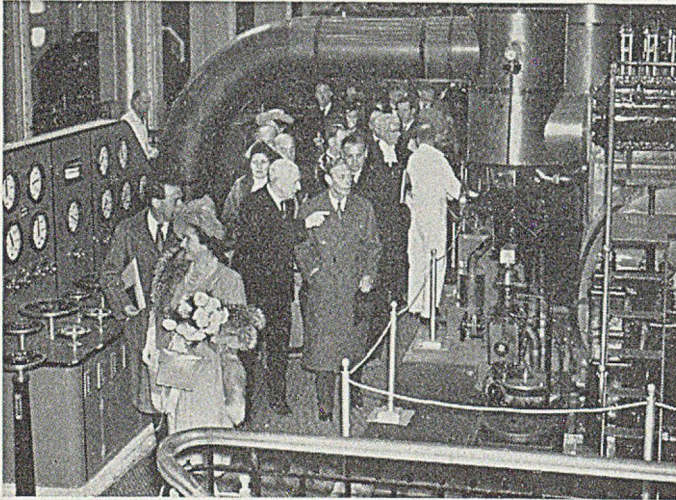
The material is transparent in thin sections but is waxy in appearance when thick. It withstands the attack of all materials, except alkali metals, and can be boiled in alkali hydroxides, hydrofluoric acid, fuming nitric acid or aqua regia without change in weight or properties. It also resists the attack of all high-boiling solvents and other organic compounds. Its inertness is explained by its molecular structure, each carbon atom being shielded by a fluorine atom.

P.T.F.E. has no true melting point, but it undergoes a transition from its solid phase at 620 deg F with a sharp drop in strength. Its electrical losses are substantially constant between 60 c/s and 3,000 Mc/s being less than those of polystyrene or polythene. Its resistance to surface arc-over is exceptional and on failing it vaporizes instead of carbonizing and therefore leaves no conducting path.

Kingston Station Opened

Tablet Unveiled by the King

ON Wednesday last week His Majesty the King, accompanied by the Queen, went to Kingston-upon-Thames to put the first 30,000-kW set of the new power station in motion. Their Majesties were greeted by the Mayor of Kingston (Mrs. Oldfield) and a number of municipal and county dignitaries and were



Their Majesties inspecting the new station. Mr. Hugh Gaitskell (Minister of Fuel and Power) is seen with the Queen. Lord Citrine is talking to the King and behind them are the Mayor of Kingston (Mrs. Oldfield) and Mr. W. C. Parker (S.E. Divisional Controller, B.E.A.)

conducted over the station by Lord Citrine, chairman of the British Electricity Authority. In the party were Mr. Hugh Gaitskell, Minister of Fuel and Power, Mr. W. C. Parker, Controller, South Eastern Division, B.E.A., and Mr. J. H. Rider, of Preece, Cardew & Rider, the consultants.

During the tour of the station the King unveiled a tablet in the turbine house commemorating the occasion and a number of those who had taken part in the planning and construction of the station were presented to Their Majesties.

Welding Practice

Need for Further Development

IN his presidential address to the Institute of Welding last week Dr. J. H. Paterson (Arc Manufacturing Co.) observed that methods of welding and the uses to which they were put would need to be further developed if they were to keep pace with the spate of new alloys becoming available to the engineering industry.

For instance only 5 per cent of the energy contained in coal burned to generate electricity

was set free in the welding arc. Even so, a large portion of that fraction was unwanted and might be dangerous if the excessive heat it generated seriously disturbed the structure of the metal being welded, or distorted the work piece. In addition the growing single-phase load imposed on power distribution networks by both arc and resistance welding might greatly handicap the future of those processes, especially as the power factor of such loads was often poor.

Thus more economical use of energy was of importance and shielding the arc with argon or helium gas pointed one way to a better thermal balance sheet: hence to more satisfactory welding at lower cost. Shielding with inert gas appeared to enable the molten weld metal to "wet" the surface of the parent metal at relatively low temperature and there was no doubt that such processes were on the eve of considerable development, but they were handicapped by the high cost of inert gases in this country.

The special report on savings in steel made possible by welding, which the past-president (Mr. J. L. Adams) had called for last year, had already been of great value to one Cabinet Committee and would be of greater value when published upon completion. Dr. Paterson favoured the extension of this idea, so that the Institute might at regular intervals publish authoritative information on different subjects.

Uses of Silicones

AT a well-attended meeting last week of the Coventry Electric Club, Mr. R. Snadow lectured on the silicones, mentioning high thermal resistance as their most notable characteristic. The resins had excellent insulating properties and their use in conjunction with woven glass cloth, or other heat resisting material, enabled electrical machines to be normally operated at 175 deg C. Such machines were smaller and lighter, for a given output.

Silicone rubber also had good insulating properties, but perhaps its chief use would be for high-temperature gaskets. The oils showed surprisingly little change of viscosity with temperature, which suggested their application as hydraulic or damping fluids as well as dielectrics; they could be thickened to make useful greases.

Italian Electrical Industry

Foreign Trade in 1947

LAST year Italy's exports of electrical machinery and apparatus showed a marked recovery on 1946. Those of power plant doubled in value and of unspecified apparatus increased more than ten times. On the other side of the account Italian purchases of electrical goods from abroad were relatively small, though much more than in 1946.

Imports of generators, motors and transformers were valued at 195,055,000 lire (133,388,000 from Switzerland) and exports at 1,897,753,000 lire (Argentina 831,608,000; Brazil, 205,288,000; Sweden, 127,025,000; and Switzerland, 176,625,000). In addition Italy imported unspecified electrical apparatus to the value of 106,364,000 lire with Switzerland the main supplier, and exported such material to a total value of 1,503,968,000 lire. (1,108 lire to the £.)

Production of electric power in Italy has recovered to nearly the record level of 1941. Last year it was approximately 20,700 million kWh compared with 17,600 million in 1946 and 15,800 million in 1938. It was estimated that last year power lost in transmission totalled nearly 20 per cent against 15 per cent average in 1938-41. Nearly three-quarters of the total power was consumed in the north—Italy's manufacturing region. The increase in consumption generally was, however, accounted for less by industry (only 10 per cent) than by the extended use of domestic electrical appliances.

Australian News

From Our Own Correspondent

THE Acting Commonwealth Statistician (Mr. S. R. Carver) has just released some interesting figures regarding Australian manufacture of electrical equipment and machinery. These show that whereas in 1938-39 the number of Australian factories making electrical merchandise was 360, at 30th June, 1947, it had increased to 658. Employees had increased from 10,666 to 25,077 and salaries and wages from £2,031,000 to £7,455,000. The cost of fuel, power, light, etc., was up from £104,000 to £244,000 and the value of materials used from £3,195,000 to £10,468,000. The total value of products (£6,954,000 in 1938-39) had reached £21,997,000 in 1946-7.

Among the articles produced during 1946-47 were 358 alternators (£143,681); 2,942 generators (£83,877); 102,607 motors (£1,144,905); 2,342 transformers and converters above 20 kVA (£508,965) and 290,415 below this rating (£376,874); storage batteries and accumulators, £2,425,866; apparatus for telegraphy and telephony, £1,325,047; electric cables and wire, £1,454,700; 141,431 electric meters (£491,176); apparatus for regulating, starting and controlling, £966,265; household fittings, £548,792;

portable tools and appliances, £118,164; small household electro-mechanical appliances £751,048; electrical appliances for motor vehicles, £64,033; 13,375 stoves, ranges, grillers and cookers (£157,505); 12,870 refrigerators (816,352); 16,654 clocks (£49,361); other domestic cooking apparatus, £236,488; electric heating apparatus, £675,660; neon signs and cold lighting, £566,155; and measuring and recording apparatus, £81,139.

France's Overseas Trade

Increased Imports in 1947

PROVISIONAL figures of the overseas trade of France for 1947 show that country as an importer of electrical power plant to a slightly greater extent than an exporter, although the reverse was shown in most other electrical lines, notably switchgear and control apparatus, radio goods, heating apparatus and cables. The accompanying table gives the values of the chief groups of imports with a note of changes compared with 1946. It will be seen that there were increases throughout all groups, e.g., 50 per cent in power plant and more than double in radio goods. Under a recent agreement with France, Sweden has undertaken to supply electrical machinery.

Classes of Imports	1947 Fr. (000)	Inc. or dec. on 1946 Fr. (000)
Dynamo - electric machines and transformers ..	744,479	+ 244,839
Switch and control apparatus ..	247,100	+ 87,100
Electric welding apparatus ..	89,328	+ 15,628
Telegraph and telephone apparatus not elsewhere specified ..	15,000	- 4,000
Automatic telegraph apparatus ..	34,005	+ 14,005
Radio apparatus except valves imported separately ..	143,654	+ 83,054
Measuring apparatus except meters ..	28,150	+ 12,950
Electro-medical apparatus ..	61,040	+ 28,040
Electric heating material ..	55,060	+ 20,760
Domestic refrigerators, elec. Unspecified electrical apparatus ..	48,750	+ 38,350
Dynamos for motor vehicles and lighting apparatus for i.c. engines ..	89,100	+ 38,500
Insulated wires and cables ..	10,755	+ 3,734
	221,365	+ 34,493

The leading French electrical exports during 1947 (valued in thousands of francs) were:—Dynamo-electric machines and transformers, 629,700 (246,000 in 1946); dynamos for motor vehicles and lighting apparatus for i.c. engines, 48,509; switch and control apparatus, 622,500 (240,000); telegraph and telephone apparatus, 180,620 (40,000); radio apparatus, 714,670 (287,000); insulated wires and cable, 487,030 (107,660); and heating apparatus, 290,300 (95,000). The greater part of these exports, which show large increases on 1946, went to France overseas. In 1947 the exchange rate was 480 francs to the £.)

PERSONAL and SOCIAL

News of Men and Women of the Industry

AT a recent meeting of the Cardiff City Council an illuminated album was presented to Mr. E. Jones, M.I.E.E., M.I.MECH.E., deputy chairman of the South Wales Electricity Board. The album contained a resolution passed by the Council congratulating Mr. Jones on his new appointment and extending to him the Council's good wishes. It also placed on record appreciation of Mr. Jones' services to the Council for forty years, the last thirteen as city electrical engineer and manager.

Mr. J. W. Laing has been appointed, as from 1st October, chief engineer of the Witton Engineering Works of the General Electric Co., Ltd. Mr. Laing served his apprenticeship with C. A. Parsons & Co., Ltd., Newcastle-upon-Tyne, after which he was engaged in the company's electrical design office. In 1929, he joined the engineering design staff of the G.E.C. at Witton as senior turbo-alternator designer and was responsible for all synchronous machines. In 1935 he returned to C. A. Parsons as senior electrical design engineer, later being appointed deputy chief electrical engineer. In addition to his wide experience in synchronous machine design, Mr. Laing has undertaken the design, installation and commissioning of a 25,000-kVA, 500 r.p.m. variable ratio frequency changer in Australia, and has made a voyage to Canada in order to study under actual working conditions the performance of turbo-electric ship propulsion equipment, for the design of which he was responsible.

Mr. A. Elderfield, A.S.A.A., has been appointed secretary of the Electric Supply Corporation (Overseas), Ltd., to succeed Mr. D. A. Green, A.C.I.S., who is now with the British Electricity Authority.

Mr. Brinley Jones has resigned his position as senior metallurgist in the Metallurgical and Research Department, Vickers Works, of English Steel Corporation, Ltd., to join Climax Molybdenum Co., of Europe, Ltd., as manager.

The Mond Nickel Fellowships Committee has made awards for 1948 to Mr. S. G. Campbell (Plessey Co., Ltd.), Mr. S. J. Garvin (Murex, Ltd.), and Mr. A. I. Nussbaum (Thos. Firth & John Brown, Ltd.).

Mr. H. Nimmo, M.I.E.E., M.INST.C.E., M.I.MECH.E., chairman of the Southern Electricity

Board has been appointed chairman of the Rural Electrification Advisory Committee of the British Electrical Development Association. Professor H. G. Robinson, Director of the School of Agriculture, Nottingham University College, has been appointed vice-chairman of the committee.

Mr. J. A. Barnett, ASSOC.M.C.T., A.M.I.E.E., is leaving the Construction Department of the British Electricity Authority head office to take up an appointment on the staff of Arthur T. Williams (Pty.), Ltd., Johannesburg. Mr. Barnett was educated at the Manchester College of Technology and served his apprenticeship with Ferguson, Pailin, Ltd., with which company he later served in the Contracts Department. He joined Cooke & Ferguson, Ltd., as head of their Export Department, and left that company early this year to take up his appointment with the B.E.A.

Mr. H. D. Roberts has been appointed commercial manager to the Affiliated Manufacturers' Associations of the Cable Makers' Association, which were established on the reorganization of the C.M.A. (*Electrical Review*, 13th August, 1948, p. 240). Mr. Roberts has been for some years a senior executive officer of British Insulated Callender's Cables, Ltd. He joined the original British Insulated and Helsby Cable Co. after the 1914-18 war and held a senior position at the Helsby Works until 1928, when he transferred to the London office of the company. He has been chairman of a number of committees connected with the cable making industry and has been a member of the Fair Trading Council for many years.

Mr. A. E. McCormack, A.M.I.E.E., has recently joined the London branch staff of Johnson & Phillips, Ltd., as a senior sales engineer. Mr. McCormack received his early training with the British Electric Transformer Co., Ltd., and later, for a number of years, was engaged on home and export sales for the Hackbridge & Hewitt Electric Co., Ltd.

Mr. Harry Moss, of Bradford, has been elected a Fellow of the Illuminating Engineering Society. Mr. Moss has been a member of the Electrical Contractors' Association for nearly thirty years, being on the National Council for ten years, and he was chairman of the Association's Bradford branch for eight years. He is now living in retirement.

Mr. F. V. Allen, of the electrical department, Cleveland Works, Dorman, Long & Co., Ltd., has been appointed assistant electrical engineer at the company's Britannia Works. He has received a presentation from the employees of the Cleveland Works where he had been stationed for thirty years.



Mr. J. W. Laing

A dinner was held at the Midland Hotel, Manchester, on 1st November, in celebration of the fiftieth year in the service of Ferranti, Ltd. of Mr. J. W. Davies, who was appointed to the board of directors on 1st January, 1942. Sir Vincent de Ferranti, chairman and managing director of the company presided.

Mr. J. B. Gwynne Lewis has recently retired from the position of manager of the Cardiff office of George Ellison, Ltd., after thirty years' service in that position. He is retained in a consultative capacity until September next when he finally retires. Mr. Lewis is succeeded by Mr. A. G. K. Williams who has been with the Ellison organization for many years. Before the last war he served at the works, at the Birmingham district sales office and as their representative in the Bristol and West of England area. During the war he was with the South Lancashire Regiment and the Royal Electrical and Mechanical Engineers. On his return from army service, Mr. Williams was appointed assistant manager of the Cardiff office.



Mr. A. G. K. Williams

Mr. G. Davidson, M.I.E.E., has been appointed assistant general secretary, and Mr. B. H. Gurr, assistant secretary, on the staff of the Association of Supervising Electrical Engineers.

Sir Louis Sterling, Mr. A. G. Snell and Mr. E. Korner have resigned from the board of Lacrinoid Products, Ltd. Mr. S. S. Gibbins and Mr. L. G. Harris have been elected directors.

Mr. R. F. Twentyman has been appointed technical director and general manager of the Bective Electrical Co., Ltd. Mr. Twentyman was previously for twelve years with F. H. Wheeler & Co., Ltd., the last four years as manager of the associated company, Thompson Ritchie & Co., Ltd. He is a member of the Illuminating Engineering Society, and a member of Executive Council of the Association of Supervising Electrical Engineers.

Mr. J. W. Taylor has been elected a director of the River Plate & Other Securities Cpn., Ltd.

The Bristol Electric Club has sent to the Electrical Industries Benevolent Association a cheque for £200, being the proceeds of its dance and prize draw held on 1st October.

The social function arranged by the Tees-side Sub-Centre of the Institution of Electrical Engineers on 26th November, will be the annual dinner and not a dinner-dance as stated in our last issue. Mr. T. G. N. Haldane, the president, will attend.

The Glasgow Branch of the Electrical Industries Benevolent Association held its second annual dinner-dance on 22nd October at the

Grosvenor Restaurant. The guests numbering 317, received by Mr. and Mrs. John H. Scott, enjoyed a very happy evening. Over £150 was obtained for the funds and this and a number of new enrolments reflected the efforts of Mr. Ray Fawcett and his committee. At dinner the "Paterson Cup" was presented to Mr. Alister Dott, the winner of the golf competition of 29th September, which increased the funds by £31. This outing was in the hands of Mr. W. S. Campbell and a committee.

About 400 people saw G.E.C. St. John Ambulance teams show their proficiency when they competed for the Gamage Ambulance and Nursing Cups at the third annual competition, which was held at the Magnet Club Sports Ground of the G.E.C. at Birmingham on 23rd October. The competitions were preceded by an inspection of the teams and a display of marching by the Ambulance Cadets. The Gamage Ambulance Cup for first aid by teams of four men was won by the company's telephone Works, Coventry; the runners-up were Chamberlain & Hookham and the G.E.C. (Witton) "B" Division—holders of the cup for the last two years—came third. In the nursing event, G.E.C., Witton, were again successful and so hold the Gamage Nursing Cup for the third year in succession. At the close of the competitions, the teams, officials and on-lookers were entertained to tea, over which Mr. J. J. Gracie, president of the Witton Brigade, presided. He extended a welcome to the Hon. Mrs. Leslie Gamage (Officer Sister of the Order of St. John), County Superintendent of Berkshire, who afterwards presented the trophies to the winning teams.

On Thursday last week a luncheon was given by Oldham & Son, Ltd., at the Clarendon Restaurant, Hammersmith, to a gathering of their service station agents. Mr. Edward Oldham, joint managing director, Mr. F. J. Wrigglesworth, director and general manager who took the chair, and Col. Stanley Bell, who was recently appointed to the board, were among those present.

Obituary

Mr. J. C. Bentley.—The death has occurred at the age of sixty-eight of Mr. Joseph Charles Bentley, managing director of Royce, Ltd., electrical engineers, a subsidiary of the Loughborough engineering concern of Herbert Morris, Ltd. He was apprenticed to the late Sir Henry Royce and assisted him to build by hand his first car, which took the road about forty-six years ago. Later he became works manager and then managing director of the company. Herbert Morris, Ltd., acquired the company on Sir Henry's death and Mr. Bentley continued to be managing director.

Mr. H. C. Channon.—The death occurred on 19th October, at the age of seventy-four, of Mr. Henry C. Channon who was chief electrical

engineer at the old Wharf Road factory of the Telegraph Construction & Maintenance Co., Ltd. He joined the company in 1891 and retired in 1933.

Mr. F. H. Livens.—The death at Droitwich is reported of Mr. Frederick Howard Livens, J.P., M.INST.C.E., M.I.MECH.E., M.I.S.I., WH.SC., who was in his ninety-fifth year. He was a former vice-chairman of Ruston & Hornsby, Ltd., and vice-president of the Institution of Mechanical Engineers.

Mr. E. E. Tasker.—The death occurred on 27th October of Mr. Edward Ernest Tasker, M.I.E.E., M.I.MECH.E., who until ill-health forced him to give up business, was a partner in the firm of McDonald & Tasker, consulting engineers.

Mr. G. A. Robertson.—The death took place on 25th October of Mr. George Archibald Robertson, M.I.E.E., for many years chief electrical engineer to Herbert Morris, Ltd. He was seventy-four and had been with the company for thirty-eight years.

WILLS.—**Mr. R. R. Martindale**, deputy chief engineer of the British Electricity Authority, who died on 22nd July, left £15,873 gross (£15,778 net).

Mr. J. H. Shaw for many years London agent for Hick, Hargreaves & Co., Ltd., and a former deputy city electrical engineer of Bradford, who died on 24th July, left £18,446 gross (£18,397 net).

Mr. E. Phillips, founder and principal of Edgar Phillips, Ltd., electrical contractors, West Hartlepool, who died on 28th June, left £28,225 gross (£28,114 net).

Mr. F. H. Johnson, director and secretary of Constructors, Ltd., and director of Poles, Ltd., who died on 29th June, left £14,166 gross (£13,943 net).

Mr. O. Cowpe, general works manager of Ferranti, Ltd., who died on 27th May, left £8,986 gross (£8,841 net).

Mr. B. Newman, electrical engineer, Ilford, who died on 31st May, left £1,714 gross (£1,617 net).

Mr. H. E. Betts, consumers' engineer for the Battersea District of the London Electricity Board, who died on 31st July, left £3,588 gross (£3,521 net).

Mr. J. J. MacGregor, C.B.E., J.P., M.I.E.E., late managing director of the Gloucester Railway Carriage & Wagon Co., who died on 4th April last, left £86,528 gross (£86,093 net).

Mr. R. A. Lower, M.I.E.E., late chief showroom superintendent of Central London Electricity, Ltd., and formerly sales superintendent to Norwich Electricity Department, who died on 19th June last, left £3,180 gross (£2,420 net).

Mr. H. E. Hawley, electrical engineer, Stoke-on-Trent, who died on 30th July, left £6,977 gross (£6,842 net).

Books Received

Problems in Electrical Engineering. By S. Parker Smith, D.SC., M.I.E.E. (Fifth Edition). Pp. 378. Constable & Co., Ltd., 10, Orange Street, London, W.C.2. Price 10s.

Short Wave Transmission and Reception. By W. Oliver. Pp. 110; figs. 18; index. W. Foulsham & Co., Ltd., 20 & 21, Red Lion Court, Fleet Street, London, E.C.4. Price 2s. 6d.

Small A.C. Transformers. By A. H. Avery. Pp. 76; figs. 45. Percival Marshall & Co., Ltd., 23, Great Queen Street, London, W.C.2. Price 3s.

Television Explained. By W. E. Miller, M.A. (CANTAB.), M.BRIT.I.R.E. (Second Edition). Pp. 52; figs. 46; index. The Trader Publishing Co., Ltd., Dorset House, Stamford Street, London, S.E.1. Price 3s. 6d.

American Electricians' Handbook. By T. Croft. (Sixth Edition). Revised by C. C. Carr. Pp. 1,773; figs. and index. McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, London, W.C.2. Price 36s. in U.K.

Essential Metallurgy for Engineers. By A. C. Vivian, B.A. (CANTAB.), D.SC. Pp. 180; figs. 36; index. Sir Isaac Pitman & Sons, Parker Street, Kingsway, London, W.C.2. Price 12s. 6d.

Training Demonstrators

WITH a view to speeding up the supply of qualified demonstrators the Midlands Electricity Board has just concluded a six-weeks' course for trainees at its Aston Fields training centre. Subsequent to the course the trainees have all been placed in districts where they will take over showroom and home-service duties under the control of senior demonstrators until they are sufficiently experienced to work on their own. Fifteen students, some of whom had been taken on direct from domestic science colleges and others from existing selected personnel, received tuition which included talks, special demonstrations and instruction on all phases of a demonstrator's work.

For the first time all available senior and assistant demonstrators in the Midlands Area, numbering 43, met in conference on 4th to 6th October. The programme included illustrated talks and demonstrations by speakers on specialized subjects and equipment.

Housecraft Course for Teachers

A two-day course in electrical housecraft for teachers is being held on 12th and 13th November at the E.A.W. Headquarters, 35, Grosvenor Place, London, S.W.1. The opening address is to be given by Mr. H. J. Randall, chairman of the London Electricity Board.

Diesel-Electric Ships

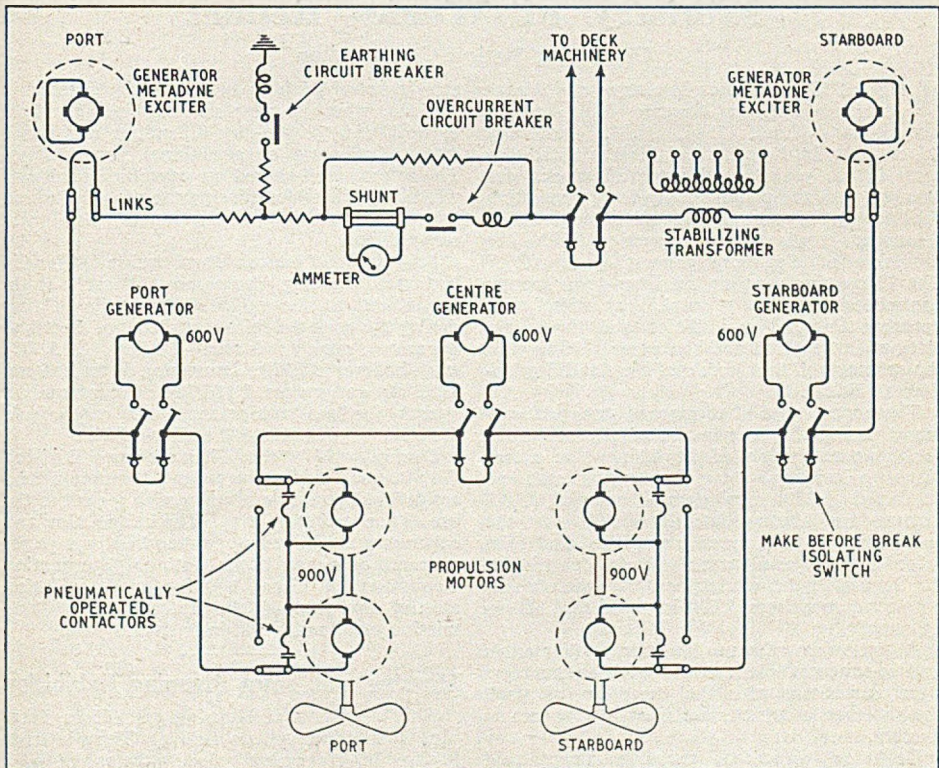
CONTROLLED CONSTANT-CURRENT SYSTEM

A TWIN-SCREW, diesel-electric, triple-grab, hopper dredger, *Mersey No. 26*, built by Ferguson Brothers for the Mersey Docks and Harbour Board, has just completed her trials. The vessel has an overall length of 237 ft, a moulded breadth of 40 ft 6 in. and a moulded depth of 17 ft 3 in., with a draught (loaded) of 14 ft 3 in. Its hopper capacity is 1,350 tons, and the s.h.p. of each screw is 836. The electrical machinery operates on the "controlled constant-current" system (not hitherto used in this country) developed by the Metropolitan-Vickers Electrical Co. as a refinement of the Austin system, in which a number of generators and motors are connected in series.

The generators are provided with a special Metadyne exciter, the salient features of which are a very small field current and a very quick response, which maintains a constant current at the voltage necessary to maintain its level irrespective of the number or rating of the

motors in the series loop. Any generator or motor can be eliminated by being short-circuited. The tendency for a consequent current increase is prevented by the action of the exciter in reducing the generator field current and hence the voltage. The propeller motors are also provided with Metadyne exciters, the variation of whose field varies the motor excitation and hence their speed. For smaller motors the fields are supplied direct from a constant-voltage auxiliary supply and controlled by rheostats.

In the installation here described, three generators and two propulsion motors operate on a constant series current of 750 A. The total voltage generated is 1,800, with a maximum to earth of 600 V. Each of the three 455-kW generators is driven by a 768-h.p., 520-r.p.m. Paxman 12-cylinder, Vee-type, pressure-charged diesel engine, to which is also coupled a 110-V, 62.5-kW constant-voltage generator supplying lighting, engine-room auxiliaries and fields of



Series arrangement of the main generators and propulsion motors indicating limit of maximum voltage to earth

deck-machinery motors. The cubicle housing the short-circuiting gear contains a relay operated by the lubricating-oil pressure of the engine, which disconnects the generator field in the event of failure of the engine, which is thus prevented from reverse motoring.

The two 836-h.p., 135-r.p.m. forced-ventilated propulsion motors are double-unit machines fitted with centrifugal overspeed devices. Each drives a tachometer generator so connected to the Metadyne exciter field that the latter responds to changes in propulsion-motor speed.

To eliminate heating losses during a prolonged stop and to bring the propellers to rest, a 750-A short-circuiting contactor is fitted across each half motor. These contactors are operated by air from a 1-h.p. Westinghouse compressor, but only when the controller has been in the "stop" position for 10 sec.

Duplicate units provide excitation for the main generators and propulsion motors. Each consists of a 40-h.p., 1,950-r.p.m. standard drip-proof motor fed from the auxiliary supply driving three Metadyne exciters, one for the generators and one for each propulsion motor. The Metadyne generator has a four-part field,

one furnished by the 110-V auxiliary supply, one by the main constant-current circuit, one by a transformer whose primary is in the main circuit and one by a shunt field for preventing hunting. The Metadyne motor field is supplied by the 110-V auxiliary supply via the controllers and by the tachometer generator.

All the propulsion equipment is controlled from a desk in the engine-room, from which control can be transferred to the bridge when manœuvring the vessel. Included in the deck machinery are three Priestman grabs, each having 62-h.p. hoist motors and 25-h.p. slewing motors, and two Stothert & Pitt winches with 50-h.p. motors. These eight motors are supplied by the constant-current loop and provided with main short-circuiting contactors, field contactors and field rheostats. A 20-kW generator direct-coupled to a 40-h.p. Paxman 4-cylinder diesel engine is also connected to the constant-voltage busbars, which are in duplicate and allow only one generator to be connected to one set at a time. The auxiliary load can be divided in any proportion between the two sets. A 90-Ah NiFe battery provides lighting and some heating in port.

Ministry of Works Report

Generating Station Construction

ACTIVITIES of the Ministry of Works during 1947 are covered in a report just issued (Cmd. 7541, H.M. Stationery Office, 9d.). In the course of this it is noted that early in the year the Minister of Works was charged with the responsibility for "expediting the supply of labour and civil engineering resources required in connection with the provision of electricity generating capacity." The Department set up an inter-departmental committee and two "working parties," one covering England and Wales and the steam stations in Scotland and the other dealing with the schemes of the North of Scotland Hydro-Electric Board.

The report says that marked progress was made during the year in the supply of labour for the construction of the 62 new, or extensions to existing, steam generating stations. In April 6,000 men were employed, with outstanding labour demands of 900. At the end of the year the number employed had been raised to 9,500 and vacancies had fallen to 400. On Scottish hydro-electric contracts the number employed rose from 1,800 in April to 3,600 in December.

Attention was given to the supply of materials and contractors' plant and all serious shortages were overcome, with the exception of steel, the shortage of which continued to give rise to anxiety.

Technical officers of the Department paid regular visits to contractors, particularly on civil engineering work in connection with

atomic power projects and electricity generating stations, where regular site meetings are held to deal with day-to-day difficulties and other matters affecting constructional programmes. The information gained on peacetime problems will be available for the industry in developing improved costing arrangements and site organization.

Production of materials and equipment for the National Building Programme is set out in appendices to the report. It is shown that during the year the following items of electrical apparatus were produced:—Cookers, 235,900; wash-boilers, 196,300; immersion water heaters, 315,300; and meters, 1,666,700. Corresponding figures for gas equipment were respectively 405,900, 414,400, 194,600 and 1,056,800.

During 1947 the Engineering Division illumination section investigated museum and art gallery lighting, especially with regard to the use of fluorescent lighting. The information and experience so gained was embodied in a paper prepared on behalf of the National Illumination Committee of Great Britain for presentation at the meeting of the International Commission on Illumination in Paris this year.

Housing and Town Planning Exhibition

The International Housing and Town Planning Exhibition will be held at Olympia from 9th to 18th November. During the exhibition a conference on living in town and country will be held.

Iron and Steel Bill

Companies to Retain Identities

LAST week the Iron and Steel Bill foreshadowed in the King's Speech was introduced by the Minister of Supply.

The proposals are to set up an Iron and Steel Corporation of Great Britain to acquire and hold the securities of companies extensively engaged in the mining of iron ore; the production of pig iron and ingot steel; or the hot rolling of steel. The Corporation will acquire all the subsidiaries of these concerns and may carry on the activities of both parent companies and subsidiaries, but if it thinks fit the Corporation may divest itself of any of these.

The companies affected are those producing over 50,000 tons of iron ore or 20,000 tons of other products and they are set out in a schedule to the Bill; they are 107 in number. Companies producing up to these quantities will have to secure licences from the Corporation to continue, but concerns producing less than 5,000 tons per annum may continue without licence.

Among the companies included in the schedule are Carron Company, Dorman, Long & Co., Ltd., The English Steel Corporation Ltd., Guest, Keen & Nettlefolds, Ltd., Hadfields Ltd., Richard Johnson & Nephew, Ltd., the Stanton Ironworks Co., Ltd., Stewarts & Lloyds, Ltd., and Thos. Firth & John Brown, Ltd.

It is intended that the acquired concerns shall retain their separate existence but the Corporation will be the sole holder of their securities. Acquisition of the securities from the present holders will be on a Stock Exchange valuation and the holders will receive in exchange "British Iron and Steel Stock" bearing a fixed interest and guaranteed by the Treasury. It is believed that stock in the neighbourhood of £300 million will be issued.

Powers are taken to prevent any "dissipation of assets" before the "vesting day" which is to be 1st May, 1960, or any later date up to eighteen months after the passing of the Act.

The general duty of the Corporation is "to secure that the products specified (in a schedule to the Bill) are available in such quantities, and are of such types qualities and sizes, and are available at such prices, as may seem to the Corporation best calculated to further the public interest in all respects.

Electrical Housecraft Advisers

THE third annual general meeting of the Association of Electrical Housecraft Advisers is being held to-morrow (Saturday) at 35, Grosvenor Place, London, S.W.1. In the morning addresses are to be given by Miss K. M. Reynolds and Miss Vera Norvick, the afternoon being devoted to the annual meeting.

Dame Caroline Haslett has accepted the Association's invitation to become its first president.

N.E.S.C.O.E. Association

Reminiscences and Future Hopes

THIS year's reunion of the North-Eastern Electric Supply Co.'s Old Employees took place in London on 28th October with Sir Arnold Gridley (the president) in the chair. Col. E. H. E. Woodward, formerly managing director of the company and now a member of the British Electricity Authority was guest of honour. As usual most of the after-dinner speeches were rich in reminiscences of pioneer work on the coast forty and more years ago, which established in important aspects the basis of modern electricity supply technique here and abroad. The enthusiasm with which the work was carried out—much of it on empirical lines that anticipated now accepted principles—and the long working days it often entailed then received material remuneration on a scale that removed any suspicion of its being a primary aim. Thus was built up a tradition of public service which, it was agreed, should serve as an inspiration to those now carrying on.

Drafts were made on their memories by Sir Arnold, whose North-Eastern experiences included nine years as a young general manager of the Cleveland & Durham Power Co., by Mr. J. R. Beard in his recollections of the staff of the same concern and by Mr. J. N. Waite in a tribute to the late R. P. Sloan. These speakers were not unmindful of the immediate troubles and the future prospects of electricity.

Supply Industry's Task

To these further reference was made by Mr. Harold Hobson, whose successful presentation in the United States of the war record of the British electricity supply industry received a warm tribute from Sir Henry Self (deputy chairman, B.E.A.), who was present as a guest and, with Mr. E. R. Wilkinson, had been present on the occasion. Mr. Hobson expressed his sincere wish that the electricity supply industry might soon extricate itself from its present difficulties and recontinue its former steady progress. Col. Woodward said he believed that the restoration of normal conditions might well signify the opening of a new era like that of forty years ago. Mr. J. Hacking (deputy chairman, B.E.A.) showed that the rate of construction each year of new generating plant would have to exceed considerably the highest pre-war figure of 700,000 kW to meet annual load increments, and to clear off formidable arrears.

On the initiation of Mr. George Wright, those present at the reunion demonstrated their appreciation of the services rendered by the hon. secretary, Mr. W. G. Bass. Qualification for membership of the Association has now been extended to include all who were with the company up to vesting date, and these should get into touch with Mr. Bass at Kern House (Fifth Floor), 36, Kingsway, London, W.C.2.

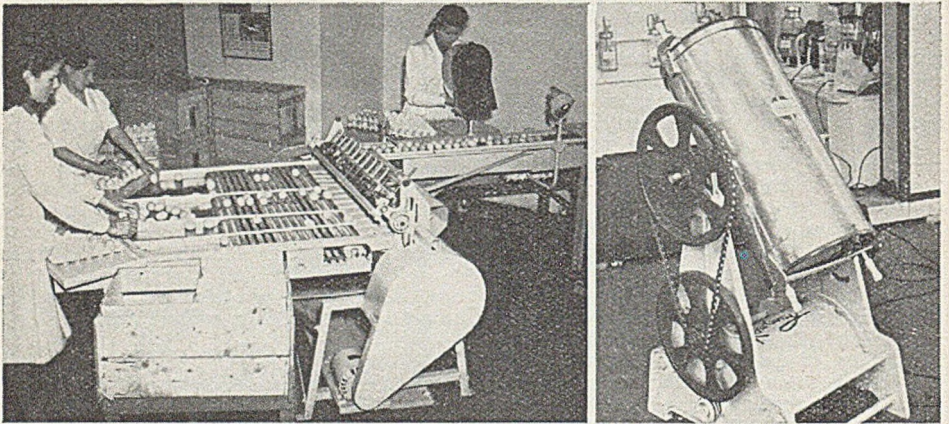
Dairy Show

ELECTRICAL AIDS FOR THE FARMER

LOOKING round the Dairy Show at Olympia, London, last week one could not help wondering how farmers who have no electricity at their service ever manage to get their work done. No matter what branch of farming they go in for—arable, dairy or poultry—electrical appliances are available for practically every operation undertaken. Many of these appliances are now considered indispensable by the modern farmer, who under modern conditions, particularly shortage of labour, would be unable to maintain high

also specialize in electric cattle clippers and sheep shearers. "An electric animal coaxer and a de-horner are other Cooper Stewart products. The G.E.C. pig farrowing heater greatly reduces mortality among piglets. Crushing, grinding, screening and elevating plant were shown by International Crushing & Grinding Equipment and Christy & Norris.

A new G.E.C. double sack hoist, supplied for single or three-phase supplies, has a capacity of 2½ cwt, with a hoisting speed of 80 ft per minute. Operation is by means of a one-hand push-



A 10,000-an-hour egg grader (Newman, Hender & Co.) and electrically operated butter churn shown by the Churn Co.

output and quality without them. It is not only to the farmer, however, that the exhibition was of interest; an ever-growing number of stands were devoted to meeting the requirements of the ice-cream industry.

Various aspects of the use of electricity in the modern dairy farm producing high-grade milk were indicated on the stands of the British Electrical Development Association by the E.D.A. colour film, "Clean Milk Production with Electricity." Copies of the Association's book, "Electricity on the Farm," which describes the principal applications of electricity in dairy, poultry and general farming, as well as farmhouse and cottage uses, were displayed on a large reproduction of the book in the form of a bookshelf. There was also an attractive scale model of an electrically driven hammer mill.

In the fields electric fences are becoming much more widely used and various types were shown by the Harvest Saver & Implement Co., the Wolsley Sheep Shearing Machine Co., and the Cooper Stewart Engineering Co. The last two companies as well as R. A. Lister & Co.

button controller, an automatic contactor gear being fitted, with self-resetting limit switches. A model of a barn hay drying installation comprised an "Aerofoil" fan (made by a G.E.C. associated company, Woods of Colchester) mounted in a main air duct from which air is passed either through lateral ducts or beneath a slatted floor on which the hay is stacked. Installations that have been in use for several years in this country have proved the value of the equipment in enabling hay to be dried independently of varying climatic conditions.

Among milking equipment, the Alfa-Laval "New Way" milker is designed for floor or wall mounting or for use in a portable unit. The neat Uni-Seco milking parlour and dairy unit is designed for six cows, but additional units accommodating two cows each may be added. Auto-recorder and tandem milking plants were shown by Gascoignes (Reading).

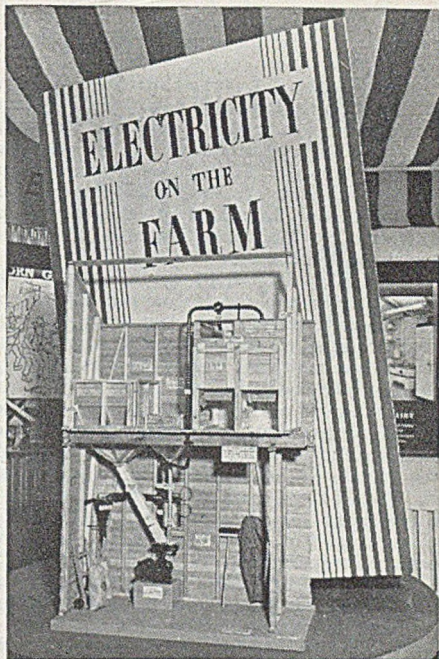
Bottle washers and fillers of all capacities up to 10,000 an hour were to be seen in abundance on the stands of many exhibitors, while pail

and churn washing machines were demonstrated by the Co-operative Wholesale Society. Pasteurizers are specialties of Perkins Clean Milk Equipment, the Dairy Supply Co., and Cherry Burrell. Electric sterilizers were included among the exhibits of the G.E.C., Barford (Agricultural), Martin's Cultivator Co., and J. W. Woolley & Co., who apart from showing their pre-war 6-kW "Clifton" unit made a special feature of the 1-kW self-contained heat storage sterilizer.

In addition to the Model 3 "Electrobloc" flash steam raiser for sterilizing combine milking plants up to four units, the last-mentioned company also introduced two new patterns of the same equipment, Model 2 intended especially for sterilizing bucket milking plants and Model 4 for dealing with combine milking plants of four to seven units. Great interest was again shown in the G.W.B. Electric Furnaces "Autolec" electrode type steam raiser shown for the first time last year. Included in the range of G.E.C. steam raisers were floating-electrode and storage types. Both of these units are suitable for sterilizing recorder-type milking machines, the latter being particularly useful for installation on isolated premises.

Examples of water heaters were displayed by the G.E.C. and Woolley, the latter including two new "Clifton" models of 35- and 60-gal capacity. Electric churns of 7- and 14-gal capacity can be supplied by the Churn Co.

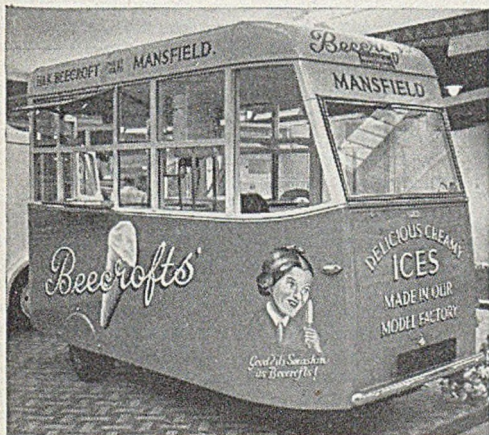
Probably the class of apparatus most diversely represented was refrigeration equipment. Milk coolers, cold-rooms, domestic and commercial type refrigerators, air coolers, frozen food cabinets, and ice-cream making and storing equipment were all to be seen in a wide variety of types. Ammonia compressor plant of up to 300 h.p. was on the stand of York Shipley, who also showed the new "Smithfridge Cleanline" metal exterior cold-room, frozen-food cabinets and air coolers. Besides service cabinets and cold-rooms Kelvinator introduced



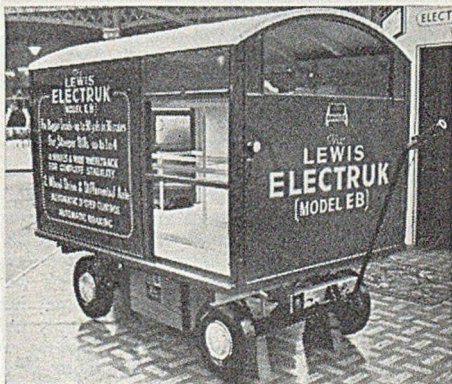
Model of an electric hammer-mill installation on the E.D.A. stand

the new "HSR" ice-cream conservators. An automatic water-ice freezing tank was a new "Hallmark" product on the J. & E. Hall stand, while Cherry Burrell and Igloo were among those showing high-speed continuous freezers.

Soft ice-cream freezers and ageing vats are specialties of Refrosta, and Denver House Sales concentrate on frosted food cabinets. Le Bryan Group Products (G.B.) introduced



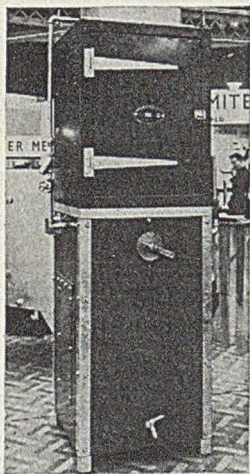
Battery-electric ice-cream kiosk vehicle (Brush) and the new model "EB" pedestrian-controlled "Electruk" (T. H. Lewis)



several new "Power Master" units, including domestic refrigerators, conservators, ice-makers and a frozen-food cabinet with built-in fluorescent lighting. A wide selection of other refrigeration equipment for dairy and ice-cream making was to be seen on the stands of Frigidaire, L. Sterne & Co., the Hertford Refrigeration Co. (L.E.C. products), Peerless Refrigeration, the Hussmann British Refrigeration Co., the Pressed Steel Co., the Essex Refrigeration Co., the General Utility Co., Universal Refrigerators, and Zero-Pak.

In addition to refrigeration equipment the Lightfoot Refrigeration Co. showed a new 25-gal ice-cream heat-treatment plant. For the medium-sized manufacturer Frigmatic had a 10-gal heat-treatment plant. Besides refrigeration and air-cooling plant, G. & J. Weir had homogenizers on view. Other examples of these, together with mixers, emulsifiers, pasteurizers, coolers and sterilizers were displayed on the stands of Cherry Burrell, T. Giusti & Son, Avrom's Dairy Products, the Boss Welding & Engineering Co., Alfred & Co., and Finance & Commerce, Ltd. Among the ice-cream processing equipment shown by W. Coombes & Sons, A. F. Gear and Astor & Co. were "choc-ice" machines. A comprehensive range of instruments specifically designed by Short & Mason for the dairy and ice-cream industries include a completely new type of "HTST"

controller and an automatic time control employing the diversion principle. A profusion of electrical devices to aid the poultry farmer comprised incubators, brooders, hovers, egg grading machines, and egg candling apparatus. Some of the incubators will accommodate 23,000 eggs or



This new Wolseley Model 4 "Electro-bloc" flash steam-raiser is designed to sterilize milking plants of four to seven units

more. A 2,500-egg model made by Western Incubators turns the eggs every hour under time-switch control and, having its own air-conditioning system, does not require a special room. Multi-heat controls, separate hatching compartments and continuous water feed are features of the Curfew cabinet incubators, the makers of which also supply combined incubators and brooders, hovers and foster mothers. Electric tier brooders were a Thos. P. Headland exhibit. A special thermo-

statically-controlled electric heater was among "Eltex" poultry appliances (George H. Elt.)

The largest of the "Ben Nevis" egg-grading machines demonstrated by Newman, Hender & Co., a four-track, twenty-four scale model, weighs, grades and stamps 10,000 eggs an hour. A feature of the two- and four-track models is the new "Non-crack" conveyor, which is claimed to eliminate completely the possibility of hair cracks and to facilitate handling. In addition to egg-grading machines, Wiltshire Egg Producers showed butter-wrapping machines.

On about a dozen stands battery electric vehicles for milk delivery and ice-cream sales. One specially designed as an ice-cream kiosk was to be seen on the stand of Austin Crompton Parkinson

New G.E.C. 2½-cwt double sack hoist



Electric Vehicles ("Morrison-Electricars"), who also showed other open and closed body styles available on 10-, 20- and 30-cwt. chassis. Another ice-cream kiosk, accompanied by a similar vehicle arranged for milk delivery, was the "Electric Pony" shown by Brush Coachwork, with "Exide" batteries and chargers.

A new model of the T. H. Lewis pedestrian-controlled "EB" "Electruk" has been designed to accommodate bigger loads (up to 1 ton, 90 gal of milk in 36 crates), to operate on even steeper hills (gradients up to 1 in 4) and to be completely stable. Other pedestrian-controlled vehicles were shown by Diamond Vehicles (Wolverhampton) and Sidney Hole—the 1-ton "Manuletric," which is of oxaluminium alloy construction.

An articulated electric vehicle was to be seen on the stand of Hindle Smart & Co., who are the sole concessionaires in the United Kingdom for "Wilson" vehicles. Two types of dairy vans were exhibited by Midland Vehicles, and "Harbilt" models (Harborough Construction Co.) included a standard chassis, a milk van, a type "670" truck and a low-loader. Two 1-ton milk floats were selected for display by Q Vehicles. Both Douglas (Kingswood) and the Lancaster Electrical Co. had several of their vehicles on view. Batteries specially designed for electric vehicles were exhibited by the Tudor Accumulator Co., and the D.P. Battery Co., the latter also showing batteries for farms and country houses. "Safetylyte" emergency lighting equipment was seen in operation.

High-Voltage D.C. Transmission

MEANS OF OPENING UP NEW POWER SOURCES

THE present "energy famine" is likely to stimulate the search for fresh sources, some of which may be remotely situated. It is therefore urged by Mr. F. J. Erroll, M.P. (W. J. Furse & Co., Ltd.) and Lord Forrester (Enfield Cables, Ltd.) in a paper presented to the Supply Section of the Institution of Electrical Engineers yesterday (Thursday) that an early decision should be made for or against the use of d.c. for transmitting power over very long distances. The authors believe d.c. can be of service in the particular circumstances considered and they feel that if suitable rectifiers and d.c. cables may be expected to become available in the near future, the fact should be made known. Otherwise they advise the establishment of such experimental installations as may be necessary to permit the manufacture of equipment to proceed on a commercial scale.

Continental Engineers' Views

Estimated costs of transmitting 2,000 MW over 370 miles in four ways are quoted (F.I.A.T. Report 1119, H.M. Stationery Office, 1947) in support of Continental opinion that the employment of d.c. is both possible and economically desirable. The French cable industry is of the opinion that solid cables are best suited to this purpose. Swedish engineers appear strongly to favour oil-filled cables, claiming that those parts of a solid cable from which compound may migrate will be liable to fail under high d.c. stress. German investigators reached the same conclusion as the Swedes, but felt that the advantages of the simpler solid cable justified the slight risk incurred.

The authors state that a typical d.c. circuit to transmit 360 MW would consist of two single-core cables of 2.5 to 3 in. overall diameter weighing 30 lb per yd and the route length would vary from 50 to 100 miles. For laying on the sea floor they would prefer self-buoyant drums to a cable ship. For overland routes d.c. cable will have to compete with overhead lines, both d.c. and a.c., so a fraction of a penny per yard cut off the installation cost may influence the choice.

The authors' inquiries (April, 1948) indicate that the total installation cost of laying by cable plough at 2 ft. 6 in. depth two 600-kV d.c. cables over 500 miles in India might be 2s. 1½d. per yard. Suggested cable sizes for various voltages, loads and losses with their approximate costs are tabulated in the paper.

The conversion to d.c. with earthed neutral of an existing isolated-neutral a.c. 220-kV six-conductor overhead line would double its carrying capacity, without increasing the percentage losses or the corona stresses in normal

operation. The cost of new d.c. lines per kW of capacity is unlikely to exceed 75 per cent of the a.c. equivalent.

Investigators are not wholly satisfied that their experiments with rectification and inversion are on the right lines. Both Swedish and Swiss organizations appear to be still seeking for fresh, perhaps simpler, methods. If such be the case (the authors believe it to be true) it offers an opportunity for British engineers demanding the attention of all who are in a position to influence development.

The paper next briefly outlines four projects which are considered to favour the d.c. transmission of hydro-electric power, from Norway to Denmark, from Tasmania to the Australian mainland, in Central-East Africa and from Tibet to India. Undersea telephone cables which have been operating since 1910 between Tasmania and Victoria have a satisfactory maintenance record.

The authors conclude with a reminder that the 500-yd section of 132-kV gas-compression cable experimentally connected in series with overhead grid lines in Yorkshire in 1944, now in its fourth year of uninterrupted service, has done all that was claimed for it. They suggest that by similar and more extensive co-operation a large-scale experiment with d.c. transmission, by cable and overhead line, might be undertaken in the British Isles.

I.E.S. Manchester Centre

THE Manchester Centre of the Illuminating Engineering Society opened its session with a luncheon at the Midland Hotel, Manchester, which was attended by the Lord Mayor of Manchester (Alderman Mary L. Kingsmill Jones), the president (Mr. J. M. Waldram) and other prominent personalities.

The toast of "The City of Manchester" was proposed by Mr. H. Atherton (chairman of the Centre), and the Lord Mayor responded. Miss N. Kenyon (member of the North Western Electricity Board) in proposing the toast of "The Illuminating Engineering Society" stressed the great need for education in the application of lighting. In replying, Mr. Waldram referred to the loss which the Society had sustained in the death of Mr. J. S. Dow and Sir Clifford Patterson.

The vice-chairman of the Manchester Centre (Mr. Fergus J. R. Makin) proposed the toast of "Our Guests" which was replied to by Mr. W. J. Wellwood Ferguson. Over 100 persons attended the luncheon, including the chief engineer (Mr. O. Howarth) and chief commercial officer (Mr. A. O. Johnson) of the North Western Electricity Board.

COMMERCE and INDUSTRY

Power Convention Exhibition. Large Cable Contract.

THE British Electrical Development Association is arranging an exhibition in connection with the British Electrical Power Convention which is being held at Torquay from 13th to 17th June next year. Manufacturers who wish to take part in the exhibition are asked to notify the general manager and secretary of the Association, 2, Savoy Hill, London, W.C.2, by 30th November.

Electricity Output

The output from solid fuel fired generating stations in the week ended 22nd October was 844.7 million kWh, as compared with 805.2 million kWh for the preceding week and 790.5 million for the week ended 24th October, 1947. Stocks of coal at electricity undertakings at 23rd October were 4,480,500 tons.

Commonwealth Visitors at Witton

Representatives of Commonwealth Parliaments visited the Witton Engineering Works of the General Electric Co., Ltd., on 15th October, the party including members of the Parliaments of New Zealand, South Africa, Eire, India and

of Commonwealth unity. Mr. W. Black, M.L.C., of New Zealand, the deputy leader of the delegation, replied on behalf of the visitors.

Production Engineering Research

The new workshops of the Production Engineering Research Association of Great Britain at Staveley Lodge, Melton Mowbray, were opened on 26th October by Sir Geoffrey Heyworth, chairman of the Advisory Council for Scientific and Industrial Research. Sir Geoffrey Heyworth mentioned in his speech that in 1939 the Institution of Production Engineers established a small research department at Loughborough College with funds provided by Lord Nuffield, which during the war was able to carry out a number of short investigations of a type which abundantly proved the practical value of research work in the production engineering field. The director of the present Association and some of his staff had come from that earlier organization.

The Advisory Council and the D.S.I.R. itself were glad to have been able to assist the Association in its plans. Government assistance had been generous in subscribing £ for £ with industry and in making a special grant of £25,000 towards the machine tools required.

Swiss Industry and Trade

Industrial activity in Switzerland remained very high at the beginning of 1948, but with a tendency to fall, especially in the textile and watch-making branches, states Mr. W. Harpham, O.B.E., H.M. Counsellor (Commercial) at Berne in a review of the country's

economic and commercial conditions published by H.M. Stationery Office, price 2s. Last year 800 new factories were built, making a total of 11,000 against 9,000 at the end of the war. The electrical engineering industry had another prosperous year, with a growing demand for power plant, instruments and apparatus. The post-war rush of overseas contracts has partly subsided, but orders on hand should ensure production at full capacity for several years. Supply of domestic apparatus exceeds the demand, and there is little opportunity for foreign manufacturers in a keenly contested



Representatives of Commonwealth Parliaments with Mr. J. J. Gracie, general manager of the Witton works of the G.E.C., and other officials of the company

Northern Ireland. They were received by Mr. J. J. Gracie, the general manager of the works, and were then conducted around several sections, including the main engineering, switch and transformer works. Several members were particularly interested to see equipment destined for their own countries. Following a visit to the mercury arc rectifier works, where demonstrations were given, the party was entertained to lunch at the Magnet Club. The chair was occupied by Dr. C. C. Garrard, resident director, who welcomed the guests and emphasized the importance of such visits as links in the chain

market. Electricity consumption in the country rose from 5,613 million kWh in 1938-39 to 9,488 million kWh in 1945-46. It is estimated that by October, 1953, the plant capacity will be sufficient, under normal conditions, for an output of 12,797 million kWh per annum. A lengthy drought in 1947 seriously affected output, necessitating strict rationing of industrial and domestic consumption. At the end of 1946 domestic appliances in use included 285,000 cookers, 295,000 water heaters, 48,000 refrigerators and some two million small heating appliances.

First Collier Arrives at Cliff Quay

On 21st October (Trafalgar Day), the collier *Bushwood* steamed up the River Orwell taking the first 4,000 tons of coal for the new 270-MW generating station at Cliff Quay, Ipswich. This was the first coal boat to arrive at the station and it went alongside bedecked with flags in honour of the occasion. The arrival of the boat heralds a further step towards the commissioning of the first section of the station, which it is hoped will commence operation towards the end of the year. The occasion was marked by an official greeting at the quay and amongst those present were Mr. W. N. C. Clinch (controller, Eastern Division, B.E.A.), Mr. C. T. Melling (chairman, Eastern Electricity Board), Mr. John Charrington (chairman, Charrington, Gardner, Locket, Ltd.), the Mayor and other officers of the Ipswich Corporation and representatives of the harbour authorities.

Cable Makers' Christmas Wages

The Joint Industrial Council for the Electrical Cable Making Industry has notified its members that it will be necessary in those establishments which observe the public holidays mentioned in Clause 2 (a) of the Memorandum of Agreement on Payment for Statutory Holidays for an alternative day of holiday to be agreed in substitution for Saturday, 25th December. It will not, however, be necessary to substitute an alternative day for Sunday, 26th December, as the following day will be a Bank Holiday. All time worked on the day substituted for Christmas Day is to be paid for at the rate of double time; time worked on Saturday, 25th December is to be paid for at the normal rates applicable to Saturday work; all time worked on Sunday, 26th December is to be paid for at the rate of double time; and time worked on Monday, 27th December to be paid for at the appropriate rate for Boxing Day, e.g., time and a half in respect of day work.

G.P.O. Engineering Wages

Complaints regarding the poor wages paid to members of the union were voiced by Mr. D. J. W. Coward, general secretary of the Post Office Engineering Union at a meeting in London last week. Mr. Coward said that the highly-trained technician was paid 97s. a week at 21 rising to 155s. at 34 and over in London;

in the provinces the rates ranged from 93s. to 148s. per week. In London skilled workmen Class IIB were paid 87s. at 21 rising to 114s. at 30; corresponding rates in the provinces were 83s. to 110s. Skilled workmen Class IIA received an allowance on these rates of 6s. a week. Labourers' rates in London were 83s. at 21 rising to 98s. after two years' service; in the provinces the rates were 79s. to 94s.

Claims for improved wages had been lodged at the beginning of April last but although in the same month an assurance had been given that the matter would be dealt with as quickly as possible, nothing practical had been done.

The meeting decided that unless it received a definite reply to this request from the Postmaster-General by the end of the week steps would be taken to force the issue. A ballot is to be held to decide whether the Union should adopt a strike policy.

Australian Cable Contract

The Brisbane City Council has started work on a 33-kV scheme for the transmission of energy from the new power station at Tennyson. A main feature will be a duplicate interconnector between the existing New Farm power station and Tennyson, a distance of approximately six miles. There will also be a ring main between the New Farm station and the northern suburbs of the city. This main will feed 33/11-kV, 7,500-kVA transformers in substations at Kedron, Northgate and Hendra. Contracts for all the cables in this scheme have been awarded to Pirelli-General Cable Works, Ltd., Southampton (an associated company of the G.E.C.) and include over 50,000 yd of 33-kV cable and over 40,000 yd of pilot cables. The total value is approximately £A.400,000.

Arc Welding Manual

In order to meet the demand for a pocket sized manual on electric arc welding the Quasi-Arc Co., Ltd., Bilston, Staffs, has produced a 74-page instruction book giving brief and concise details of all aspects of the subject. This booklet is packed with information which will be invaluable to the welder, the foreman and the designer and is likely to prove a useful addition to existing arc welding literature.

Batti-Wallahs

The principal guest at last week's luncheon of the Batti-Wallahs' Society, was Mr. E. W. Delve, chief officer of the London Fire Brigade, who in addition to giving an absorbing account of the incendiary and flying bomb attack on London, brought with him two films made by the National Fire Service while raids were in progress.

The first film, which dealt with the fire in the City of London on 29th December, 1940, was a vivid portrayal of its immensity. It showed the difficulties under which the Fire Brigade fought

the thousand or so fires, and impressively recorded the heroism of the men who manned the engines, pumps and hoses. The second film showed how the Brigade helped to counter the worst effects of the flying bomb, and the part it played in rescue work.

Price Reductions

The Midland Electric Manufacturing Co., Ltd., announces that it has reduced the prices of all its products by 5 per cent as from 1st November. The company states that the reduction is permitted by economies which have been effected in the works by improved post-war designs, the installation of new and improved machines, and the improvement of the supply of raw material which has permitted the return to normal planning for mass precision manufacture.

Drying Hay

A Technical Report, W/T17, on "Barn Hay Drying" by C. A. Cameron Brown and P. G. Finn-Kelcey has been issued by the British Electrical and Allied Industries Research Association, Thorncroft Manor, Dorking Road, Leatherhead, Surrey, at 9s. 6d. net. It describes investigations carried out during 1945, 1946 and 1947 and gives details of the decentralized installations and the results obtained. The authors suggest methods for applying the process to British farming and for the construction and operation of full-scale installations which can be housed in new or existing buildings. The Report, of 42 pages, includes thirty diagrams, and in addition there are twelve plates. The appendices dealing with equipment and design can be obtained as a separate document, W/T17A, at 9d. net, so as to bring the particulars within reach of the small farmer.

Equipment at Kingston

Referring to our article in last week's issue, Aiton & Co., Ltd., state that they supplied the central evaporator plant. The evaporator has a net gained production of 25,000 lb per hr and employs a P. & B. vapour compression system of working.

Two Chloride batteries have been installed in the new Kingston power house. One comprising 55 cells with a capacity of 400 Ah is used for switch operation and indicator and signal lamps and in emergency for certain essential lighting points. The second battery of 16 cells with 100-Ah capacity is used for metering.

A.P.L.E. Scottish Section

The inaugural meeting of the new Scottish Section of the Association of Public Lighting Engineers is being held today (Friday) at the City Chambers, Dundee. The meeting will be officially opened this morning by Lord Provost Powrie, and will be followed by addresses by Mr. N. Boydell, the president of

the Association, and Mr. T. Lappin, chairman of the Section. Following a lunch there will be talks on street lighting by a nominee of the Chief Constables (Scotland) Association, Mr. J. King, Mr. J. C. Lamb and Councillor D. M. Christie. Mr. T. Wilkie (past president) will also speak.

"Guilty Chimneys"

Evidence against coal smoke is presented in "Guilty Chimneys," published by the National Smoke Abatement Society, Chandos House, Buckingham Gate, London, S.W.1 (price 1s.). Over a hundred quotations from many kinds of authority are included, with extracts from official reports and a number of striking photographs.

Rhodesian Agencies

The U.K. Trade Commissioner at Salisbury, Southern Rhodesia, reports that Wallace & Sons, P.O. Box 1078, Bulawayo, desire United Kingdom agencies for the following classes of goods in respect of Northern and Southern Rhodesia and Nyasaland:—Refrigerators; electric cookers; vacuum cleaners; washing machines. Further information can be obtained on application to Export Promotion Department (Ref. E.P.D. 41957/48. Com./1181/I.D.2.)

N.W. Board Buys a Hotel

Haddon Hall Hydro, one of the largest hotels in Buxton, has been acquired by the North Western Electricity Board for use as a training school. Mr. George Gibson, chairman of the Board, has stated that it is hoped eventually to share with other Boards the training facilities which are being arranged.

Eastern Electricity Board

The Eastern Electricity Board has now moved its headquarters to Wherstead, near Ipswich (telephone: Ipswich 51041). The Chief Engineer's Department will remain temporarily at Finborough, Stowmarket, Suffolk, and the Chief Accountant's Department at Northmet House, Cannon Hill, Southgate, N.14.

B.E.A. East Midlands Division

The permanent headquarters of the East Midlands Division of the British Electricity Authority are now at British Electricity House, Barker Gate, Nottingham (telephone: Nottingham 46151). Address of the Accountancy Department of the Division is still c/o R. B. Blaker, 3, King Street, Nottingham.

Soldering Methods

Researches into the soldering process are reviewed in a new edition of the handbook entitled "Notes on Soldering," by W. R. Lewis, which is issued free of charge by the Tin Research Institute, Fraser Road, Greenford, Middlesex. This compilation of the more

important facts likely to be of value to users of solder on a large scale for manufacturing assembly purposes discusses the various forms of solder and describes methods of applying heat to the joints so that their principles may be easily discerned and readily adapted for any particular applications. The importance of design for soldering is emphasized.

The fundamental principles underlying the production of wiped joints in lead pipes are fully covered and alternative types of joint in lead pipe are described and illustrated. Aluminium, stainless steel, cast iron and other "difficult-to-solder" alloys are capable of being soldered by the special methods suggested. There are data on the behaviour of solders at various temperatures, under tensile and shear stresses, and under creep conditions, together with notes on the metallurgical constitution of the tin-lead solders; also a bibliography and a detailed scheme for the chemical analysis of tin-lead solders devised by Dr. J. W. Price.

This 88-page booklet illustrated with 47 photographs and diagrams, is available to readers in the United States of America who should apply to Dr. Bruce Gonser, The Battelle Memorial Institute, 505, King Avenue, Columbus, 1, Ohio.

Switchgear Company Acquired

Dorman Smith Holdings, Ltd., announces that it has acquired all the share capital in British Klockner Switchgear, Ltd., of Chertsey, which company will continue to manufacture motor control gear. Mr. G. A. Standen who has managed the company for the past seven years, has accepted a seat on the board, and has been appointed managing director.

Fibreglass

The Lord Provost of Glasgow, Sir Hector McNeill, recently paid a visit to the Possilpark factory of Fibreglass, Ltd., and inspected the various processes, including the manufacture of glass yarn for the insulation of wire and cable. At the luncheon, Sir Hugh Chance, chairman of Fibreglass, Ltd., outlined the policy of the company.

"Wireless World" Publications

The *Wireless World* Diary for 1949 contains in its reference pages information, mostly technical, of the kind that every wireless man needs. The data is that most widely useful in the design and maintenance of radio equipment. In addition there are general reference pages giving a summary of existing regulations affecting the wireless user, addresses of radio organizations, etc. There is also a large selection of useful formulæ, abacs for easy graphical estimation of such things as coil windings and circuit constants, lists of units abbreviations, definitions and classifications, with a number of miscellaneous circuit diagrams. Base connections for some 400 valves are

included. Data is given for television and extra short-wave aerials; this has been revised to include F.M. aerials designed for the projected B.B.C. service. The diary, which is bound in imitation leather, is published by Iliffe & Sons, Ltd., price 3s. 4½d. (including purchase tax), and is obtainable from stationers and booksellers.

The *Wireless World* Great Circle Projection Map, first drawn by the late J. St. Vincent Pletts at the time when world wide radio communication was just beginning, has again been reprinted. The map gives the true bearing and distance "as the radio wave travels" to any part of the world from London or, with negligible error, from any part of the British Isles. Copies are obtainable from the Publisher of *Wireless World*, Dorset House, Stamford Street, London, S.E.1, at 2s. 6d. (by post 3s.).

Radio Interference Prevention

The Postmaster-General has introduced a new Wireless Telegraphy Bill, one purpose of which is to give the Post Office powers to prevent the use of electrical apparatus which causes interference with radio reception. It is proposed that where any offending apparatus is in use the owner may be served with a notice requiring him not to use it after a given date—usually 28 days after the serving of the notice—unless a suppression device has been fitted. Users will have the right of appeal against a notice to a tribunal.

The Bill is also designed to put on a permanent basis legislation for the licensing of radio receiving and transmitting apparatus, including radar equipment.

Dearer Lead in America

The American Smelting & Refining Co. and the St. Joseph Lead Co. this week raised the price of lead by 2 cents a pound, bringing it to a record level of 21.50 cents in New York and 21.30 cents in St. Louis. The Consolidated Mining & Smelting Co. of Canada has made a similar increase in the domestic market.

South African Import Control

The introduction of import control by the South African Government is considered imminent, according to press reports from Pretoria. It is understood that in its initial stage the measure will be designed to restrict the purchase with dollars of non-essential luxury goods such as radio sets, refrigerators, etc.

Art Exhibition Lighting

Ekco-Ensign, Ltd., has recently carried out a temporary fluorescent installation for the exhibition of pictures held by the Beecroft Art Gallery Society at the Westcliff Hotel, Southend. The lighting was most effective. The company says that there was no suggestion of colour distortion. Mr. I. D. Spark, a member of the company's Illuminating Engineering Depart-

ment, advised on the installation which made use of both 5-ft and 4-ft lamps and employed two types of fittings. Each exhibit was separately treated.

London Electricity Warning

Mr. E. J. Taylor, chairman, Electricity Subcommittee, London and S.E. Regional Board for Industry, on Monday urged that economy plans should be introduced at once without official instructions. Commercial premises must use not more than half of their installed capacity between 8 a.m. and noon and between 4 p.m. and 6 p.m., with effect from Monday. In the three months December-February the economy hours in London will be from 7 a.m. to 7 p.m., more than the national peak hours, because of the concentration of entertainment premises, hotels and restaurants. A warning was given that whole streets of shops and business premises may have complete power "black-outs" on a rota basis unless they economize.

Works Visit

On 27th October, members of the Joint Anglo-American Council on Productivity visited the Ilford works of the Plessey Co., Ltd. They were conducted over the works by Mr. A. G. Clark, chairman, and Mr. J. A. Smith, director and secretary of the company. With the party was Vice-Admiral J. W. S. Dorling, C.B., M.I.E.E., director of the Radio Industry Council.

Dissolution of Partnership

Messrs. W. E. Vaughan and I. S. V. Leafe, trading as electrical engineers at 28, Messenger Lane, West Bromwich, under the style of Vaughan & Leafe, have dissolved partnership. Mr. Vaughan will attend to debts.

Trade Publications

Everett Edgcumbe & Co., Ltd., Colindale Works, Hendon, London, N.W.9.—Catalogue sheet 300/4809 giving technical description of "Inkwell" recording instruments.

Isopad, Ltd., 14, Poland Street, London, W.1.—Priced leaflet illustrating electric heating pads and blankets.

Thos. Dryden & Sons, Ltd., Grimshaw Street, Preston.—Priced leaflet on the "Drydenair Major" electric radiator.

Modern Electrical Industries (Southern), Ltd., 9 Hatherley Road, Sidcup, Kent.—Priced and illustrated folder on "Warmabed" heating pads.

Thorn Electrical Industries, Ltd., 105-109, Judd Street, London, W.C.1.—Folder illustrating the Mary Ann "Bedalax" vacuum cleaner.

Jelson Electric, Ltd., Coventry Road, Sheldon, Birmingham, 26.—Leaflet describing a wash-boiler safety switch unit.

C. W. Outram & Co., Ltd., Woodville, Derbyshire.—Two illustrated leaflets on re-

fractories for electric fires, tubular heaters, cookers, etc., and vitreous porcelain insulators for lighting, heating and power purposes.

Brookhirst Switchgear, Ltd., Northgate Works, Chester.—Priced leaflet No. 598 on the type YH contactor break star-delta starter for motors of up to 20 h.p.

George Turnock, Ltd., Tunion Works, Navigation Street, Walsall.—An illustrated catalogue of lampholders, ceiling roses, plugs and sockets, connectors and other electrical accessories with a separate price schedule.

White Electrical Instrument Co., Ltd., 10, Amwell Street, Rosebery Avenue, London, E.C.1.—A pamphlet giving illustrated particulars and prices of torsion balances and accessories.

Sun Electrical Co., Ltd., 118-124, Charing Cross Road, London, W.C.2.—Priced leaflet on electrically heated pads and blankets.

Kenbar Electrical Co., Ltd., Manor Way, Elstree, Herts.—Priced leaflet illustrating the "Kenbar" star-delta starter for motors of up to 15 h.p.

Wandsworth Electrical Mfg. Co., Ltd., 32, Frederick Street, Birmingham, 1.—Illustrated price list of domestic and industrial switches and plugs.

Lumsden Lamp Co., Millburn, Almondbank, Perth.—Catalogue and price list of ultra-violet and infra-red "sun" lamps.

Scophony, Ltd., Wells, Somerset.—Two bilingual leaflets (English and French), R/10 on a high speed wood router and B/10 on strobodynamic balancing machines.

Trade Announcements

Northern Coachbuilders, Ltd., has been allocated a further new factory on the Team Valley Trading Estate near Newcastle-upon-Tyne. This will be solely concerned with the construction of N.C.B. electric vehicle bodies—chiefly for the bakery, dairy and general delivery trades.

Silentbloc, Ltd., and its subsidiary company, the Andre Rubber Co., Ltd., have recently opened northern headquarters at 11, Cloth Hall Street, Huddersfield, under the management of Mr. H. Clements assisted by Mr. K. Walker (telephone: Huddersfield 5491).

English Clock Systems, Ltd., the industrial branch of Smiths English Clocks, Ltd., has moved to new premises at "Speedometer House," 179-185, Great Portland Street, London, W.1. (telephone: Welbeck 0226). The address for the works and delivery of all goods is still Wharfedale Road, King's Cross, London, N.1.

Drug Houses of Australia Export, Ltd., 2-3, Norfolk Street, Strand, W.C.2, have been appointed London buying agents for Goldsbrough, Morton & Co., Ltd., Melbourne, and wish to communicate with manufacturers of equipment including 32-V generators and electrical appliances for use in country districts, and small electric welders.

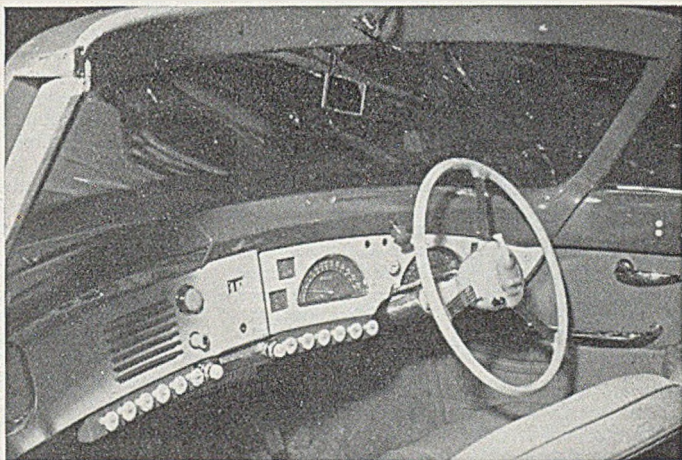
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Motor Exhibition

INCREASED USE OF ELECTRICAL ACCESSORIES

ALTHOUGH it is ten years since the last Motor Show was held we have failed to discover any new applications of electricity among the exhibits now to be seen at Earls Court, London. What was very noticeable, however, apart from a general improvement in design, was the very much greater use that is being made of the electrical appliances available. Electrical features that before the war were to be found only on the most expensive cars, have now become largely standardized, while so many electrical devices are now included in the luxury car that it is becoming a problem to find room on the dashboard to accommodate all the controls.

Car heaters, de-frosters and de-misters, and motor-operated window and hoods are among the more popular refinements now finding an increasing use. A neat new de-froster and de-mister shown by the Key Leather Co. is available in both standard and dual-heat models: it is held to the window by suction discs. Many cars, if not already fitted with radio sets, are wired ready to accommodate them. Masteradio, Philco, Radiomobile and



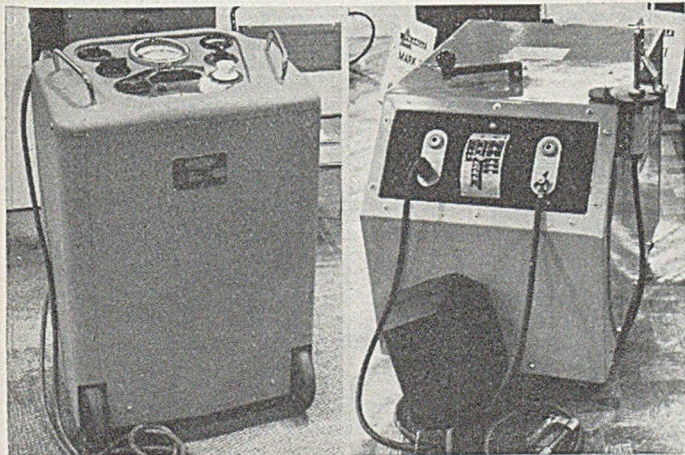
So many electrical devices are now included in the luxury car that it is becoming something of a problem to accommodate all the controls. Note the pushbuttons on the door for the hood and window

E. K. Cole all show up-to-date receivers of exceptional compactness, the last-mentioned company displaying a new short-wave model.

The installation of the controls for the horn, trafficators and headlamps is facilitated by a new steering column unit (Simms Motor Units), the various components of which can either be fitted one on top of the other or mounted separately. Most headlamps are now built into the wings and efforts still continue to reduce dazzle. Joseph Lucas, Ltd., give demonstrations of their flat-topped beam control. A magnetic

inspection lamp is a useful accessory which is made by the Notek Electric Co.

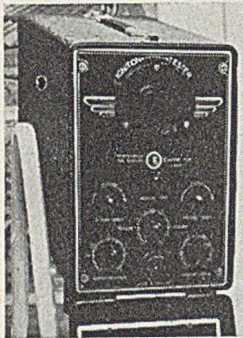
Among ignition equipment special attention is drawn to Runbaken "Oilcoils" which are claimed not only to give easier starting but to reduce petrol consumption considerably. In addition to magnets for all types of vehicles the B.T.H. Co. has impulse starters to simplify engine starting



The "Davenset Model Q" fast battery charger and one of the new Triangle welders

where electric starters are not provided, and electric speed indicators for marine engines.

Increased output, smaller size and reduced weight have been achieved in a new Lucas dynamo by employing the latest development in insulating materials designed for increasing



dynamo driving speed and by using aluminium for the end bushes. The dynamo measures only 3.9 in. in diameter compared with 4.5 in. for the unit it replaces.

Batteries are well represented by Oldham & Son, Peto & Radford, Chloride

English Electric electronic ignition tester

Electrical Storage Co. ("Double-Life" models), Brown Bros., the Young Accumulator Co., Tungstone Products, S. Smith & Sons (England) and Park Bros., who also show the "Park Cyclometron" for automatically testing batteries. New terminals for heavy-duty batteries appear on the C.A.V. stand.

Battery chargers to meet all requirements from those of private car owners for home charging to those of large garages and service stations are to be found on the stands of Philips Electrical, Partridge, Wilson & Co., F. C. Heyberd & Co., and S. Guitermann & Co. The new "Davenset Model Q" fast battery charger (Partridge, Wilson) is automatically controlled, the charge rate tapering at a pre-determined rate and a time switch preventing overcharging. Either 6-V or 12-V batteries can be dealt with, the maximum charging rate being 114 A. The equipment, which is easily moved on roller tyred wheels, is supplied with a portable moving-coil high-discharge battery tester.

Garage Equipment

There is a very comprehensive display of other electrical equipment for garage use—electric hand tools, drills, polishers, sanders, cylinder reboring machines, valve refacing and grinding machines, shot-blasting apparatus, paint spraying equipment, electro-plating plant, compressors, tyre inflators, car lifts, washing plant and metering petrol pumps, including export types recording in litres and computing in foreign currencies. Simplicity and speed of operation are among noteworthy features both of the new Romac "Elecstatic" vulcanizer and also of a new range of Triangle portable welders.

Fault locating and testing equipment has become very much more extensively used and tends to become ever more elaborate. A particularly interesting collection of apparatus

on the Crypton Equipment stand includes fixed portable engine analysers, "electrical service shops," various types of test benches, armature testing growlers, armature drop testers, ammeter and voltmeter testing sets, electrical tachometers and fault-finding test sets. A new English Electric electronic ignition tester employing an entirely new technique enables the electrical performance of the entire ignition circuit to be observed while the engine is moving. It takes into account the natural working conditions, including compression and temperature, both of which directly affect the sparking-plug firing voltage.

On the Benjamin Electric stand lighting equipment for use in factories, garages and service stations, includes a new range of "Fluorolier" trough reflectors for fluorescent tubes, finished with "Crysteel" vitreous enamelling. The new fittings include troughs having apertures to give a proportion of upward light; others are designed to be used with visor front covers, thus providing a totally enclosed unit with either glass or "Perspex" visor front.

More Fluorescent Light

INCREASED use of fluorescent lighting in schools and factories as a means of reducing fatigue and improving the nation's eyesight was advocated by Dr. J. N. Aldington, director of Siemens Research Laboratories, in a lecture before the Preston Scientific Society last week.

The beneficial effects of sunlight were well known and there was increasing evidence that the use of fluorescent light, when properly applied, resulted in similar benefit due, it must be added, largely to the psychological effect produced by rooms lighted to an adequate degree in pleasing colours.

The new 5,000-W xenon gas-arc lamp recently developed for street lighting was demonstrated in the hall in which Dr. Aldington was speaking. It was demonstrably true, he said, that an increase in street and road lighting could have a powerful effect in reducing the incidence of road accidents at night, but so far economic considerations had tended to restrict the application of the best practice to limited sections of streets and highways.

Register of Scottish Designers

THE Scottish Committee of the Council of Industrial Design is compiling a register of industrial designers living in Scotland who will be available for Scottish industry. The register is intended to include all designers at present on the staffs of manufacturers in every branch of industry and also designers working as consultants on their own account. Applications for membership of the register will be dealt with at the office of the Scottish Committee, 95, Bothwell Street, Glasgow.

Electricity Supply

Power Station Sites at Doncaster and Wimbledon

Blackpool.—**STREET LIGHTING CONVERSION.**—The Corporation is taking steps to convert 518 street lamps from gas to electric lighting at a cost of £8,521.

Bradford.—**ANNUAL ACCOUNTS.**—The accounts of the former City Electricity Department for the year ended 31st March last show a net profit of £21,563. Income rose from £1,318,762 to £1,393,060 and working expenditure from £1,111,262 to £1,285,257. Sales aggregated 262.3 million kWh (against 254.5 million in 1946-47).

Doncaster.—**PROPOSED NEW STATION.**—The British Electricity Authority has applied to the Minister of Fuel and Power for consent to the establishment of a new generating station on a site of 5½ acres at Crimpsall, Doncaster. The installation will include two 30,000-kW turbo-alternators and four 180,000-lb-per-hr boiler units. Plans can be inspected at the Town Clerk's office, 1, Priory Place, Doncaster, and objections to the application by owners or lessees of property within 300 yards of the site must be sent to the Secretary, Ministry of Fuel and Power, Electricity Division, Cromwell House, Millbank, London, S.W.1, within thirty days of 4th November. A copy of any objections must also be forwarded to Mr. H. F. Carpenter, secretary, British Electricity Authority, British Electricity House, Great Portland Street, London, W.1.

Mr. W. H. Dunkley, chief generating engineer (construction) for the Yorkshire Division, addressed a meeting of Doncaster Civic Trust on 26th October on the subject of the proposed station. The Trust decided for the time being not to press for an inquiry into the scheme, but the deputy chairman suggested that the B.E.A. might consider an alternative site at Barnby Dun, about four miles away, having regard to the nuisance which he said would be caused to Doncaster by sulphur fumes and grit. Mr. Dunkley told the meeting he would report back later after he had submitted the matter of the suggested alternative site to the B.E.A.

Eastern Area.—**BOARD'S PROGRESS REPORT.**—In the first six months of nationalization the Eastern Electricity Board has connected 25,378 new consumers giving a total of over 1,200,000; among them are over 400 farms. Since 1st April, 1,515 million kWh has been sent out, an increase of 244 million—nearly 20 per cent—on the previous year. Much of this increase was probably due to the cold summer.

Over 120 miles of h.v. and 150 miles of l.v. mains have been laid and 300 new substations put into commission. About 150 housing estates have been connected and many of the thousands of new consumers are using electricity for cooking.

Kettering.—**LOSS ON YEAR'S WORKING.**—A deficit of £15,919 is shown in the accounts of the former Kettering Electricity Department for the year ended 31st March last. Revenue amounted to £778,829 while working expenses were £753,888, leaving a gross profit of £24,941. After meeting loan charges of £47,132 and bringing in sundry income there was a loss as stated.

Oldham.—**YEAR'S RESULT.**—Sales of electricity increased from 130.5 million kWh in 1946-47 to 142.9 million last year, according to the statistical tables included in the accounts of the former Corporation Electricity Department. The year's revenue amounted to £695,508 (against £627,343), working expenses being £648,835 (£510,993). The net result was a loss of £1,662.

Reading.—**MUSEUM LIGHTING.**—The director of the Corporation Museum and Art Gallery is to submit to his Committee a report upon the installation of a new lighting system in the museum and art gallery.

Wimbledon.—**OPPOSITION TO POWER STATION PROJECT.**—The Town Council has agreed to present the strongest possible opposition to the proposal of the British Electricity Authority to erect a new power station at Wimbledon on the ground that it will be partly on land used by the council for sewage and refuse disposal. An amendment that the B.E.A. scheme should be facilitated by the co-operation of the Council was defeated by 18 votes to 7.

WINTER SURCHARGE DISLIKED.—The council has expressed dismay at the London Electricity Board's proposal to increase electricity charges during the three winter months. A resolution passed by the Council contends that the heavy increase for the winter quarter will not be offset by the proposed reduction in the three subsequent quarters, and asks for the proposal to be abandoned.

Overseas

France.—**E.C.A. ASSISTANCE.**—The Economic Cooperation Administration has announced further details of the use of 45,000 million francs from the French counterpart funds to increase France's productive capacity. Included in this is about 25,000 million fr. to be used for increasing electric power production. The amount is allocated as follows:—Electricité de France, 17,000 million fr.; Cie National du Rhône, 4,000 million fr.; and power plants at mines, 4,000 million fr. The funds for Electricité de France are to be used for further construction of sixty hydraulic plants and eleven thermal plants with a corresponding yearly productive capacity of 7,000 million kWh of hydro-electricity and an installed thermal

TRANSPORT

power of 750,000 kW. All the thermal plants and most of the hydro-electric plants are expected to be in operation in 1952 and will raise France's electric power capacity to 40,000 million kWh a year against 26,300 million in 1947. The Compagnie Nationale du Rhône is using its funds for the hydraulic equipment programme on the Rhône including the Genissiat project. Power plants at mines now under construction will ensure the use of an increasing tonnage of low quality coal in the production of electricity to be delivered to the distribution network of Electricité de France. The main group is being installed in the north and Pas de Calais districts. The total plant capacity will be 265,000 kW.

Norway.—POWER PRODUCTION.—Under the provisions of a four-year plan proposed by the Norwegian Department of Commerce, the production of hydro-electric power in Norway is to be expanded by at least 30 per cent as the basis of a considerable increase in the output of the electro-chemical and electro-metallurgical industries. Between 1938 and 1948 the annual production in Norway increased from 9,650 million kWh to 12,300 million kWh. If the Department's programme is carried out, production in 1953 will reach the level of 16,000 million kWh. To finance this expansion, investments totalling 684 million kroner (about £35,000,000) in new water-power plants will be required.

Spain.—COALFIELD GENERATING STATION.—A new generating station, situated on the coalfield at Ponferrada, is due to start production before the end of the year with an initial output of 50,000 kW. This will be increased eventually to 150,000 kW. The total cost of this project, officially described as "one of the most important links in the chain of power generating stations which the Government is setting up throughout the country," is estimated at 150,000,000 pesetas. The plant is scheduled for completion next summer.

Sweden.—IMPROVED CONDITIONS.—Several weeks of rainy weather have contributed greatly to the improvement of the Swedish waterpower system, some of the largest reservoirs having been filled to capacity. The shortage of reserves has been decreased by 100 million kWh of late but the total present storage is still 400 million kWh short of normal capacity. In view of this situation it has been announced that power rationing—which has made it possible to reduce weekly power consumption by 10 million kWh to 240 million kWh on an average—will be maintained. A draft bill has been submitted by the Swedish Waterfalls Board with the aim of prolonging the present rationing for a term of three years.

Tasmania.—FINANCING HYDRO-ELECTRIC SCHEMES.—A loan of £4,392,000 applied for from the Commonwealth Loan Council for 1948-49 includes £1,173,000 on account of the Hydro-Electric Commission.

Finland.—LARGE HELSINKI SCHEME.—An expansion programme involving the expenditure of 380 million Finnish marks in 1949 has been drawn up by the metropolitan transport company of Helsinki, the capital, of which 120 million marks is to be spent on new trams and 48 million on trolley-buses. A further 100 million is to be spent on motor-buses.

Liverpool.—TRAMWAY ABANDONMENT.—The Passenger Transport Committee recommends that application be made for powers to spend £614,000 on the conversion of the transport system from trams to motor-buses and the repair of much of the wear and tear on the permanent way. The programme of conversion would be spread over a period of ten years. It is estimated that to put the whole of the track into a reasonable condition would cost more than £1,600,000. The first proposed abandonment of tramway routes affects about twenty-nine miles of track. No further renewal work on tram tracks after 1950 is contemplated, provided that the abandonment programme is completed by 1958.

Sweden.—ELECTRIC "RAIL-BUS."—What is claimed to be "the world's first electric rail-bus" has been introduced by the Swedish State Railways in collaboration with the A.S.E.A. The construction is in principle identical with that of the usual diesel-electric design, except that it is operated from overhead lines. During a trial run from Krylbo to Falun recently a speed of 100 km per hour was obtained. It is expected that series production of the new type of rail-bus will be commenced soon by the State Railways.

Co-ordination in Ulster

THE Northern Ireland Minister of Commerce (Sir Roland Nugent) has appointed Sir Eyre Gordon, C.S.I., C.I.E., to be chairman of the Northern Ireland Joint Electricity Committee. The other members of the committee are the chief electrical engineers of the Belfast Corporation (Mr. J. C. Girvan) and the Electricity Board for Northern Ireland (Mr. T. G. Christie).

The function of the Committee will be to co-ordinate the generation of electricity in Northern Ireland and to ensure that the two large stations at Belfast and Ballylumferd and any other stations, hydro-electric or otherwise, which eventually come within its control, operate to the best advantage. The Committee will also be concerned with factual problems arising from any arrangements which may be made for the interchange of supplies with Eire.

Sir Eyre Gordon has had a long and distinguished administrative career in India and became chairman of the Indian Public Service Commission in 1936. He returned from India during the war and served with the Ministry of Food.

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Reports and Dividends

The Parsons Marine Steam Turbine Co., Ltd., reports a profit for the year ended 30th June last of £107,879, as compared with £118,016 for the preceding year, to which is added other income of £22,524, making £130,403. After providing for taxation, etc., there is a net profit of £21,169 (against £40,879). The final dividend is 9½ per cent, making 12½ per cent for the year (against 15 per cent), and the balance carried forward is £23,902 (against £29,521, less profits tax arising on retrospective increase in rate £5,000, brought in).

Falk, Stadelmann & Co., Ltd., report consolidated profits for the year ended 31st March last of £491,248, to which is added investment income of £8,295 and profit on sale of securities £442, making £499,985. After deducting directors' remuneration, depreciation and tax, there is a net profit of £157,830 to which is added £176,172 brought in making £334,002 available. The ordinary interim dividend is 10 per cent, plus a final bonus of 5 per cent (same), £31,000 is placed to general reserve and £15,000 to contingencies reserve, and after making other allocations, a balance of £175,402 is carried forward.

Ferranti, Ltd.—The accounts of this company for the year ended 30th June last were dealt with in our last issue. Following the annual meeting on 18th November there will be an extraordinary meeting at which a resolution will be submitted for the establishment of a pensions fund for officers and employees.

Belliss & Morecom, Ltd.—Consolidated trading profits for the year ended 31st March last amounted to £38,050, to which is added £24,146 income from investments, making £62,196, and the net profit was £12,442 of which £344 is retained by the subsidiary. For the previous year the trading profit of the parent company was £104,327, with £25,514 income from investments, making £131,841, and there was a net profit of £55,683. The year's distribution on the ordinary shares is maintained at 14 per cent.

Hoover, Ltd.—It is announced that shareholders have applied for 50 per cent of the 540,000 ordinary 5s. shares recently offered. The balance of the issue has been taken up by the underwriters.

Bagdad Light & Power Co., Ltd.—The chairman, Sir Kinahan Cornwallis, stated at the annual meeting in London that the year had witnessed continued expansion of the company's business. Total sales during 1947 amounted to 25,092,000 kWh against 20,852,000 in the preceding year, an increase of 20 per cent. Consumers connected at 31st December, 1947, numbered 30,544, compared with 25,831 at the

end of 1946. The board had decided to place orders for a second 12,500-kW generator together with steaming and auxiliary plant, and to reinforce the transmission and distribution system. Modern premises for offices and stores had also been approved.

On 4th October last the company was served by the Minister of Communications and Works of Iraq with twelve months' notice of the Government's intention to purchase the undertaking. The directors were taking legal advice regarding the date on which the right to purchase first arose under the concession, as in their opinion it had not been adopted by the Government of Iraq.

Lancashire Electric Light & Power Co., Ltd.—Under Section 21 of the Electricity Act, 1947, a meeting of all holders of securities of the former company is to be held at the Café Royal, Regent Street, London, W.1, on 24th November to receive a statement from the stockholders' representative on the completion of his duties, and his accounts for the three months ended 31st March, 1948.

The City of London Electric Lighting Co., Ltd., has announced a dividend of 1½ per cent for the period from 1st January to 31st March last.

The Anglo-Portuguese Telephone Co., Ltd., has declared an unchanged interim dividend of 3 per cent.

G. & J. Weir, Ltd., are again paying an interim dividend of 10 per cent.

Kerry's (Great Britain), Ltd., has declared an interim dividend of 5 per cent (unchanged).

New Companies

Elcontrol, Ltd.—Registered 22nd October. Capital, £3,000. Manufacturers of, and dealers in, electro-mechanical recording and controlling devices, particularly relating to the ascertainment, recording and control of changes in electrical capacity, temperature, atmosphere and light, liquid level and flow control, etc. Subscribers: E. R. Thomas and H. S. Connolly. Regd. office: The Clock House, 7, Arundel Street, W.C.2.

H. E. Hawley (Stoke-on-Trent), Ltd.—Registered 25th October. Capital, £7,500. To acquire the business of an electrical engineer and contractor carried on by Edgar Bloor at High Street West, Stoke-on-Trent, as "H. E. Hawley." Subscribers: E. Bloor and L. C. Heath. Regd. office: High Street West, Stoke-on-Trent.

P. Harding, Ltd.—Registered 25th October. Capital, £3,000. Electrical engineers and general electrical installation contractors, armature winders, wireless engineers and service agents, etc. Directors: P. Harding, B. G. Suthers and

Mrs. B. J. Harding. Secretary: G. Bennett. Regd. office: 26, The Drive, Liddington Hall, Worplesdon, Surrey.

E. R. Insulator Co., Ltd.—Registered 25th October. Capital, £5,000. Electricians, electrical, radio and general engineers, etc. Subscribers: H. P. Dickenson and E. E. Howard. Solicitors: S. J. Grey & Willcox, 61, Newhall Street, Birmingham, 3.

Lockhart, Cole & Co., Ltd.—Registered 25th October. Capital, £1,000. Electricians, radio and television and electrical engineers, etc. Directors: D. H. Lockhart and F. N. Cole. Secretary: Betty H. Cole. Regd. office: 32, The Mall, Ealing, W.5.

F. R. Hunter & Co., Ltd.—Registered 19th October. Capital, £500. To acquire the business of a radio and electrical dealer and contractor carried on by F. R. Hunter at 156, Westbourne Street, Hove, Sussex. Directors: F. R. Hunter and Olive J. Hunter. Regd. office: 17a, Queen's Road, Brighton.

Multi-Broadcast (Mid-England), Ltd.—Registered 18th October. Capital, £100. Distributors and relayers of radio television and radio programmes, wireless telephony and telegraphy, etc. Directors: N. Edyvean-Walker and F. S. G. Scott. Regd. office: 24, Market Place, Rugby.

Composite Radio Products, Ltd.—Registered 18th October. Capital, £2,000. Manufacturers and repairers of, agents for, and dealers in, wireless and television sets, accessories and apparatus, artificial lighting apparatus, electrical fittings, etc. Directors: J. W. Weld and J. C. Minifie. Regd. office: The Old School, High Street, Wool, Dorset.

Companies Struck Off Register

The names of the following companies have been struck off the register and they are thereby dissolved:—Bennett's Electrical Supplies, Ltd.; Ellis Electric, Ltd.

Increase of Capital

Asea Electric, Ltd—Increased by £200,000, in £1 ordinary shares, beyond the registered capital of £350,000.

Bankruptcies

N. A. M. Settle, lately residing at 142, St. George's Road, Bolton, electrical engineer.—Receiving order made 20th October on a creditor's petition.

W. H. Tordoff, residing and carrying on business at 10, Burnett Avenue, Manchester Road, Bradford, electrical engineer.—Application for discharge to be heard on 10th December at the County Court House, Bradford.

T. Williams, electrical engineer, residing at Wilholme, Lucknow Road, Short Heath, Willenhall, Staffs, and trading in co-partnership with G. Williams, now deceased, at Willenhall,

as Geo. Williams & Son, electrical engineers and contractors.—First and final dividend of 2½d. in the £, payable 17th November at the Official Receiver's office, Somerset House, 37, Temple Street, Birmingham, 2.

A. Fielding, residing and carrying on business at 223, Whalley New Road, Blackburn, electrician.—Supplemental dividend of 2s. 11d. in the £, payable 17th November at the Official Receiver's office, 20, Byrom Street, Manchester.

E. B. Page, carrying on business at 10 & 12, John Street, Hyde, electrical engineer.—Last day for receiving proofs for dividend 12th November. Trustee, Mr. F. C. Ormrod, 20, Byrom Street, Manchester, 3.

Private Arrangement

H. G. Thornton, trading as "Thornton Electric Co.", 218, Victoria Park Road, Hackney, London, E.—Creditors were called together recently when it was shown that the liabilities totalled £1,871 against assets of £435. It was stated that in 1947 the turnover was about £7,000 and there was a possibility of the business being sold as a going concern. A resolution was passed in favour of a deed of assignment being executed to Mr. S. Sherwood, Harold Road, Upper Norwood, London, S.E.

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers, which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

Portugal.—A Lisbon company requires agency, covering Portugal and its colonies, for electric cables. (X.201.)

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to know the names of the makers of the following:—

"Fingalite" clamp-on type table and desk standards.

"Grayvac" vacuum cleaners.

"Murlek" toasters.

"Frequentis" arc lamps.

"Koolesi" lighting fittings.

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

STOCKS and SHARES

CONSIDERATION of the Iron and Steel Bill is overshadowing most other Stock Exchange topics. In the market directly concerned, prices of the shares to be (perhaps) taken over, opened this week at a discount on the estimated compensation figures. Other sections of the industrial market are speculating on the possibility of switching orders from steel shares, on the lines of those which hoisted prices at the time of the railway and electricity operations. Experience does not, however, encourage the idea. Exclusion of Vickers, Babcocks and Tube Investments from the scheme was welcomed.

The gilt-edged market is digesting fairly satisfactorily last month's £100 million helping of new 3 per cent British Electricity Stock 1974/77. A fractional premium has been maintained on the newcomer's issue price of 99½. Other Government issues, particularly of course those with which the new stock comes closely into competition, remain subdued but not seriously disturbed. The original Electricity Stock, dated 1968/73, stands at 101½. British Transport 3 per cents, redeemable 1978/88, are quoted at 99½, of which the fraction roughly represents accrued interest. Understandably, the market has temporarily lost the sparkle which characterized the early-autumn advance, but is coping with these issues in a manner suggesting that "safety first" is still a very active investment principle.

Joseph Lucas Prospects

The Motor Show and the company's impending accounts give a double reason for current interest in Joseph Lucas £1 ordinary shares. The report for the year ended last July is due in a few weeks' time. A year ago, the distribution was raised from 15 to 17½ per cent. At 82s. 6d., the shares yield £4 4s. 10d. per cent, a return which does justice to the company's trading position, exemplary record, and impressive balance sheet. In the last-named, group reserves exceeded the total capital of £2,342,500 (nearly all in ordinary stock), while net liquid assets, including a million in cash, totalled nearly £5½ million. Consolidated profits represented, last time, earnings of 32 per cent on the ordinary. This year's interim was doubled, to 5 per cent, merely to improve the proportions of the two annual payments, and maintenance of the total distribution is taken for granted.

Television

People who claim that fortunes are going to be made—one day—from television hold the view that this country is on the eve of big expansion. Most of the well-known British companies are actively interested in domestic television. In the cinema market, the best known are Cinema-Television 6d. shares, quoted at half-a-crown, and Scophony 1s. shares, at 1s. 6d. The former is a subsidiary in the Rank

cinema group, and owns the Baird patents, with an ancillary business in Bush Radio. A 10 per cent dividend has lately been paid. Scophony has drastically reorganized the capital and infused £100,000 fresh working funds into the revival programme; no dividend has yet been paid. Indirect television interests are manifold.

Company News

Ferranti's chairman referred a year ago to the company's policy of concentrating on heavy plant at the expense of lighter appliances. As a result of the past year's trade, profits of the parent company were maintained at about the former level, but with the aid of increased contributions from the transatlantic subsidiaries, and of reduced taxation, the net profit of £182,000 represents a useful advance. Public interest is confined to the half-million 7 per cent preference stock, quoted at 35s. to yield 4 per cent. Profits cover the dividend about nine times. Falk Stadelmann's profits for the year ended last March show a modest increase, and are well within total group earnings. Reference is made, in the report, to the question of further capital, and also to difficult business in departments such as those concerned with domestic appliances. The £1 shares have lately risen 3s. 9d. to 45s., at which they pay 6½ per cent on the 15 per cent distribution.

The Month's Changes

Our monthly price lists record the all-round improvement which has taken place in the industrial markets since the beginning of October. Few spectacular changes are shown, but rises of up to two or three shillings are agreeably numerous. Most of the leading electrical equipment shares are better to that extent, thanks in part to G.E.C.'s excellent results. Tube Investments have celebrated their escape from the Steel Bill by rising 6s. 3d. on the month. E.M.I. at 19s. 6d. are 1s. 6d. higher as a result of the bigger distribution. Deccas are an active market in advance of the accounts. From 17s. 6d. they have been up to 23s. and are now 20s. 6d. Cable & Wireless and B.E.T. stocks have made further advances. Our price lists have been revised this week to bring in eight other electrical shares of public interest.

Hoover New Shares

Of the 540,000 new 5s. ordinary shares offered by Hoovers at 34s. 6d., only about half were taken by the shareholders who had the right of subscribing. The other 270,000 shares will go to the underwriters. It is understood that the Hoover Company of Canada, which holds by far the majority interest in Hoover, Ltd., did not apply for its proportion of new shares, and this is the reason why the new issue showed a disappointing result. The price of the new shares is 34s. 6d. middle, the same as that at which the shares were offered to the proprietors. The old shares have gone back to 35s., a fall of 2s. since a month ago.

Electrical Investments

Past Month's Price Changes

Company	Dividend		Middle Price	Month's Rise or Fall	Yield p.c.	Company	Dividend		Middle Price	Month's Rise or Fall	Yield p.c.
	Pre-vious	Last	1 Nov. 1948				Pre-vious	Last	1948		
Overseas Electricity Companies						Equipment and Manufacturing					
Atlas Elec.	Nil	2	14/-	..	2 17 2	Aberdare Cable	10	15	63/3	+3/3	4 15 0
Calcutta Elec.	6†	6†	33/6	-3d.	3 11 8	Aron Elec. Ord.	15	15	50/-	+1/8	6 0 0
Cawnpore Elec.	13	13	40/-	..	6 10 0	Assoc. Elec. Ord.	15	15	75/-	+3/6	4 0 0
East African Power	7	7	46/-	+1/6	3 1 0	Automatic Tel. & El.	12½	12½	63/3	..	2 19 1
Jerusalem Elec.	5	6	17/6	-½	6 8 0	Babcock & Wilcox	15	15	71/6	+2/0	4 4 4
Madras Elec.	8	8	37/6	..	2 13 2	Baldwin, H. J. (2/-)	25	25	9/3	-6d.	5 7 9
Nigerian Elec.	12½	10	35/6	+½	5 12 8	British Aluminium	10	10	47/6	+3d.	4 4 2
Palestine Elec. "A"	7†	Nil	28/9	-½	—	B. I. Callender's	6½	6½	34/-	+0d.	3 18 3
Perak Hydro-elec.	Nil	Nil	12/6	..	—	British Thermostat (5/-)	23½	23½	26/9	+1/-	4 7 9
Whitehall Inv. Pref.	—	6	25/6	..	4 14 1	British Vac. Cleaner (5/-)	20	20	12/3	..	8 3 4
Equipment and Manufacturing (Continued)						Transport and Communications					
Johnson & Philips	15	15	70/-	+½	4 5 9	Anglo-Am. Tel. Pref.	6	5 5/8	116	-2	—
Lancashire Dynamo	22½	22½	5½	+½	4 8 0	Def.	1½	1½	22½	+1	—
Laurence, Scott (5/-)	12½	12½	14/6	+1/-	4 6 2	Anglo-Portuguese	8	8	30/-	..	5 6 8
London Elec. Wire	10	10	47/6	+½	4 4 2	Brit. Elec. Traction: Def. Ord.	50	50	1965	+40	2 10 10
J. Lucas	15	17½	82/6	+½	4 4 10	Calcutta Trams.	10	Nil	31/8	-1/-	—
Matthee & Platt	11	11	52/-	+½	4 4 7	Cape Elec. Trams	6	6	30/-	-½	4 0 0
Metal Industries (B)	10	10	45/9	+2/-	4 7 4	Cable & Wireless: 5½ Pref.	5½	5½	128½	+3	4 5 7
Mid. Elec. Mfg.	35	35	8½	..	4 5 0	Ord.	4	4	210½	+9½	1 18 0
Micrex	20	20	92/6	+5/-	4 6 7	Globe Tel. & Tel. Ord.	5†	5†	48/-	+½	2 1 8
Newman Ind. (2/-)	22½	22½	16/9	-3d.	6 13 6	Great Northern Tel. (£10)	15	12	21	..	5 14 3
Oldham & Son (1/-)	60	60	10/9	-6d.	5 11 6	Inter. Tel. & Tel.	Nil	Nil	20	..	—
Plessey (5/-)	20	20	16,3	+½	6 3 0	Marconi-Marine	7½	7½	31	+6d.	4 16 9
Parsons C. A.	12½	12½	62/-	+1/6	4 0 8	Oriental Tel. Ord.	10	16	54/-	..	5 18 6
Pye Deferred (5/-)	25	25	26/3	..	4 15 3	Telephone Props.	6	6	17/6	..	6 17 2
Radio & Tel. (2/-)	40	—	5/-	-3d.	—	Tele. Rentals (5/-)	10	10	11/-	+3d.	4 11 0
Revo (10/-)	27½	27½	59/6	..	4 12 10	T. Tilling	10	10	117/6	+½	1 14 2
Reynolds	12½	12½	61/3	..	4 1 8						
Scophony (5/-)	—	—	1/6	-6d.	—						
Seet. Cable (4/-)	30	30	23/3	+3d.	—						
Siemens Ord.	7½	7½	34/6	+1/6	4 7 0						
Switchgear & Cowans (5/-)	10	20	16/6	..	6 1 3						
T.O.C. (10/-)	15	15	32/6	..	4 12 4						
T.O. & M.	10	10	44/-	+6d.	4 11 0						
Telephone Mfg. (5/-)	9	9	9/6	+3d.	4 14 9						
Thorn Elec. (5/-)	25	25	18/9	..	5 6 8						
Tube Investments	22½	25	6 7/8	+0/3	3 17 8						
Vactric (5/-)	Nil	Nil	10/-	+½	—						
Veritys (5/-)	2½	5	4/-	..	6 5 0						
Walsall Condents (4/-)	70	70	56/3	+½	4 19 3						
Ward & Goldstone (5/-)	50	50	59/-	+1/6	4 4 9						
Watford (2/-)	15	15	5/9	..	5 4 4						
Westinghouse Brake	14	14	65/-	+½	4 6 2						
West, Allen (5/-)	10	10	10/6	+9d.	4 17 7						

* Dividend postponed.

† Dividends are paid free of Income Tax.

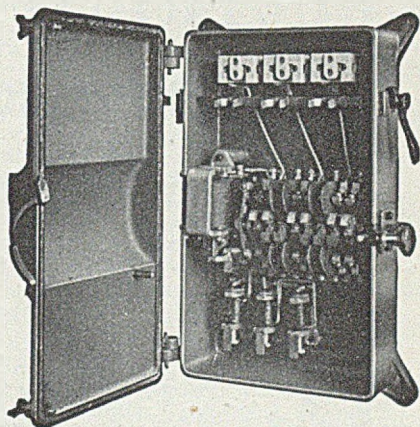
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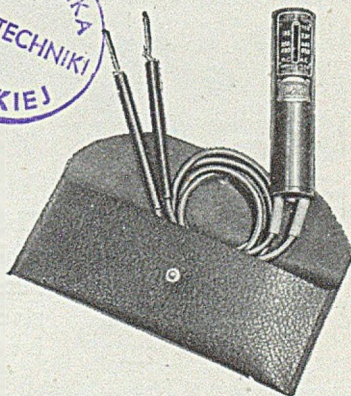
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Next Week's Events

Monday, 8th November

BIRMINGHAM.—Imperial Hotel, 6 p.m. I.E.E. South Midland Supply and Utilization Group. "Special Electrical Requirements of a Viscose Rayon Factory," by C. H. Freeman and H. V. Mather.

CARDIFF.—At the South Wales Institute of Engineers, 5 p.m. I.E.E. Western Centre. "Centralized Ripple Control on High-Voltage Networks," by T. W. Ross and R. M. A. Smith.

LIVERPOOL.—Reece's Restaurant, Parker street. I.E.E. Mersey and North Wales Centre. Annual dinner and visit of president.

LONDON.—At the Institution of Electrical Engineers, 5 p.m. Institution of Post Office Electrical Engineers. "The Possibilities of Super H.F. Radio and Wave-guide Systems for Telecommunications," by W. J. Bray.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "The Design of Large Vertical-Shaft Water-Turbine-Driven A.C. Generators," by E. M. Johnson and C. P. Holder.

Tuesday, 9th November

BELFAST.—Queen's University, 6.45 p.m. I.E.E. Northern Ireland Centre. "Load Dispatching and the Reasons for it, with special reference to the British Grid System," by A. R. Cooper.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. Continuation of the Discussion on "To what Extent does Distortion really matter in the Transmission of Speech and Music?" opened by P. P. Eckersley.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Measurements Group. Discussion on "Automatic Load and Voltage Control with reference to Meter and Instrument Testing," opened by J. Almond and A. Glynne.

WIMBLEDON.—Compton Hall, Compton Road, 7.30 p.m. A.S.E.E. South-West London Branch. "Electrical Education," by P. Honey.

Wednesday, 10th November

ABERDEEN.—Caledonian Hotel, 7.30 p.m. I.E.E. North-East Scotland Sub-Centre. "Wire Broadcasting," by A. R. Almond.

BRADFORD.—Midland Hotel, 7.30 p.m. A.S.E.E. Bradford Branch. "Electric Lifts," by J. Greenwood.

EDINBURGH.—Heriot-Watt College, 7 p.m. I.E.E. Scottish Centre and Institution of Post Office Engineers. "The Wartime Activities of the Engineering Division of the B.B.C." by H. Bishop.

HASLEMERE.—A.S.R.E., 6.30 p.m. I.E.E. Southern Centre. "Analysis-Synthesis Telephony with special reference to the Vocoder," by R. J. Halsey and Dr. J. Swaffield.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Supply Section. "The Lightning Pro-

tection of High-Voltage Transmission and Distribution Systems," by H. M. Lacey.

I.E.E. London Students' Section, 2.30 p.m. Visit to Young Accumulator Co., Ltd., New Malden, Surrey.

At the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. Institution of Heating and Ventilating Engineers. "Electrostatic Filtration," by F. Wright.

SHEFFIELD.—Royal Victoria Station Hotel, 6.15 p.m. I.E.E. Sheffield Sub-Centre. "The Design of Contactors with regard to their Industrial Application," by B. Feldbauer.

Wednesday and Thursday, 10th and 11th November

LONDON.—4, Grosvenor Gardens, S.W.1. Iron and Steel Institute. Autumn meeting.

Thursday, 11th November

DUNDEE.—Royal Hotel, Union Street, 7 p.m. I.E.E. North-East Scotland Sub-Centre. "Wire Broadcasting," by A. R. Almond.

LEEDS.—Metropole Hotel, 7 p.m. Joint meeting of the I.E.E. North Midland Centre and the Yorkshire Branch of the Institution of Mechanical Engineers. "Corrosion of Heating Surfaces in Boiler Plants," by J. R. Rylands and J. R. Jenkinson.

LEWISHAM.—S. E. London Technical College, 8 p.m. A.S.E.E. South-East London Branch. Meeting in conjunction with the Electrical Engineering Society. "The Man and His Job, No. 1—The Supply Engineer," by E. H. Jesty.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilization Section. "Waterworks Power Plant Practice; the Comparative Costs of Steam, Diesel and Electrically Operated Plant," by T. P. Wakeford.

PALMER'S GREEN, N.13.—Lacey Hall, Hazelwood Lane, 7.30 p.m. A.S.E.E. North London Branch. "The Design and Layout of Street Lighting," by J. F. Roper.

PLYMOUTH.—Grand Hotel, 3 p.m. I.E.E. South-Western Sub-Centre. "The Operational Characteristics of Modern H.V. Wood Pole Lines," by G. T. Garwood.

SWANSEA.—The Guildhall, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. Address by chairman of the Western Centre.

Friday, 12th November

CREWE.—Crewe Arms Hotel, 7 p.m. A.S.E.E. Crewe Branch. "Variable Speed A.C. Motors," by F. Thompson.

DONCASTER.—Association of Mining Electrical and Mechanical Engineers (Yorkshire North-West Branch). "H.M. Electrical Inspector's Report," by G. M. Harvey.

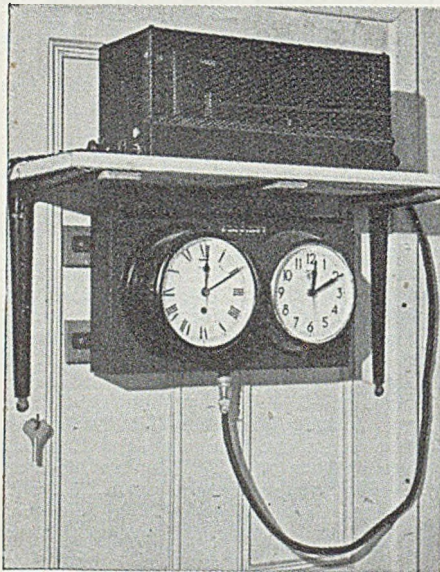
LONDON.—Grosvenor House, W.1, 8.30 p.m. Electrical Industries Benevolent Association. Annual ball.

NEWCASTLE-ON-TYNE.—Old Assembly Rooms. I.E.E. North-Eastern Students. Annual dance.

Clock Control

Automatic Frequency Regulation

VARIATION of mains frequency is likely to continue to occur so long as power shortages persist. Therefore, in many cases, means of automatically regulating mains-driven a.c. synchronous clocks are desirable. The accuracy originally claimed for the system devised by Jackson Automatic Controls, Ltd., Windsor House, Victoria Street, London, S.W.1, was better than one part in 100,000, which is



Frequency regulation for synchronous clocks, showing mechanical reference dial (left) with electric monitor (right) and amplifier above

equivalent to one second in 27.8 hours, without adjustment of temperature. The control and dividing unit is contained in the lower cabinet shown in the illustration, the output from the dividing circuits being passed through the amplifier housed in the perforated metal case on the shelf above. The adjusting knob is just visible on the lower cabinet between the spring-wound reference clock on the left and the electrical monitor clock on the right.

After preliminary operation of 15 W equipment to ascertain the proper control setting, the outfit kept time correctly for three weeks during which period the input frequency varied by as much as nearly 1 c/s. The equipment was subjected to severe vibration during transit to the customer, who therefore wished to check it upon delivery. The only auxiliary test load available on site was an old clock synchronous motor taking 0.08 A at 230 V, or 18.4 W, plus the electric monitor clock taking 0.75 W, making a total load of 19.15 W, or 28 per cent overload.

The equipment was run for five weeks, without altering the control setting, during which period the departure from correct time amounted to 43 seconds, corresponding to 1.23 seconds per day. The ambient temperature during the test ranged from 58 deg F. during the day to 31 deg F during the night, representing a variation of 27 deg F. Since going into service (controlling a turret clock of 20 ft diameter and taking 10 W) the control outfit has continued to function correctly within one second per day.

Mill Modernization

Switchgear for Stand-by Plant

STAND-BY factory generating plant installed as an assurance against power cuts is, in many cases, proving to be useful also for peak load reduction when energy is purchased on a maximum demand tariff. Such sets are likely to be needed for several years, making it advisable to install switchgear conveniently arranged for the safe selection of either locally generated or purchased supplies.

Typical duplicate busbar switchboards built by Crompton Parkinson, Ltd., have recently been installed by C. Richardson & Sons, contractors, of Romiley, Cheshire, as part of the modernization of two Lancashire mills manufacturing felt products. Power intake from the local high-voltage distribution network is through the consumers' substations stepping down to 400 V three-phase, four-wire, supplemented by a mill generating set in each case.

The board at the Baltic Mill of Stansfield & Co. has a 400-A isolator in the incoming circuit from the substation to one set of busbars; two 200-A "Klad" form "A" oil circuit breakers; four 100-A "Klad Minor" oil breakers; and four-pole selector switches. Each 200-A feeder can be supplied individually from either source, but the 100-A feeders are grouped together for selection. The four "Minor" units control four feeders, which group can similarly be supplied from either source. The diesel-driven alternator is connected to the other set of bars.

At the Longholme Mill of Richard Ashworth there is an incoming 800-A isolator; five "Klad" form "A" oil breakers for the main circuits; two 100-A "Klad Minor" oil breakers for small power circuits; and four-pole selector switches. Again the incoming supply goes to one set of busbars and the generated supply to the other set, with similar provision for selection. At this mill the alternator is driven by a steam turbine, the pass-out steam being used for process work.

The "Klad" type of breaker is totally enclosed and isolation is effected by a mechanical lowering device, which moves it vertically downwards and at the same time automatically covers up live contacts. Complete interlocks are fitted.

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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 (2s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

TELEFONAKTIEBOLAGET L. M. Ericsson.—
1 "Switching arrangement for time-zone metering in automatic telephone systems." 7204. 7th May, 1942. (610204.)

British Thomson-Houston Co., Ltd.—"Combined transformers." 3464. 26th February, 1943. (610305.)
Metropolitan-Vickers Electrical Co., Ltd., and D. G. O. Morris.—"Thermionic valve circuit arrangements." 4966. 16th March, 1944. (610306.)

A. L. Cianchi.—"Enclosed electrical switches or valves and terminal mountings therefor." 5540. 24th March, 1944. (610307.)

Birlec, Ltd., and A. G. Lobley.—"Furnaces." 9341. 16th May, 1944. (610308.)

1945

W. W. Triggs (Farnsworth Television & Radio Corporation).—"Thermionic saw-tooth wave generator." 1313. 16th January, 1945. (610511.)

Marconi's Wireless Telegraph Co., Ltd.—"Radio vision devices." 9766. 18th April, 1944. (610318.)
"Radio wave focusing devices." 10731. 29th April, 1944. (610320.)
"Systems for focusing and for directing radio-frequency energy." 13373. 27th May, 1944. (Addition to 610318.) (610321.)
"Directive antenna of variable directivity." 13620. 30th June, 1943. (610517.)

Phillips Lamps, Ltd., H. G. Taylor and R. F. Gregson.—"Magnetic separators." 13909. 2nd June, 1945. (610322.)

Standard Telephones & Cables, Ltd.—"High-frequency treatment of food products in glass and like containers." 17954. 20th July, 1944. (610520.)
"Resilient support for voltage regulator." 21132. 16th October, 1944. (610524.)

Aircraft-Marine Products, Inc.—"Electrical connector and method of making electrical connections." 21868. 25th August, 1944. (610328.)

H. W. K. Jennings (J. H. Homrighous).—"Electric remote control systems." 22386. 30th August, 1945. (610528.)

General Electric Co., Ltd., and L. C. Stenning.—"Synchronization of radio transmitters." 26654. 12th October, 1945. (610532.)

N. M. Rust and P. S. Brandon.—"Radio distance measuring systems." 26760. 12th October, 1945. (610534.)

Soc. Anon pour les Applications de l'Electricité et des Gaz Rares Etablissements Claude-Paz & Silva.—"Process of manufacturing emissive electrodes for electric discharge apparatus." 27793. 15th January, 1942. (610535.)

Industrial & Scientific Instruments, Ltd., and S. J. Ward.—"Apparatus for the electrical conductivity testing of liquids." 32557. 3rd December, 1945. (610545.)

1946

Sadir-Carpentier.—"Cathode-ray tube signal indicator arrangements and teletransmission system incorporating the same." 1836. 20th March, 1945. (610551.)

General Electric Co., Ltd., and D. M. Heller.—"Hermetically sealed containers." 2996. 30th January, 1946. (610342.)

Igranic Electric Co., Ltd.—"Electric generator-motor systems." 3621. 5th February, 1945. (610343.)

E. P. Newton (Telefonaktiebolaget L. M. Ericsson).—"Thermo-contacts." 8178. 15th March, 1946. (610346.)

G. E. Duke and C. H. Nicholson.—"Pin-and-socket electric couplings." 8212. 16th March, 1946. (Cognate application 27964/46.) (610347.)

Standard Telephones & Cables, Ltd.—"Negative feedback amplifier." 9021. 14th April, 1945. (610105.)

E. A. Nind and E. L. C. White.—"Circuit arrangements for repeating or amplifying electrical signals." 9082. 25th March, 1946. (610107.)

J. Lucas, Ltd., and M. W. Kendall.—"Terminals for electric cables." 9096. 25th March, 1946. (610109.)

Marconi's Wireless Telegraph Co., Ltd., and C. D. Colchester.—"Pulse modulator circuit arrangements." 9175. 25th March, 1946. (610112.)

General Electric Co., Ltd., N. C. Smart and A. A. Chubb.—"Telemetering systems." 9248. 26th March, 1946. (610349.)

Marconi's Wireless Telegraph Co., Ltd.—"Multi-vibrators and circuits utilizing the same." 9371. 30th December, 1944. (610118.)

Phillips Lamps, Ltd.—"Circuit arrangements for amplifying or generating ultra-high-frequency oscillations." 9417. 20th August, 1941. (610120.)

General Electric Co., Ltd., and A. J. Biggs.—"Apparatus for making electrical measurements at radio frequencies." 9444. 27th March, 1946. (610121.)

A. E. Jackson.—"Electric tumbler switches." 9514. 27th March, 1946. (610125.)

Corning Glass Works.—"Thermostatic regulators." 9534. 26th April, 1945. (610127.)

British Thomson-Houston Co., Ltd., and W. A. Bocock.—"Vacuum cleaners." 9669. 28th March, 1946. (610147.)

Furzehill Laboratories, Ltd., S. Smith & Sons (England), Ltd., and A. J. Quinton.—"Electro-dynamic devices, for example, for measuring instruments." 9701. 28th March, 1946. (610351.)

C.A.V., Ltd., and A. T. C. Priddle.—"Electric switches." 9742. 29th March, 1946. (610160.)

R. K. Landless.—"Electric fires." 9749. 29th March, 1946. (610353.)

Maudsley's, Ltd., and C. W. H. Minchin.—"Dynamo-electric machines." 9802. 29th March, 1946. (Addition to 1971968.) (610175.)

Duro-Test Corporation.—"Fluorescent lamp." 9823. 31st March, 1945. (610354.)

Blick Time Recorders, Ltd., C. F. Woodcock and E. O. Chapman.—"Electrically operated printing apparatus." 9827. 29th March, 1946. (610181.)

E. F. White.—"Electrically operated apparatus for playing a game." 9934. 30th March, 1946. (610359.)

A. R. G. Owen, H. Knaggs and J. Buckingham.—"Directional wireless aerial systems." 9941. 30th March, 1946. (610360.)

J. Starkiewicz, O. Simpson, R. L. Stow and J. Buckingham.—"Photoconductive cells." 9944. 30th March, 1946. (610362.)

J. Starkiewicz, L. Sosnowski, O. Simpson, R. L. Stow and J. Buckingham.—"Photovoltaic cells and electrical rectifiers." 9945. 30th March, 1946. (610363.)

English Electric Co., Ltd., and C. G. A. Woodford.—"Electrical actuators particularly for aircraft." 10013. 1st April, 1946. (610205.)

English Electric Co., Ltd. (L. L. Brinkworth).—"Indicator devices in electrical control systems." 10014. 1st April, 1946. (610206.)

Cantie Switches, Ltd., and M. S. Pearson.—"Contact units for electric switches and switchgear." 10123. 2nd April, 1946. (610230.)

W. A. Bryce & Co., Ltd., and J. A. Atkins.—"Cased transformers, chokes and the like." 10158. 2nd April, 1946. (610241.)

A. J. Roberts.—"Warning device for use with telephones." 10207. 2nd April, 1946. (610249.)

General Electric Co., Ltd., A. F. Cornock and L. B. W. Jolley.—"Instruments for indicating and measuring mechanical shocks." 10281. 3rd April, 1946. (610262.)

British Thomson-Houston Co., Ltd.—"Heat-resisting capacitors." 10314. 6th April, 1945. (610276.)

Wadkin, Ltd., and W. L. Sims.—"Rotary electric switches." 10329. 3rd April, 1946. (610380.)
"Electric motor controlling systems." 10330. 3rd April, 1946. (610381.)
"Electric motor controlling systems." 10331. 3rd April, 1946. (610382.)

Waygood-Otis, Ltd.—"Control for electric circuit employing a cold-cathode gas-filled valve." 10350. 10th July, 1945. (610407.)

General Motors Corporation.—"Control device for electric motors." 10382. 18th April, 1945. (610278.)

Allmänna Svenska Elektriska Aktiebolaget.—"Means for indirect forced commutation of static current converters in two-way connection." 10393. 21st April, 1945. (610392.)

General Electric Co., Ltd., and R. G. Jakeman.—"Mechanical power transmission arrangements." 10429. 4th April, 1946. (610281.)

General Electric Co., Ltd., L. W. Barsdorf and F. C. Orchard.—"Electrical resistance measuring apparatus." 10430. 4th April, 1946. (610282.)

Western Electric Co., Inc.—"Perforating, punching and reading machines." 10439. 14th April, 1945. (610413.)

J. S. Kosacki.—"Thermionic amplifiers." 10454. 4th April, 1946. (610283.)

Standard Telephones & Cables, Ltd., and H. S. Bishop.—"Electrical heating tools." 10480. 4th April, 1946. (610423.)

W. E. Dennison.—"Electric fires." 10494. 4th April, 1946. (610285.)

Pye, Ltd., and K. N. Hawke.—"Electric pick-ups." 10533. 5th April, 1946. (610434.)

British Thomson-Houston Co., Ltd.—"Production of preferred crystal orientation in thin gauge silicon steel." 10569. 12th April, 1945. (610440.) "Pipe couplings." 10570. 13th April, 1945. (610441.)

Jackson Electric Stove Co., Ltd., and H. J. Winn.—"Interconnecting of metal parts." 10575. 5th April, 1946. (610443.)

Marconi's Wireless Telegraph Co., Ltd., J. W. Sanger-Stevens and H. J. H. Wassell.—"Cable termination devices." 10592. 5th April, 1946. (610286.)

Marconi's Wireless Telegraph Co., Ltd., F. P. Best, C. D. Colchester and J. Twatt.—"Navigation aiding apparatus." 10593. 5th April, 1946. (610287.)

Marconi's Wireless Telegraph Co., Ltd.—"Television scanning systems." 10594. 9th January, 1945. (610288.)

Philips Lamps, Ltd.—"X-ray tube with a rotary anode." 10598. 20th November, 1941. (610447.)

"Holders for electrical apparatus." 10604. 10th October, 1941. (610448.)

Soc. Industrielle des Procédés Loth.—"Electric supply devices comprising a transformer and an induction regulator." 10607. 7th January, 1941. (610449.)

"Radio beacon system for the blind landing of aircraft." 10608. 18th January, 1941. (610450.)

Siemens Bros. & Co., Ltd., and E. A. Bryan.—"Automatic switches of the kind used in telephone systems." 10619. 5th April, 1946. (610453.)

"Automatic switches of the kind used in telephone systems." 10620. 5th April, 1946. (610289.)

B. E. F. Greenaway and V. J. B. Higgins.—"Radio-graph measurement scales." 10625. 5th April, 1946. (610454.)

E. J. Ambrose, K. A. B. Wright and J. G. Salmon.—"Manufacture of transparent conducting electrodes." 10655. 6th April, 1946. (610462.)

J. A. Crabtree & Co., Ltd., and R. W. Morgan.—"Electric plugs." 10656. 6th April, 1946. (610463.)

Standard Telephones & Cables, Ltd.—"Electric pulse communication systems." 10664. 25th August, 1944. (610464.)

"Capacitive switch for radio signalling." 10665. 9th April, 1945. (610465.)

R. E. Thompson & Co. (Sunbury), Ltd., and P. R. Benford.—"Bimetallic temperature-sensitive electric switches." 10721. 8th April, 1946. (610475.)

British Klockner Switchgear, Ltd., and G. A. Standen.—"Switch control means for electric motors." 10765. 8th April, 1946. (610483.)

British Thermostat Co., Ltd., and J. E. Sherlock.—"Thermostatic devices for controlling the temperature in electrically heated ovens and the like." 10769. 8th April, 1946. (610484.)

British Thomson-Houston Co., Ltd.—"Electric control devices." 10773. 12th April, 1945. (610485.)

W. C. Bexon.—"Super tension cables." 10786. 8th April, 1946. (610488.)

Furzhill Laboratories, Ltd., and L. Namenyi-Katz.—"Electrical apparatus actuated by bank notes." 10790. 8th April, 1946. (610489.)

M. K. Electric, Ltd., C. L. Arnold, R. W. Dowsett and J. F. Duffield.—"Electric switches, particularly for use on alternating-current circuits." 10796. 8th April, 1946. (Addition to 532336.) (610490.)

"Electric switches particularly ceiling switches." 10797. 8th April, 1946. (610491.)

A. G. Howard.—"Electric heating elements." 10812. 8th April, 1946. (610296.)

P. R. T. Laboratories, I. Ltd., and V. A. Jones.—"Screening means for radio and electrical apparatus." 10817. 8th April, 1946. (610500.)

Etablissements S. E. M.—"Electrostatic microphones and loud-speakers." 10848. 22nd January, 1946. (610297.)

Compagnie Générale d'Electricité.—"Small relays for telephony signalling and similar uses." 10916. 4th February, 1944. (610299.)

Philips Lamps, Ltd.—"Electron-discharge devices for generating oscillations." 11004. 22nd November, 1941. (610396.)

Philips Lamps, Ltd.—"High-vacuum electron discharge tubes." 11005. 3rd December, 1941. (610574.)

British Thomson-Houston Co., Ltd.—"Methods of and apparatus for manufacturing gas-filled cable." 11020. 17th April, 1945. (610576.)

C. A. Johnsen.—"Radar systems." 11061. 10th April, 1946. (610583.)

Western Electric Co., Inc.—"Electron discharge device." 12674. 2nd May, 1945. (610398.)

Landis & Gyr Soc. Anon.—"Construction of bottom bearing for damping humming noises in electricity meters." 15507. 28th May, 1945. (Addition to 508642.) (610592.)

Humber, Ltd., A. C. Miller, A. M. Kamper and G. Berry.—"Electrical connections between relatively movable members." 16372. 29th May, 1946. (610594.)

1947

General Electric Co., Ltd., and L. C. Stenning.—"Electric frequency changers." 15255. 12th October, 1945. (Divided out of 610532.) (610599.)

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month from 27th October:—

BEATTY. No. 641,213, Class 9. Vacuum cleaners, and domestic machines for polishing and waxing floors, all being electrical apparatus.—Beatty Bros., Ltd., Fergus, Ontario, Canada. Address for service: c/o Gee & Co., 51 & 52, Chancery Lane, London, W.C.2.

TANIA. No. 663,576, Class 9. Electric domestic floor-polishing machines, electric suction cleaners and electric suction squeegees, and parts of all such goods included in Class 9.—Rollnick & Gordon, Ltd., Capitol Works, Empire Way, Wembley, Middlesex.

MINA. No. B663,879, Class 9. Electric welding apparatus and parts thereof not included in other classes and electric current transformers.—Arc Manufacturing Co., Ltd., 52a, Goldhawk Road, London, W.12.

FAULKALITE. No. 663,984, Class 9. Electrically operated igniting appliances.—Faulkalite Electrical Products, Ltd., 14, Whitworth Road, Rochdale, Lancs.

TEMELEC. No. 664,874, Class 9. Electrical apparatus and instruments included in Class 9, and insulated wire for use in electrical measuring instruments.—The Temple Electrical Co., Ltd., Clun House, Surrey Street, London, W.C.2.

THOMAS A. EDISON (design). No. 661,533, Class 11. Portable self-contained electric lighting outfits.—Thomas A. Edison, Inc., West Orange, New Jersey. Address for service: c/o Marks & Clerk, 57-8, Lincoln's Inn Fields, W.C.2.

MAGLOW. No. 665,329, Class 11. Electric fires.—Mabro & Co., Ltd., 88, Shoot-up Hill, London, N.W.2.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

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

Australia.—BRISBANE.—16th December. City Electric Light Co., Ltd. Power station auxiliary switchgear. (E.P.D. 42228/48. Com./1184.)*

Dagenham.—30th November. Corporation. Street lighting units. (See this issue.)

Salford.—16th November. North Western Electricity Board (No. 1 Sub-Area). Complete electrical installations in 144 houses. (29th October.)

St. Helens.—16th November. Education Committee. Installation of electric lighting, etc., in Merton Bank and Thatto Heath primary schools. (See this issue.)

Stockton-on-Tees.—Education Committee. Installation of electric lighting, etc., at the new junior mixed and infants' school, Ragworth estate. Borough architect, 124, High Street.

Sunderland.—Education Committee. Electrical installation in the new Valley Road primary infants' school. Education architect, Ryhope Road.

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

Durham.—County Education Committee. Accepted. Electrical work at schools. Crook County (£432).—Neale & Partners. East Hedley Hope County (£159).—Doves (Darlington). Fir Tree County (£141).—R. Robson. Chester-le-Street County (£1,578).—C. H. Ellis & Co.

Middlesbrough.—Education Committee. Accepted. Electrical installation at the Constantine Technical College (£315).—North-Eastern Electricity Board.

Thornaby-on-Tees.—Town Council. Accepted. Electrical installations in 18 new houses (£474).—J. Bushell & Sons.

West Bromwich.—Corporation. Accepted. Installation of fluorescent lighting in the Borough Treasurer's Department (£915).—Midlands Electricity Board.

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.

Amlwch.—County Secondary School. Anglesey (£93,000); Pochins (Manchester), Ltd., builders, King Street, Middlewich, Cheshire.

Ashton-under-Lyne.—Houses (32), Fountain Street for T.C. (£45,588); W. Plant & Hill Bros., builders, Witham Street.

Barking.—Flats (186), in six blocks, Longbridge Road; E. R. Farr, town clerk, Barking Town Hall.

Bolton.—Extensions, Victoria Restaurant (£20,000); borough engineer.

Bournemouth.—Sea front scheme, including shops, concert hall, underground coach station, etc.; borough engineer.

Community Centre (£33,000) Kinson, for T.C.; J. Burton, borough architect.

Bradford.—Houses (26), Clayton estate for T.C. (£35,728); R. J. Patchett, Ltd., builders, Clayton Heights.

Workshops, Idle, Jowett Cars, Ltd.; F. Robinson & Sons, builders, Jesse Street.

Bromley.—Factory extensions, Farwig Lane, James Young, Ltd., coach builders; Pearce Bros., builders, North Street.

Burnley.—Factory, Cog Lane; Disabled Persons Employment Corporation, Ltd., 25, Buckingham Gate, S.W.1.

High School for Girls (£217,000), Ivy Bank site, for E.C.; borough engineer.

Cambridge.—South wing at St. Catharine's College, and extensions at Newnham Women's College; city architect.

Cardiff.—Milk pasteurization depot, Sanatorium Road; Britton's Dairies, Ltd., 84, Beda Road.

Carmarthen.—Houses (72), on six sites; G. C. Thomas, R.D.C. surveyor, 3, Spilman Street.

Chislehurst.—County Primary School, Redhill Road, for Kent E.C.; R. Hopkins & Sons, builders, Dartford.

Cookstown.—Houses (126), in four groups, for R.D.C.; Gamble & Maxwell, architects, 5, University Terrace, Belfast.

Darlington.—Factory for repairing and maintaining buses in Haughton Road; D. T. Todd, promoter, Market Place.

Dukinfield.—Houses (42), Yew Tree Lane estate for T.C.; Kenyon Construction Co., Ltd., Alt Lane, Ashton-under-Lyne.

Edinburgh.—Additions at Edinburgh dental hospital, Chambers Street (£130,000); Master of Works, Edinburgh Royal Infirmary.

Two-storey buildings, adjoining Mining Department, Grassmarket; Governors of Heriot-Watt College, Central Office, Chambers Street.

Enfield.—Houses (162), Herford Road and Cedar Road, for U.D.C.; engineer and surveyor.

Gateshead.—Technical College (£500,000); H. J. Cook, chief architect, Swinburne Street.

Hetton (Co. Durham).—Houses (76) at Low Moorsley and Pemberton Street for the U.D.C.; direct labour.

Hull.—Factory, Industrial Site No. 9; Globe & Simpson, Ltd., 21a, St. George's Road.

Factory, Stoneferry Industrial Estate; English Plaster Products, Ltd., Clough Road.

Leeds.—Flats (96), Moortown, Belle Isle and Lime Pit estates, for T.C.; R. R. Roberts (Leeds), Ltd., builders, 122, Lower Wortley Road.

Little Thurrock.—Secondary school (£75,000), Essex E.C.; R. Troy & Co., builders, Great Suffolk Street, S.E.1.

London.—BRIXTON.—Two blocks of flats, Hillyard Street; Ross & Ross, architects, 231, Brixton Road, S.W.9.

MAYFAIR.—Rebuilding offices, 25, Savile Row; H. St. John Harrison, architect, 1, Babmaes Street, S.W.1.

PECKHAM.—Rebuilding dairy and offices, 195/201, Queen's Road; United Dairies (London), Ltd., Palace Court, Bayswater, W.2 (staff architect).

WEST NORWOOD.—Five storey block of 40 flats, York Hill (£76,490) for L.C.C.; Hugh Minty & Partners, architects, 14, Bedford Row, W.C.1.

STOKE NEWINGTON.—Library, Woodberry Downs (£35,000), for T.C.; H. A. Gold, architect, 14, Bedford Row, W.C.1.

Longsight.—Two-storey extensions to departmental Stores, 639/641, Stockport Road; F. W. Woolworth & Co., Ltd., New Bond Street, London, W.1.

Manchester.—Bank and offices, 161/163, Stretford Road, Hulme; Architects' Department., Williams Deacon's Bank, Ltd., 44, Mosley Street.

Melton Mowbray.—Girls' school (£60,000); E. G. Fowler, architect, Grey Friars, Leicester.

Middlesbrough.—Church and presbytery, College Road; R. C. authorities.

Houses (250) for the T.C.; borough engineer.

Newcastle (Staffs).—Extensions to works, Hanover Street, Henry Farr & Son, Ltd.; Wood, Goldstraw & Yorath, architects, Victoria Chambers, Station Road, Tunstall, Stoke-on-Trent.

Newport (Isle of Wight).—Primary school, Nine Acres site, for Isle of Wight C.C.; county architect, County Hall.

Normanton.—Houses (68); W. Martin Jackson, architect to U.D.C., The Mount, Syndale Road.

Nottingham.—Junior schools, Wigman Road; city engineer, Guildhall.

Plymouth.—Houses (200), Easiform type, Ernesettle, for T.C.; John Laing & Son, Ltd., builders, Mill Hill, N.W.7.

Portsmouth.—Houses (34), Paulsgrove; J. C. Nicholls, 55, Carmarthen Road, Cosham.

Reading.—Factory, Basingsstoke Road, Warwick Bros., timber merchants; Sainsbury & Chamberlain, architects, Cross Street.

Water depot buildings, Berkeley Avenue (£40,000); borough engineer.

St. Albans.—Factory, Transplanters, Ltd.; C. Miskin & Sons, builders, Romelands.

Sheffield.—Factory, Arundel Street and Sylvester Street; William Turner, Ltd., Eyre Works.

Extensions to steelworks, Lee & Sons, Ltd.; C. Ross, Ltd., builders, Hecley.

Stockport.—Branch Library, Thornfield Road, for T.C.; borough engineer.

Stockton-on-Tees.—Junior mixed school in Darlington Lane for the E.C.; G. Dougill & Sons, builders, Chestnut Street, Darlington.

Sunderland.—Additions to Technical College (£100,000); education architect, Ryhope Road.

Swindon.—Civic restaurant, rear of Town Hall; borough engineer.

Walsall.—Trolley bus garage, Carl Street (£55,000), for T.C.; borough engineer.

Warrington.—Extensions, Ellesmere Works; T. Locker & Co., Ltd., Church Street.

Additions, Wilderspool Brewery; Greenall, Whitley & Co., Ltd., brewers.

West Hartlepool.—Conversion of "Amble-side" into old people's hostel for the T.C. (£10,000); borough architect.

Widnes.—Secondary schools for Rev. J. Hayes, P.P., St. Patrick's, Dock Road (£300,000); W. Tomkinson & Son, Ltd., builders, 7/31, Great Newton Street, Liverpool, 1.

Wigan.—Church of St. Anne (£25,000), Beech Hill; Ernest Gee, architect, 17, North John Street, Liverpool.

Accidents in Mines

Chief Inspector's Report

THIS year's Report of the Chief Inspector of Mines, Sir John R. Felton (Stationery Office, 9d. net) presents statistics for 1939 to 1946 with detailed particulars of accidents for 1945 and 1946.

In 1945 the number of persons killed was 550 (506 underground) and in 1946 it was 543 (493 underground). The corresponding figures for disablement for more than three days were 181,059 (163,101 underground) and 167,210 (150,431 underground). In these two years electricity was responsible for 7 and 17 fatalities and 5 and 8 seriously injured by explosions. Out of 44 and 42 shaft and miscellaneous underground accidents 1 and 3 were attributed to electricity and out of 469 and 514 serious injuries 44 and 36 were from the same cause.

Haulage and miscellaneous surface fatalities numbered 44 and 50, of which 2 and 0 were due to electricity, which was responsible for 20 of the non-fatal accidents in each case for totals of 209 and 211 from all causes. Three explosions in 1946 were due to the ignition of local explosive mixtures by sparking from electric drilling machines as a result of inadequate ventilation and improper maintenance.

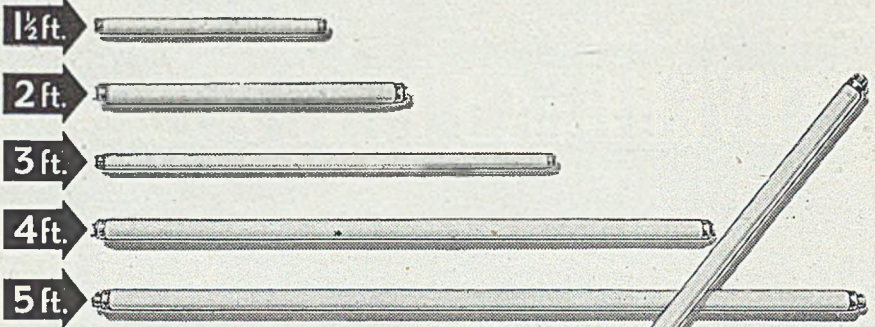
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Complete Range of
OVERHEAD LINE Equipment
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When you need Line Equipment you want to be sure that every component part is up to standard and will fit properly in place. This we can guarantee. To ensure absolute accuracy and interchangeability in assembly, we manufacture Complete Units, both porcelain and ironwork, in our own plants. So—whatever your requirements—whether it be Extra High Tension Equipment or the simplest form of Insulator—make sure by specifying "Bullers".

Bullers

BULLERS LTD., 6, Laurence Pountney Hill, London, E.C.4.
 Phone: Mansion House 9971 (3 lines). Telegrams: "Bullers, Cannon, London."



and now - **Osram**
8 ft.

FLUORESCENT LAMPS

With suitable *S.E.C.* fittings and gear
 Available on 1st January next

8ft. 1 1/2 inch diam. 135 watts } Each available in **"NATURAL"**
 8ft. 1 inch diam. 70 watts } **COLOUR**

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON W.C.2

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CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS for insertion in the following Friday's issue are accepted up to **First Post on Monday**, subject to space being available, and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1. **CLASSIFIED** advertisements are **PREPAID** at 3/- per line (approx. 7 words) per insertion: **ONLY OFFICIAL AND GOVERNMENT ANNOUNCEMENTS CAN NOW BE DISPLAYED**: -42/- per inch. Where the advertisement includes a Box Number this counts as two words and there is an additional charge of 1/- . **CHEQUES AND POSTAL ORDERS** should be crossed and made payable to **ELECTRICAL REVIEW**.

SITUATIONS WANTED.—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion. **REPLIES** to Box Numbers should be addressed to the Box Number in the advertisement, c/o **ELECTRICAL REVIEW**, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the **ELECTRICAL REVIEW**. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Original testimonials should not be sent with applications for employment.

OFFICIAL NOTICES, TENDERS, ETC.

BOROUGH OF DAGENHAM

Street Lighting: London-Tilbury Trunk Road

THE Council invite tenders for the supply, delivery and equipment of thirty-two 400-watt high-pressure Mercury Vapour Electric Discharge Street Lighting Units on the London-Tilbury Trunk Road A.13. Details of the installation requirements, including layout, approved by the Ministry of Transport, together with form of tender, may be obtained on application to the Borough Engineer and Surveyor: Tenders must be delivered by 30th November, 1948. The Council does not bind itself to accept the lowest or any tender.

KEITH LAUDER, Town Clerk.

Civic Centre, Dagenham. 1241

ST. HELENS EDUCATION COMMITTEE

Installation of Electric Lighting, etc.

TENDERS are invited for the installation of electric lighting, etc., at the following schools: Merton Bank Primary School and Thatto Heath Primary School.

Forms of tender, together with full particulars, may be obtained from the undersigned. Tenders must be delivered at the Town Hall, St. Helens, not later than noon on Tuesday, 16th November, 1948.

No tender will be considered unless it is contained in a sealed envelope endorsed "Tender for installation of electric lighting at — school(s)". The Corporation do not bind themselves to accept the lowest or any tender.

N. F. NEWBURY, Director of Education.

Education Office, St. Helens. 1322
27th October, 1948.

SITUATIONS VACANT

Vacancies advertised are restricted to persons or employments excepted from the provisions of the Control of Engagement Order, 1947.

SOUTH-EASTERN ELECTRICITY BOARD

Staff Vacancy

APPPLICATIONS are invited for the following appointment in the Epsom district, Surrey:—

Consumers' Engineer. Salary £631 per annum. This salary is provisional, and is subject, in due course, to negotiation with the appropriate organisation. Arrangements for superannuation will be made. Applicants must be experienced in the operation of hire and hire purchase schemes, supervision and organisation of installation work of all types; preparation of estimates and statistics. They must also possess considerable experience in showroom management and control and in the construction and operation of domestic and industrial electrical apparatus. Applicants must also be good negotiators and correspondents, and have had experience in D.C.-A.C. change-over schemes.

Applications, stating age, present position, experience and qualifications, and giving the names of two referees, should reach the Manager, Surrey Sub-Area, South-Eastern Electricity Board, Burford, Nr. Dorking, Surrey, by not later than the 20th November, 1948.

A. L. BURNELL, Secretary. 1295

10, Queen's Gardens, Hove, 3, Sussex.

5TH NOVEMBER, 1948

STATES OF GUERNSEY

APPPLICATIONS are invited for the appointment of **MAINTENANCE ENGINEER**. Salary £600 per annum, rising by annual increments of £20 to £700 per annum, plus cost-of-living bonus of £50 per annum for a married man or £25 for a single man. The commencing salary may be increased by one or more increments for candidates with exceptional experience and qualifications.

Preference will be given to applicants who are Corporate Members of the Institute of Mechanical Engineers and/or the Institute of Electrical Engineers, or who possess a Board of Trade Marine Engineers' First-Class Certificate of Competence for internal combustion engines.

The applicant appointed will be required to take charge of the maintenance of harbour cranes, navigational aids—air and marine—and heating installations, and must have had considerable practical experience in plant maintenance and workshop practice.

Candidates should not be over 45 years of age and the successful applicant will be required to pass a medical examination. The appointment will be terminable at any time by one month's notice on either side.

Applicants should indicate in the following order: (a) Name and address; (b) Age, nationality, and whether married or single; (c) Educational training; (d) Professional qualifications; (e) Present position, salary and date of appointment; (f) Previous positions, with salaries and dates of appointments; (g) Detailed particulars of experience; (h) Any further remarks in support of application; (i) Notice required to terminate present appointment.

Applications, endorsed "Maintenance Engineer," together with copies of two recent testimonials, should reach the undersigned not later than 13th November, 1948. Canvassing in any form will disqualify.

L. A. GUILLEMETTE.

States Office, Guernsey. States Supervisor. 1204
16th October, 1948.

CROWN AGENTS FOR THE COLONIES

APPPLICATIONS from qualified candidates are invited for the following post: Inspector of Works (Mechanical/Electrical) required by the Gambia Public Utilities Department for two tours each of 18-24 months, with prospect of permanency. Commencing salary according to age and war service in scale £600 to £800 a year (including expatriation pay). Outfit allowance £60. Free passages.

Candidates, under 35, must have served a mechanical or electrical engineering apprenticeship and be experienced in the operation and maintenance of medium-sized power station diesel-driven alternators and in the maintenance of L.T. and H.T. distribution networks.

Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/24219 (3B) on both letter and envelope. 1292

LONDON COUNTY COUNCIL

REQUIRED at the School of Engineering and Navigation, Poplar High Street, E.14, in the senior department, to commence in January, 1948, a full-time temporary Teacher of Engineering Subjects to Ordinary National Certificate standard in Mechanical and Electrical Engineering; ability to teach subjects to Higher National Certificate standard in Mechanical Engineering an advantage.

Burnham (Technical) Scale salary with London allowance. Application forms (stamped addressed foolscap envelope necessary) from the Principal at the School, returnable by 30th November, 1948. (2112) 1260

BRITISH ELECTRICITY AUTHORITY

A PPLICATIONS are invited for the following appointments on the Headquarters Engineering Staff in London:—

GENERATION DESIGN DEPARTMENT.

1. PLANT DESIGN SECTION.

- (a) Senior Assistants for each of the specialised fields defined below. Senior Assistants should have the requisite qualifications for Corporate Membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers, together with recent experience in the design departments of manufacturers of the appropriate types of central power station equipment, and be capable of conducting technical investigations and preparing specifications.
- (i) Boiler plant, with special reference to costs and economic investigations.
- (ii) Fans and dust extraction equipment.
- (iii) Pulverised fuel equipment.
- (iv) Water treatment and conditioning plant, with special reference to the chemical aspect.
- (v) Cooling towers. For this post recent experience in the investigation of cooling tower performance will be acceptable in place of design experience with a manufacturer.
- (vi) Pumping plant, with special reference to boiler feed and circulating water pumps.
- (vii) General mechanical design, associated with the investigation of mechanical design features of the whole range of power station plant, both mechanical and electrical.
- (viii) Coal and ash handling plant.
- (ix) Co-ordination of mechanical and electrical sections of major power station plant, together with specification of cranes, fire fighting equipment, workshop equipment and other miscellaneous items of plant. For this post plant manufacturing experience is not essential.
- (b) Junior Assistant for each of the fields defined below. Junior Assistants should have degrees in engineering and preferably training with manufacturers of power station equipment or with supply undertakings operating power stations.

- (x) Boiler plant.
- (xi) General mechanical design.
- (xii) Coal and ash handling plant.

II. DISTRICT HEATING SECTION.

A Senior Assistant to conduct investigations into, and assist in the design of, thermal-electric generating stations for district heating schemes. Candidates should have the requisite qualifications for Corporate Membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers, together with experience in the general aspects of the design of power station installations, and be capable of assessing the necessary installed plant capacities from consideration of heat and electrical load curves and preparing estimates of capital and running costs. Previous experience of such work on district heating or process steam supply schemes would be an advantage.

Salaries will be in accordance with ability, experience, qualifications and responsibility.

Application forms may be obtained from the Director of Establishments, British Electricity House, Great Portland Street, London, W.1, and when completed, giving full particulars of qualifications and experience, should be submitted to him by Monday, 22nd November, 1948. 1324

BRITISH ELECTRICITY AUTHORITY (Yorkshire Division)

Clerk of Works, Rotherham Power Station

A PPLICATIONS are invited for the position of Clerk of Works at the Prince of Wales Power Station, Rotherham, in connection with power station extensions. Applicants, who should preferably be under 40 years of age, are required to have knowledge and experience in building construction, civil works, contract, measurements, setting out and steelwork erection. Recognised technical qualifications will be an advantage. The salary will be at the rate of £550 per annum, which will be regarded as provisional until the final scales have been negotiated with such organisations as are appropriate. The position will be subject to the provisions of the superannuation regulations under the Electricity Act, 1947. The successful candidate will be required to pass a medical examination.

Forms of application may be obtained from the undersigned, to whom completed forms must be returned not later than 19th November, 1948.

G. A. VOWLES,

Divisional Controller.

British Electricity House,
St. Mary's Road, Leeds, 7.

1290

BRITISH ELECTRICITY AUTHORITY (South-Eastern Division)

A PPLICATIONS are invited for the following positions at the Stations indicated:—

ROTHERHAM POWER STATION.

(a) **SHIFT CHARGE ENGINEER.** Applicants should have received theoretical training and had experience in the operation of steam power stations and E.H.T. switch-gear.

KINGSTON "B" POWER STATION.

(b) **ASSISTANT CHEMIST.** Applicants should possess a degree in Chemistry or be Associate Members of the Royal Institute of Chemistry, and should have had experience in analysis and testing of coal, oil and water. Experience in the problems of boiler fouling and water corrosion would be an advantage.

(c) **JUNIOR CHEMIST.** Applicants should have had experience in analysis and testing of coal, oil and water. Applicants for the above positions should be not more than 45 years of age.

Salaries will be in accordance with the National Joint Board Agreement as follows:—

(a) Class B, Grade 8, £387 p.a.

(b) Class H, Grade 8a, £517 13s. p.a., including 5% London allowance.

(c) Class H, Grade 10a, £364 7s. p.a., including 5% London allowance.

Construction work which is in progress at Kingston "B" Power Station will bring the salaries (b) and (c) into Class J of the National Joint Board Agreement in the near future.

Forms of application may be obtained by sending a stamped addressed foolscap envelope to the Divisional Secretary, British Electricity Authority, South-Eastern Division, British Electricity House, Lower Ham Road, Kingston-on-Thames, Surrey.

Completed application forms, clearly endorsed, must be returned to the above address not later than the 20th November, 1948. 1242

BRITISH ELECTRICITY AUTHORITY (London Division)

Metering Section, 95/103, Park Street, Southwark, S.E.1

A PPLICATIONS are invited for the position of Electrical Fitter in the Meter and Instrument Section from persons who have had experience in the overhaul and repair of integrating meters, indicating instruments and relays. Preference will be given to those who are able to carry out site maintenance on impulse summation and demand recording equipment. Manufacturer's works experience will be additional recommendation.

Wages and working conditions are in accordance with the N.J.I.C. Agreement for the Electricity Supply Industry. The present rate is 37.5d. per hour for a 44-hour, 5-day week.

Applications in writing, stating age, qualifications, experience, etc., should be addressed to the Divisional Secretary, Ergon House, Horseferry Road, Westminster, S.W.1.

J. N. WAITE, Divisional Controller. 1294

BRITISH ELECTRICITY AUTHORITY (South-Western Division)

A PPLICATIONS are invited for the following appointments at Divisional Headquarters, Bristol.

(a) **EDUCATION AND TRAINING OFFICER.**

(b) **WELFARE OFFICER.**

The provisional salary scale for these appointments will be within the range of £750-£950 per annum.

For post (a): Applicants should be of Degree standard in Engineering or Economics, and should have experience in the operation of training schemes for manual, technical, clerical, administrative and professional grades. Some teaching experience would be an advantage.

For post (b): Applicants should have had experience of personnel management and welfare and be capable of advising on Industrial Catering and Canteen Management, Organisation of Sports and Social Activities, Personnel Welfare Services, Administration of Savings Schemes, Benevolent Funds, etc.

The appointments will be subject to Superannuation under terms and conditions to be approved by the British Electricity Authority.

Applications, stating age, education, qualifications, experience and present salary, should be addressed to the undersigned so as to be received not later than Tuesday, 30th November, 1948.

R. C. BARRETT,

Divisional Secretary.

British Electricity House,
26, Oakfield Road, Bristol, S.

1326

BRITISH ELECTRICITY AUTHORITY
(South-West Scotland Division)

APPPLICATIONS are invited for positions as Junior Shift Engineers in generating stations in the South-West Scotland Division.

Present salary range Grade 8b, Class II, £465/£484 per annum, which is provisional until a final scale has been agreed with the appropriate organisation.

Applicants should have had previous operating experience in a generating station and possess technical qualifications such as Graduate Membership of the I.E.E., the Higher National Certificate or a Board of Trade Certificate. Age limit 45 years, except for those already employed in the electrical industry.

Application forms may be obtained from, and should be returned to, the undersigned not later than 15th November.

E. J. EDGAR, Divisional Controller.

British Electricity House,
168, Broomhill Drive,
Glasgow, W.1. 1327

BRITISH ELECTRICITY AUTHORITY
(Midlands Division)

APPPLICATIONS are invited for an appointment as Assistant Electrical Maintenance Engineer at the Worcester Generating Station, Class G, Grade 8a, commencing salary £474 per annum.

Applicants should have had a sound general education and technical training and be well experienced in power station electrical maintenance.

Salary and conditions of service will be in accordance with the N.J.B. Schedule, and superannuation under terms and conditions approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Divisional Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, and be returned within 14 days of this advertisement.

F. W. LAWTON, Divisional Controller. 1310

BRITISH ELECTRICITY AUTHORITY
(East Midlands Division)

Appointment of Assistant Section Engineer, Coventry

APPPLICATIONS are invited from suitably trained persons for the position of Assistant Section Engineer at the Section Office situated in Coventry. Salary will be within the range £471 3s. to £602 8s. according to qualifications and experience.

Applicants must have a good technical education and be experienced in the maintenance of high-voltage electrical plant, transmission lines and cables.

Applications must be submitted on the official form to be obtained from the undermentioned office, and should be returned completed within 14 days of the publication of this advertisement.

W. S. BURGE, Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. 1320

CENTRAL MIDDLESEX GROUP HOSPITAL
MANAGEMENT COMMITTEE

APPPLICATIONS are invited for the post of Hospitals Engineer. The person appointed will be responsible to the Management Committee for the satisfactory operation and maintenance of the engineering services of the hospitals and allied institutions within the Group, as well as being directly in charge of the engineering services in one of the hospitals. He will be required to supervise the carrying out of works of engineering maintenance, and to keep all records necessary for the effective and efficient control of the engineering staff, plant, services and equipment. Applicants for this appointment should be mechanically trained, having served an apprenticeship in mechanical engineering, and should possess a qualification at least up to the standard of the Higher National Diploma or Certificate in Mechanical Engineering. The salary would be on the scale £680 × £25 to £780 per annum, plus £30 per annum London weighting.

The appointment will be subject to the National Health Service (Superannuation) Regulations, 1947, and the successful applicant, if not a transferable officer, will be required to pass a medical examination.

Applications, giving full details of age, experience and qualifications, together with names and addresses of three referees, to be sent to the undersigned not later than 22nd November, 1948.

A. E. COOPER, Secretary.

Central Middlesex Hospital,
Acton Lane, London, N.W.10. 1201

BRITISH ELECTRICITY AUTHORITY
(London Division)

Junior Charge Engineer, Woolwich Generating Station

APPPLICATIONS are invited for the position of Junior Charge Engineer at the above generating station, salary and conditions in accordance with N.J.B. Schedule, Class K, Grade 8b.

Applicants should have a good practical and technical training in mechanical and electrical engineering, and experience in the operation of generating station plant.

Applications, stating age, qualifications and experience, should be addressed to the Divisional Secretary, Ergon House, Horseferry Road, Westminster, S.W.1, and be received within 14 days of the appearance of this advertisement.

J. N. WAITE, Divisional Controller. 1277

BRITISH ELECTRICITY AUTHORITY
(North-Western Division)

APPPLICATIONS are invited for the undermentioned positions:—

SHIFT CHARGE ENGINEER, at Greenhill Power Station, Oldham. Salary in accordance with the N.J.B. Scale, Class G, Grade 8, £505 per annum.

SHIFT CHARGE ENGINEER, at Padidham Generating Station, Padidham. Salary in accordance with the N.J.B. Scale, Class G, Grade 8, £505 per annum.

Applications, stating age, qualifications, experience, etc., should be addressed to the Establishment Officer, British Electricity Authority, British Electricity House, Wilmslow Road, East Didsbury, Manchester, 20, to reach him not later than seven days after the appearance of this advertisement. 1263

COMMONWEALTH OF AUSTRALIA
(Postmaster-General's Department)

APPPLICATIONS are invited for permanent appointment to the Commonwealth Public Service as follows:—
TELECOMMUNICATIONS ENGINEERS.

Salary: £531-£711 (Australian). The commencing salary for each appointee will be determined according to his qualifications and experience.

Duties: Electrical, mechanical or civil engineering work, as applied to telephones, telegraphs, radio, workshops production and transport, or research in these fields.

Qualifications: Applicants must be natural born or naturalised British subjects and be aged not more than fifty years and six months. Minimum professional qualifications are: (a) Completion of a university degree in Engineering (four-year course); or (b) Completion of a course in Engineering Science (three-year course) supplemented by at least two years' engineering experience in an appropriate field; or (c) In the case of an engineer not coming within category (a) or (b), possession of such qualifications and experience in recognised telecommunication fields as would ensure him comparable professional status.

Prospects of advancement are excellent and the rate of progress depends on individual capacity, since promotion is on merit. The higher engineering grades and present salary ranges (excluding senior administrative positions) are:—

Divisional Engineer £846-£936
Assistant Supervising Engineer ... £606-£696

Selected applicants will be eligible for travel benefits under the Free and Assisted Passage Agreement, details of which are available at Australia House. Early passage to Australia will be arranged.

Applications: To the Chief Migration Officer, Australia House, The Strand, London, W.C.2. Envelopes should be endorsed "Application for position of Telecommunication Engineer." Applicants considered suitable for the position offered will be interviewed by representatives of the Postmaster-General's Department. 1278

SOUTHERN ELECTRICITY BOARD
(No. 1 (Southall) Sub-Area)

APPPLICATIONS are invited for the position of Operating Control Engineer, Class L, Grade 9, 1st year (as a minimum), N.J.B. conditions, required for shift duties in the Board's Control Centres in Southall-Uxbridge areas.

Candidates must have a good technical knowledge and have had previous experience of similar work on large systems operating up to 66 kV.

Applications on the prescribed form, which may be obtained from the undersigned, should be made by 15th November, 1948.

F. G. H. REMNANT, Administrative Officer. 1243

2/6, Windmill Lane,
Southall, Middlesex.

EASTERN ELECTRICITY BOARD
(Fens Sub-Area)

APPPLICATIONS are invited for the following appointments in the Fens Sub-Area of the Eastern Electricity Board.

(a) **PERSONAL ASSISTANT TO SUB-AREA MANAGER.** Applicants should have good general experience in the distribution and commercial branches of the electricity supply industry and have had a sound technical education. The provisional salary is £750 per annum.

(b) **MANAGER OF THE HUNTINGDON DISTRICT.** The district is rural comprising an area of approximately 600 square miles and containing five branch offices. Applicants should have had a thorough experience of rural distribution systems combined with commercial activities, especially regarding supplies to farms, a sound technical education and preferably similar experience in a managerial capacity. The provisional salary is £850 per annum.

The above mentioned salaries are subject to adjustment if necessary to conform to the salary scales which may be agreed with the appropriate negotiating body.

Applications, stating age, education, qualifications and experience, together with copies of three recent testimonials should be sent to the Manager, Fens Sub-Area, Eastern Electricity Board, Hobson Street, Cambridge, within fourteen days of the appearance of this advertisement. 1328

CROWN AGENTS FOR THE COLONIES

APPPLICATIONS from qualified candidates are invited for the following post: Trade School European Instructor (Electrical) required for Malayan Educational Service for 3 years with possible permanency. Commencing salary according to age and war service in scale \$420 a month rising to \$620 a month, plus expatriation pay of between \$90 and \$150 a month. In addition, cost-of-living allowance payable at rate of 50% of substantive salary, with maxima of between \$150 and \$375 a month, according to dependants. (Malayan dollar = 2s. 4d.). Free passages.

Candidates, 30 to 35, must have served apprenticeship to electrical engineering, have had good subsequent experience as foreman, and be capable of teaching electrical installation trade practice and domestic and industrial wiring, including electrical motor construction and generators. They must possess Final City and Guilds Certificate in Electrical Engineering (or equivalent), and should preferably have had some teaching experience.

Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/N/23851 (3B) on both letter and envelope. 1293

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD
(Perth City Area)

Appointment of Mains Engineer

APPPLICATIONS for the above appointment are invited from engineers who have had full technical training and extensive experience of H.T. and L.T., A.C. and D.C. mains work, including change-over, fault location and rectifier substations. Preference will be shown to Corporate Members of the Institution of Electrical Engineers.

Salary in accordance with N.J.B. Schedule, Class D. Grade 5.

Applications, stating age, qualifications, experience and date available for duty, with testimonials or the names of three people to whom reference may be made, should be addressed to J. N. Atkinson, A.M.I.E.E., Area Manager, North of Scotland Hydro-Electric Board, Electricity Works, Shore Road, Perth. 1261

UNIVERSITY OF BIRMINGHAM
(Department of Electrical Engineering)

APPPLICATIONS are invited for the following appointments:-

(a) Lecturer (Grade IIB), salary £600-£750 per annum, according to qualifications. Preference will be given for candidate with experience in heavy current engineering, but this will not be insisted upon.

(b) Lecturer (Grade IIC), salary £550-£600 per annum, according to qualifications.

Further particulars may be obtained from the undersigned, to whom applications, with the names of three referees, should be sent within a fortnight of the appearance of this advertisement.

C. G. BURTON,
Secretary. 1279

The University,
Edmund St., Birmingham, 3.

MERSEYSIDE AND NORTH WALES
ELECTRICITY BOARD

APPPLICATIONS are invited from Qualified Accountants with wide experience in Costing, Stores and Machine Accounting, for the following appointments. The salary will be according to qualifications and experience, and will be within the annual salary ranges stated.

(a) ASSISTANT ACCOUNTANT at Headquarters, Liverpool (£800-£1,200).

(b) ASSISTANT ACCOUNTANTS at Sub-Area Offices in Chester and Wrexham (£730-£895).

(c) COST ACCOUNTANT at Sub-Area Office, Liverpool (£730-£895).

(d) ACCOUNTANCY ASSISTANT at Headquarters, Liverpool (£650-£760).

The salaries quoted are provisional and subject to such variations as may be necessary to conform with scales of salaries agreed after negotiation with the appropriate organizations.

Successful candidates will be required to satisfy the Board's medical adviser and to contribute to a super-annuation scheme.

Applications should be forwarded in an envelope endorsed with the name of the appointment concerned, and addressed to the Chief Accountant, Electricity House, Love Lane, Liverpool, 3, so as to reach him not later than 20th November, 1948.

JAMES RANKIN,
Secretary. 1325

NORTH-WEST METROPOLITAN REGIONAL
HOSPITAL BOARD

Architect's Department

APPPLICATIONS are invited for the appointment of Principal Engineer in the Department of the Architect to the Board, at an inclusive salary of £840 × £25-£990 per annum. Applicants should be Chartered Engineers, and must possess wide general mechanical and electrical engineering experience, including heating, ventilation and other services, particularly as applied to hospitals. Good administrative ability is essential.

The appointment will be subject to the provisions of the National Health Service (Superannuation) Regulations, 1947, and will be terminable by one month's notice.

Applications, giving details of experience, together with the names of three referees, should be addressed to The Secretary, North-West Metropolitan Regional Hospital Board, 11a, Portland Place, W.1, to arrive not later than 25th November, 1948. 1323

CITY OF MANCHESTER

City Surveyor and Engineer's Department

APPPLICATIONS are invited for the permanent appointment of a Junior Engineer in the Street Lighting Section of the City Surveyor's Department, at a salary of £420/£465 per annum in Grade A.P.T. II of the National Joint Council Scales.

Applicants must possess the Higher National Certificate or equivalent degree and have had practical workshop and drawing office experience, also a sound knowledge of installation and maintenance system of gas and electric street lighting.

Applications, stating age, qualifications and experience, should be addressed to the City Surveyor, Town Hall, Manchester, 2, to reach him not later than 16th November, 1948. Canvassing in any form will disqualify.

PHILIP B. DINGLE.

Town Hall, Manchester. Town Clerk. 1259
26th October, 1948.

SOUTHERN ELECTRICITY BOARD

Appointment of Education and Training Officer

APPPLICATIONS are invited by the Southern Electricity Board for the post of Education and Training Officer on the staff of the Secretary to the Board.

Applicants should be university graduates and have experience in the selection and training of personnel and of the initiation and operation of training schemes. Educational, industrial or engineering experience and a knowledge of the Electricity Supply Industry would be an advantage.

The provisional salary (subject to negotiation) will be within the range £750 to £950 per annum according to experience.

Applications should be submitted on a form to be obtained from the undersigned, and should reach me not later than the 19th day of November, 1948.

F. W. KEMPTON.

Southern Electricity House, Secretary. 1258
Bath Road, Maidenhead, Berks.

NEWCASTLE UPON TYNE REGIONAL
HOSPITAL BOARD

Appointment of Regional Engineer

APPPLICATIONS are invited for the post of Regional Engineer to the Board at an inclusive salary of £1,400 rising by annual increments of £50 to £1,600 per annum. The post is superannuable under the National Health Service (Superannuation) Regulations, 1947, and will be subject to termination by three months' notice on either side.

The Engineer will be required to advise the Board on all engineering matters connected with the hospital service and to undertake, as may be required, practical engineering work on behalf of the Board. He will be required to devote the whole of his time to the service of the Board, and wide experience of all branches of hospital engineering design and operation is a desirable qualification.

Applicants should be Corporate Members of the Institution of Civil Engineers, Institution of Mechanical Engineers or Institution of Electrical Engineers.

Applications must be submitted by 26th November, 1948, and should state age, qualifications, experience, present position and salary, and the names of three referees, and should be addressed in an envelope endorsed "Regional Engineer" to the Secretary, Newcastle upon Tyne Regional Hospital Board, "Dunira," Osborne Road, Newcastle upon Tyne, 2. Canvassing in any form will be disqualify. 1202

A Diesel Electric Rail Traction Sales Engineer is required by a large Midland engineering concern. Salary up to £700 per annum according to qualifications and experience. Reply age, etc., to—Box 474, T. & G., 101, St. Martin's Lane, London, W.C.2. 1101

A Sales Engineer required with experience of modern air radio technical and operational practice and a sound knowledge of I.C.A.O. requirements. Write, quoting Ref. 148, to—Box 1132.

ACOUSTIC Specialist required for application of modern electronic technique to development of and measurements on subscribers' telephone instruments. Applicants should have good theoretical qualifications and a desire to apply them in this field. State salary required.—Box 1160.

ADVERTISERS seek Representatives calling on wholesalers, distributors and factors of domestic electric light fittings, etc., to handle additional easy selling lines. All parts Midlands, N. Midlands and Scotland. Full details.—Box 8642.

AN electrical engineering company in the Midlands requires Draughtsmen experienced in the mechanical design and construction of D.C. machines; preference given to those with electric traction experience. Reply particulars of experience and training to—Box No. 439, 101, St. Martin's Lane, London, W.C.2. 104

AN experienced Foreman Armature Winder wanted by leading Croydon repair firm (permanency).—Box 72.

APPPLICATIONS are invited by manufacturers of high-grade electrical gear for the position of Senior Designer for electrical accessories. Applicants must have good experience and be able to take charge of existing D.O. in Midlands. State qualifications, age and salary required in confidence to—Box 8605.

APPPLICATIONS are invited for post of Electrical Superintendent to the Bournemouth Gas and Water Company. The person appointed will be required to take charge, under the Chief Mechanical Superintendent, of all the company's electrical plant and transmission lines. These consist of steam turbine, gas and diesel engine driven D.C. generators, A.C. and D.C. rectifiers, etc., totalling some 1,600 kW, motor drives, electrostatic detarriers, switchboard and instrument panels, automatic controls, lighting, internal telephone and power supply lines. He will also be required to design and supervise the installation of all new electrical work. Applicants should possess a sound theoretical knowledge with good practical experience and preferably hold the A.M.I.E.E., or equivalent qualification. Salary depending on experience and qualifications, £550-£800 gross. Applications should be addressed to the Engineer and General Manager, The Bournemouth Gas and Water Co., 136, Old Christchurch Rd., Bournemouth. 1336

ASSISTANT Works Manager required. Experience in all sections of transformer manufacture up to 45 MVA, rate fixing and control of labour essential.—Yorkshire Electric Transformer Co. Ltd., Empire Works, Dewsbury. 1109

BUYER for electric control gear works in South-East London. Must have experience of small electro-mechanical apparatus, stock control, etc. Reply, stating age, experience and salary required, to—Box 1301.

BIRMINGHAM E.W.F. wholesaler with large turnover requires Buyer. Intimate knowledge of all classes of switchgear, wiring accessories, lighting fittings, etc., essential; also experience interviewing manufacturers' reps. Well paid perm. post for right man (our staff advised). Full details in confidence.—Box 1264.

CABLE Jointers, by contractors for work in Middle East after preliminary period in England. Write, stating age and experience.—Box 1138.

CAPABLE Engineer to take charge of a department responsible for the pre-production development of radio accessories. Degree or equivalent with several years industrial production experience essential.—Box 1333.

CHARTERED Electrical Engineer with power-supply and some managerial experience wanted for important branch in East Africa. Age under 38. Salary and allowances £1,100 to £1,300, plus quarters. Write—Box 920, c/o Walter Judd Ltd., 47, Gresham St., London, E.C.2. 1334

CHIEF Test Engineer conversant with modern switchgear practice required to supervise the testing of switchgear in the Manchester district. Must be capable of controlling staff on mechanical and electrical testing, to satisfy consulting engineers. Reply, stating age, salary required and previous experience, to—Box 131.

COMMERCIAL Assistant to the Manager of an electric control gear works in South-East London. Technical experience essential and experience of both buying and sales an advantage. Give full details, together with salary expected, to—Box 1300.

CONTRACTS Engineer for switchgear department of a large engineering firm in Midlands. Previous experience desirable. Send full details to Ref. 146.—Box 1036.

CONTROL Engineers for network operation required by large industrial organisation operating in the Middle East, for control centre, covering operation of extensive overhead and underground transmission and distribution networks up to 66 kV. Applicants must be experienced in the operation of indoor and outdoor metal-clad switchgear at all voltages, transformers and associated substation equipment. Age not over 35. Write, stating age and full details of qualifications and experience, quoting Dept. F.116, to—Box 1348, at 191, Gresham House, E.C.2. 187

DEPUTY Division Head required for laboratory responsible for development of carrier current telephone and multi-channel telegraph equipment. Replies from those with suitable experience should give qualifications and salary expected. Permanent and pensionable position with good prospects.—Box 1157.

DESIGNER-Draughtsman with experience in mass-production problems and technique, capable of designing small electro-mechanical components. Progressive position for man with ideas and ability to work with minimum of supervision for old-established West London firm.—Box 133.

DESIGNER-Draughtsman. Light electro mechanical work. Academic qualifications, Higher National Certificate Standard, Production experience an advantage. Apply writing, stating age, qualifications, training, experience and wage required, to the—Siemens and General Electric Railway Signal Co. Ltd., East Lane, Wembley. 1337

DESIGNER for modern factory in West of England, with experience in design of metal Rectifier Sets, including transformers. Must be fully experienced and capable of taking complete responsibility for design. Reply, giving full details of experience and salary required, to—Box 996.

DEVELOPMENT Engineer. Manufacturers of electric vehicles require Development Engineer, capable of solving all electrical problems involved, including the planning and design of circuits, motors, switchgear, etc. Ability to construct and test prototype electrical equipment an advantage. Applicants must have ingenuity and confidence in being able to carry out this work. Ability is more important than past experience. To the right man this post offers interesting work with good prospects of advancement in an expanding concern. Write, stating age, single or married, details of any positions held and work done, present salary and salary required. Our own employees have been informed.—Box 1283.

DRAUGHTSMEN for work on electrical and radio test instruments. Excellent opportunities and good rates of pay. Write, giving full particulars of experience, to—Taylor Electrical Instruments Ltd., 419/424, Montrose Avenue, Slough, Bucks. 1331

DRAUGHTSMEN (Senior and Junior), must be capable of carrying out work on the design of a wide range of electrical apparatus. Please write, stating age, experience and salary required, to—Clifford & Snell Ltd., Carshalton Road West, Sutton, Surrey. 8635

DESIGNER-Draftsman, experienced L.T. industrial switch and fuse gear design. Capable of showing initiative and originality. Birmingham area. Write in confidence, giving experience, age and salary, to—Box 8606.

DRAFTSMAN, experienced, for work on motors, sizes l.h.p. up to 20 h.p. Particulars of experience, salary required, etc., to—Personnel Manager, Tilling-Stevens Ltd., Maidstone, Kent. 1290

DRAFTSMEN 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

DRAFTSMEN, with a minimum of 5 years' experience in the design of electric cookers and similar apparatus, i.e., control equipment, etc., are required by well-known manufacturers, Home Counties area. Only qualified men need apply. Write, stating age and experience and salary required, to—Box 1062. (This advertisement appears by permission of the Ministry of Labour and National Service, under the Control of Engagement Order, 1947.)

ELECTRICAL contractors require Assistant Estimator with experience in Ministry of Works and War Office contracts, for London and Birmingham offices. State experience and wages required.—Box 1174.

ELECTRICAL Engineer Foreman for paper mill in Scotland, age 35-40. Must be fully conversant with E.H.T. supply, D.C. generator, D.C. and A.C. installations. Should have served recognised apprenticeship, and have, or the equivalent of, the Higher National Certificate. Good modern bungalow available.—Box 1214.

ELECTRICAL Engineer, young, well educated, required as Area Manager for Inverness by large firm of electrical engineers, and contractors carrying out distribution schemes for North of Scotland Hydro-Electric Board and electrical installations in buildings throughout North of Scotland. To be resident in Inverness and to supervise contracts. Special preference given to applicant with northern connections. Technical qualifications and apprenticeship with good firm essential. Really excellent prospects for young man with initiative and able to take responsibility. Apply, stating age, apprenticeship, technical qualifications and experience, to—Box 1281.

ELECTRICAL Engineers required by a large industrial concern operating in the Middle East. Applicants should have obtained their National or Higher National Certificate and have experience of construction and maintenance of overhead and underground mains, indoor and outdoor substations and a system operating on voltage up to 33 kV; also a knowledge of H.V. cable jointing and the keeping of mains records. Age 25-35, attractive salary plus generous allowance in local currency. Free passage out and home, medical attention, kit allowance. Write, stating age and full details of qualifications and experience, quoting Dept. F.01, to—Box 1357, at 191, Gresham House, E.C.2. 180

ELECTRICIAN, mainly for private house maintenance work and repairs to domestic appliances. Able to drive small van. Must be thoroughly experienced. References must bear strictest investigation. Permanent job and good pay for the right man.—London N.10 district. Write, giving full particulars, to—Box 8643.

ELECTRONIC Engineer required as head of department engaged on the design and manufacture of special purpose electronic test gear. A suitable applicant must have an honours degree in electrical engineering or applied physics and wide experience of electronic engineering. State age, qualifications, experience and salary required to—Box 1266.

ENGINEER-Draftsman, by London consultants, age 21/25. Minimum qualifications Ordinary National Certificate in electrical engineering. Must be quick and keen draftsman with some experience of electrical equipment of buildings. Commencing salary £234 to £286 per annum according to age and experience.—Box 1244.

ENGLISH Electric Co. Ltd. have urgent vacancies on work of national importance for experienced Medium and Heavy Electrical Switchgear Draftsmen. Good prospects and security. Staff pension scheme. Apply, quoting Ref. D.O.26, to—Central Personnel Services, English Electric Co. Ltd., Queens House, Kingsway, W.C.2. 1193

E.W.F. wholesaler, established over 50 years, requires Traveller for London with practical electrical experience, an industrial connection preferred. Permanent progressive position. Apply in confidence.—Box 1342.

FOREIGN Correspondent (German and French essential) for manufacturers (London area) of mica and electrical insulating materials. Write full particulars.—Box 1296.

FOREMAN, experienced in cable laying and overhead lines, by contractors with work in Midlands and near London. Possibility of going abroad later. Write, stating age, salary and experience.—Box 1139.

ELECTRICIANS for large factory in Essex, under good conditions, including a five-day week; good wages paid in agreement with trade unions; experienced in factory maintenance, wiring and plant installations, A.C. and D.C.—Box 1321.

FLUORESCENT lighting equipment manufacturers require Representatives to operate on commission basis in all areas except North-West England.—Box 1339.

IDEA Man, capable of taking charge of special research department incorporating prototype workshops. Required to develop improvements to existing product lines and new ideas in the electrical, domestic and medical field, for large manufacturers of electrical appliances. Full details, including age, references, salary required, to be sent in confidence to—Box 1268.

IMPORTANT electrical manufacturers require Electrical Engineer with B.Sc.(Eng.) or qualifications of a similar standard. Candidates should be 28/40 years of age, with experience of rectification, electronics and motor control gear. Commercial experience an advantage. Salary in accordance with experience and qualifications. Write, giving full details, to—Box 1111.

LEADING Manchester electrical engineers require Switchgear Sales Engineer, fully experienced and technically qualified, to handle enquiries and contracts for major E.H.T. installations. Write in confidence, giving full details of training, experience, etc., and salary expected.—Box 1009.

LIGHTING Sales Engineer, by firm of electrical contractors and fluorescent fitting manufacturers. Knowledge in the preparation of lighting schemes and electrical contracting essential. Salary £500 plus commission and expenses.—Box 8567.

LONDON electrical wholesalers require experienced Sales Representative with trade connections in South-East London. Applications treated in strict confidence.—Box 1284.

LOW Power Radio Transmitter Design Engineer required. Qualifications: Engineering or Physics degree or equivalent and industrial experience of transmitter design. Salary according to qualifications and experience. Pensionable position on permanent staff.—Box 1159.

MERZ & McLellan, Consulting Engineers, Carlisle House, Newcastle upon Tyne, require a number of Electrical Assistants. Applicants should give full particulars and should preferably possess a university engineering degree and be between the ages of 25 and 35. Salaries according to qualifications and experience. 1302

PERSONNEL Officer required by cable company in the London area. Scope of work includes labour and welfare matters. Excellent opportunity for man with good experience and progressive ideas.—Box 1005.

PHYSICIST or Engineer is required for the Heat Group of the Research Laboratories of the General Electric Co. Ltd., North Wembley, Middlesex. Must have a degree or equivalent qualifications and preferably with some experience in connection with research and development work on heating elements, thermostats and switches, electric water heating or domestic appliances. Apply to the Director, stating age, academic qualifications and experience. 1297

PROGRESSIVE lamp factory in Yorkshire, manufacturing low-voltage electric lamp bulbs and employing about 350 women, requires a highly efficient Manager; must be very thoroughly experienced, highly qualified and good disciplinarian. Permanent and progressive post for right man. Applicants should state in detail age, education, qualifications, references and salary required to—Box 1303.

PROJECT Engineer, by West London firm, capable of designing and developing new electro-mechanical controlling devices. Practical experience in modern production methods an advantage, with technical qualifications to Grad. I.E.E. or degree standard. Age between 30-40 years. Write, giving fullest details of education and experience to date and salary expected, to—Box 134.

REPRESENTATIVES for London territories by old-established E.W.F. wholesalers. The full range of products of leading manufacturers is handled, and important exclusive interests present great opportunities to first-class men. They will receive energetic backing from a live and expanding organisation and full and understanding co-operation. They must be accustomed to substantial business with large industrial buyers and high-grade electrical contractors. Own car an advantage though not essential. Applications are invited from keen men who wish to earn a substantial remuneration on a salary, expenses and commission basis. Write very fully, stating present turnover, income and area covered, to—The Supra Electrical Co. Ltd., 54/56, Oxford St., W.1. 214

REPRESENTATIVES wanted by makers of high-class electric light fittings. Commission basis.—Box 8640.

REPRESENTATIVE for Birmingham, by well-known E.W.F. wholesalers, established connection essential. Remuneration: salary, commission, expenses. Reply in confidence, giving full details.—Box 8634.

REPRESENTATIVE required for London territory by well-known manufacturing electrical engineers. Selling ability in connection with lamps, cables, fluorescent equipment, etc., essential. Full details of education, age and experience to—Box 1246.

REPRESENTATIVES, by large manufacturing company for East Midlands, Southern and Northern Counties. Four-figure prospects. Full details of experience, age, to—Box 1267.

RESearch Engineer, aged 25-30, is required by the research laboratories of the General Electrical Co. Ltd., North Wembley, Middlesex, for work in connection with pulse techniques and electronics. Good experimental experience is essential, and an Honours graduate is preferred. Apply to the Director, stating age, academic qualifications and experience. 1060

SENIOR Draughtsman with experience in H.T. metal-clad switchgear. Write, giving full particulars to—Switchgear & Cowans Ltd., Elsinore Rd., Old Trafford, Manchester, 16. 1173

SENIOR Development Engineer by factory manufacturing motorised domestic electric appliances. Must have previous experience on actual design of fractional h.p. motors. Engineering degree an advantage. Apply in writing, stating full details of experience, age and salary required, to—Truvox Engineering Co. Ltd., Ref. FC/2, Hirwaun Trading Estate, Aberdare, Glam. S. Wales. 1330

SENIOR Electrical Engineering Draughtsman, experienced in layout and installation of equipment for rolling mills or other heavy plant. Salary according to qualifications and experience. Apply in writing to General Engineering Dept., Northern Aluminium Co. Ltd., Rogeston, Mon., stating age and full particulars. (This advertisement appears by permission of the Ministry of Labour and National Service under the Control of Engagement Order, 1947.) 1103

SENIOR Engineers, with experience in design of domestic electric appliances, automatic irons, immersion heaters, toasters, fires, etc. Previous development experience essential. Engineering degree an advantage. Apply in writing, stating full details of experience, age, and salary required, to—Truvox Engineering Co. Ltd. (Ref. FC/1), Hirwaun Trading Estate, Aberdare, Glam., South Wales. 1329

SEVERAL experienced Optical Lens Grinders, good wages/conditions, permanent position; Radio/Television Testers, Inspectors, Repairers; Acoustic/Loud-speaker Development Engineers; Chief Radio Estimator; Electrical Detail Draughtsmen; Research Engineers, B.Sc. (El.), B.Sc. (Eng.); Senior Electric Instrument Draughtsman; Inspector E.H.P. motors repair service; Senior Designer/Draughtsman, electronic experience.—Technical Employment Agency, 179, Clapham Rd., S.W.9. BRIXTON 3187. 8658

SIMENS Brothers & Co. Ltd., Ref. 715/6, Woolwich, S.E.18, invite applications for posts as Senior Engineers in the line telephone transmission laboratory. Suitably qualified applicants only should write, stating details of experience and salary required. 1153

SUPERVISING Electrical Engineer required by old-established electrical contractors in Southern Counties. Previous experience in estimating, supervision and accounts essential. Position offers scope to man of initiative. Apply with full details of experience, technical qualifications, stating age, when available and salary required.—Box 1282.

SWITCHGEAR and Transformer Sales Engineer, by leading electrical manufacturers for Yorkshire area. Give full details age, education, experience, salary required to—Box 1298.

SWITCHGEAR Draughtsmen for Johannesburg. Applicants must have good practical and technical experience on detailed design and development of H.T. and L.T. gear, vertical and horizontal isolation, and auxiliary apparatus, also experienced in power diagrams, etc. Single men preferred, age 25 to 35. Applications, giving details of experience and salary required, should be sent to—The Employment and Welfare Manager, Johnson & Phillips Ltd., Victoria Way, Charlton, S.E.7. 1034

SWITCHGEAR Sales Engineer required in Midlands. Previous experience desirable. Send full details to—Ref. 145.—Box 1035.

TECHNICAL Salesmen wanted for new types of photographic lighting equipment of the highest standard, for all parts of the United Kingdom and Ireland. Excellent opportunity. Good commission.—Speed Lamps Ltd., 21, Denman St., Piccadilly Circus, London, W.1. Gerrard 7145. 8632

THE De Havilland Aircraft Co. Ltd., Hatfield, Herts., require Electrical Technical Illustrator for preparation of maintenance manuals for aircraft. Applications, in writing, should be addressed to the Personnel Manager. 1196

THE opportunity occurs for a few capable Travellers in the London, Eastern and South-Eastern Counties, preferably with connections, to represent old-established electrical wholesalers. Salary, commission, pension and expenses paid.—Box 1265.

THERMOVENT Heating; E. K. Cole Ltd. require a Technical Sales Representative for London and South-Eastern England; trade connections and knowledge of space heating required. Apply with full particulars to—Sales Manager, 5, Vigo St., W.1. 1269

TOOL Designer required. Press tools, plastic moulds, die-casting dies (pressure), jigs and fixtures are all designed and made by the Company and a man who has specialised in one or more of these would be preferred, but this is not essential. Applications should be addressed to the Employment Supervisor, Hoover Ltd., Perivale, Greenford, Middx., giving full particulars of age and experience. 1355

W. H. Allen, Sons & Co. Ltd., Bedford, have a vacancy for a qualified Electrical Engineer, experienced in the design of alternating current machinery. Some practical knowledge of D.C. machinery design an advantage. Staff pension scheme. Applications are invited, stating full particulars of qualifications, experience, age and remuneration required, addressed in confidence to the Secretary. 1103

WORKS Manager: A. Reyrolle & Co. Ltd., Hebburn, Durham, invite applications from Engineers with good technical qualifications; wide experience in works management and production organisation in modern light and medium engineering practice; capable of initiating and developing production research in works employing 5,500. Adequate remuneration. Reasonable consideration in housing and removal. Superannuation fund. This is a senior appointment responsible direct to Managing Director. Applicants should give full details of education, engineering and administrative experience, confidentially, to the Managing Director, marked "Personal." 1245

WORKS Superintendent for company engaged on heavy electrical engineering in the London area. Successful applicant must be able to control the personnel of a number of manufacturing departments, maintain good discipline and establish sound labour relations. Should be conversant with modern methods for the control and reward of labour and be accustomed to co-ordinate the activities of his departments with the methods and programme of a planning engineer. Should have a good mechanical engineering knowledge, with experience in general machine shop practice, welding, assembly and other ancillary departments, and possess a knowledge of plant maintenance and repair. Write, stating age, experience and salary required, in confidence, to—Box 1285.

YOUNG MAN (20-25) as Assistant in new and interesting field of research (ceramic dielectrics). Good knowledge of chemistry and physics to approximately degree standard and practical aptitude essential. Some industrial laboratory experience preferred. Salary £350 p.a.—Box 1332.

APPOINTMENTS FILLED

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

SITUATIONS WANTED

ADMINISTRATOR, aged 40, seeks change. Experienced reorganising, planning, running mixed departments up to 400 on light electro-mech. instruments, radio. Tough job welcomed. Salary £600/£700.—Box 8644.

ADVERTISER desires change, Sales or General Manager, 25 years' sound commercial experience, home and export trades. Thorough knowledge sales and general administration. Used to control of large staff. Midlands or London area preferred. Full details with salary offered to—Box 8657.

CHIEF Draughtsman (35), free shortly for similar position in London area. Considerable and varied experience in design and production of domestic appliances, electrical accessories, radio and electro-mechanical apparatus.—Box 8656.

CLERK/Storekeeper, 20 yrs. trade, switchgear, access., cables, fts., general/industrial, domestic, purchasing, pricing, tenders, enquiries, order, dept.—Advertiser, 1, Oakford Road, N.W.5. GUL. 1249. 8613

COMMERCIAL Manager with wide experience and good technical training requires new appointment. 30 years all branches scientific instrument industry.—Box 8629.

ELECT. Engineer (27), Nat. Certificate, recent sitting for A.M.I.E.E. examination, 10 yrs. works and office experience instruments and control gear, technical correspondence, D.O., car driver, seeks progressive position.—Box 8593.

ELECT. Engineer (35), estimating, costing, buying, interviewing, office routine, correspondence, organising ability, drawing experience, good education and engineering training.—Box 8620.

ENGINEER, Grad. I.E.E., D.F.H. (26), works apprenticeship, 2 yrs. switch gear, 2 yrs. general mechanical D.O. exp. seeks progressive appointment. London district preferred.—Box 8626.

E (D.F.H.), initiative, hard worker, good sales and administrative experience, seeks executive post with responsibility, scope and prospects. Excellent references. Write—Box E747, c/o Streets, 110, Old Broad Street, E.C.2. 1287

STORKEEKEEPER, free shortly, would be pleased to hear from London wholesalers, or contractors, seeking man with 30 years' experience storekeeping and assisting buying from manufacturers. Reasonable salary.—Box 8645.

TRADER Counter Assistant, experienced wholesale electrical trade, requires position.—Box 8651.

AUCTION NOTICES

G. R.

BY ORDER OF THE MINISTER OF SUPPLY

WIVENHOE, ESSEX.

For Sale by Auction, without reserve, on 24th, 25th and 26th November, 1948, at 11 a.m. each day:

Valuable Government Surplus

ENGINEERING, ELECTRICAL & RADIO EQUIPMENT and Miscellaneous Stores, including Diesel Engines and Petrol Engines (unused), Winches, and large quantity of Pile Driving Gear and Ancillary Equipment, Concrete Mixers, Platform Weighing Machines, Gravity Conveyors, Air Conditioning Units, Scrap Batteries, numerous Electric Motors of various sizes, Electrical Equipment, Radio Equipment, Electric Cable, Lead Cable, Steel Wire Rope, Bicycles, Twist Drills, Hand Tools, Webbing Equipment, Tarpaulins, Tackle Blocks, and a varied assortment of Accommodation Stores and Miscellaneous Items.

Lying at M.O.S. Depot No. 65, Wivenhoe, Essex, and Returned Stores Depot, Reed Hall, Colchester. All lots from both Depots will be sold "as viewed where lying" by catalogue at Wivenhoe.

On view 22nd and 23rd November, 9.30 to 12.30 and 1.30 to 4 p.m., and on sale days from 9.30 to 11 a.m.

Admission by catalogue only, price 6d. (P.O. only, and envelopes marked "Govt. Sale"), to admit two persons on view days, one person on sale days, obtainable from the Auctioneers: C. M. STANFORD & SON, 23, High Street, Colchester. Phone 3165 (3 lines). 1240

G. R.

Without Reserve

BY ORDER OF THE MINISTER OF SUPPLY

FULLER, HORSEY, SONS & CASSELL

have been instructed to offer for sale by auction in lots at M.O.S. DEPOT, 12-14 TOWER BRIDGE RD., LONDON, S.E.1, on Tuesday, 16th November, 1948, and following day, at Eleven o'clock precisely each day:

SURPLUS STORES AND EQUIPMENT

Including Metro-Vick 60-kVA Spot Welders, 400/440 v.v. single-phase; E.E.C. 162-kVA Oil-cooled Transformer, 440/3/50; Avery Brinell Hardness Tester, type 891; Broom & Wade Type N.X. Air Compressor Set; David Brown 5-h.p. Reduction Gears, size CH.6A; Electric Motors; Blowers and Fans; Batteries and Accumulators; Radio and other Electrical Equipment; Electric Cable; Factory Scales; Valves; Metal Pumps; Padlocks; Paint; Plywood Drawing Boards; large quantity of Engineers' Hand Tools.

36" and 54" Plastic-coated Canvas and 36" Plain Canvas; Canvas Bags; Old Rope, Canvas, Hessian and Aluminium; Waterproof Covers; Anti-Gas Clothing; Blankets and numerous other effects.

Catalogues, 6d. each, admitting two persons on view days and one on sale days, may be had, when ready, of Messrs. Fuller, Horsey, Sons & Cassell, 10, Billiter Square, London, E.C.3. 963

Tenth Sale

G. R.

Without Reserve

BY ORDER OF THE MINISTER OF SUPPLY

R.A.F. No. 25 MAINTENANCE UNIT, HARTLEBURY, Wores. (4 miles from Kidderminster, 11 from Worcester).

NOCK & JOSELAND have received instructions from the Minister of Supply to sell by auction, without reserve, on Friday, 12th November, 1948, at 11 a.m., the Valuable

Miscellaneous Stores comprising

WIRELESS AND ELECTRICAL EQUIPMENT

comprising 6 Electric Aviation Spirit Pumps, Petrol/Electric Generating Sets (6 and 9 kVA), Generator Test Sets, Megger Testers, Ammeters and Voltmeters, Motor Starters, Accumulators, Receivers, Power Units, and Miscellaneous Small Spares.

22,000 pairs Shoes, Service pattern, Black, from sizes 6 to 13.

General Stores, comprising Engineers' and Carpenters' Tools, Micrometers and Vernier Callipers, Machines (Roller Bending), Petrol Hose with Taps, Easans, Knives, Forks and Spans, Compound Plastic Jointing, Rubber Solution, Semi-Rotary Pumps, Collapsible Panniers, Compasses (type F.10) and Astro Compasses, Gravity Rollers, Portable Air Compressors (petrol and electrically driven), Servicing Trolleys, Dinghies and Dinghy Spares, etc., etc.

Barrack Furniture, comprising Chests of Drawers, Dining Chairs, Upholstered Easy Chairs, Wicker Chairs, Aircraft Chairs, Aircraft Cushions, Clothes Horses, Wood Forms, Folding Tables, Wood Washtand Frames, and Folding Table Wringers.

Clothing, comprising Fur-lined Flying Jackets and Trousers, Flying Suits (Inner and Outer), Flying Helmets, Wool-lined Flying Boots, Pantaloon (Motor Cycle), Waterproof Sleeping Suits, Waterproof Clothing (Black), Ground Sheets, Goggles, etc.

View day, Thursday, 11th November, 1948, between the hours of 10 a.m. and 4 p.m., and on the morning of the sale day between the hours of 9 a.m. and 11 a.m. Catalogues, price 6d. (postal orders, not stamps), can be obtained from the Auctioneers: Nock & Joseland, Bank Buildings, Kidderminster. Tel. 2053. 1127

Eighth Sale

G. R.

Without Reserve

BY ORDER OF THE MINISTER OF SUPPLY

R.A.F. STATION, HANDFORTH, CHESHIRE

(Camp Entrance at junction of Moss Lane & Grove Lane)

Large Assemblage of Very Valuable

WIRELESS AND ELECTRICAL EQUIPMENT

Tentage, Footwear and Miscellaneous Surplus Stores, including Miscellaneous Tentage, Fly Sheets, Tarpaulins, Canvas Covers, Wireless Indicators, Receivers, Power Units, Direction Finders, R.F. Units, Amplifiers, Remote Control Panels, Eliminators, Aerial Systems, Rotary Transformers, Sodium Lamp Transformers, Motor and Engine-driven Generators, 24-v. Electric Motors, 1-ph. Transformers, Impedance Matching Units, Voltage Regulators, Electric Light Boxes, Accumulators, Batteries, Suppressors, Switch Boxes, Fusing Units, Rotary Switches, Dimmer Switches, Tumbler Switches, Plugs and Sockets, Voltmeters, Ammeters, Hour Meters, Junction Box Assemblies, Cable, Resistances and Condensers, Auto Selectors, Ankle Boots, Leather and Composition Soles and Heels, Shoe Repairing Nails, Thread, etc., Life-saving and Electrically Heated Waistcoats, Kapok-lined Inner Flying Suits, Leather Flying Helmets, Wool Felt Slouch Hats, Zip Fasteners, Machine Cotton and Thread, Brass and Bakelite Buttons, Buckles, Balls Twine, Ballon Rope Lines, Barrage Balloons and Parts, Rubber Cord, Elastic, Field Dressings, Brushes, Hydraulic Pumps, Electric Horns, Winches, 20-cwt. Chain Hoists, Pulley Blocks, Motor-driven Fans, Bicycles and Spares, Tool Kits, Rubber Solution, Heat Distributing Fans, Camera Testing, Leads, Cones, Bromide Paper, Camera Controls, Pressure and Oxygen Gauges, Anti-vibration Mountings, Wooden Racking, Ball-bearing Roller Conveyors, Metal Cases and Drums, Swivel Hand Trolleys, Bomb Trolleys, Storage Boxes, Padlocks, Bleaching Powder, etc., etc.

To be sold by auction on Tuesday and Wednesday, 16th and 17th November, 1948, commencing at Eleven o'clock each day.

Auctioneers: BRADY & SON.

View days, Friday and Monday, 12th and 15th November, 1948, from 10 a.m. to 4 p.m., and on sale days from 9 a.m. to 10.45 a.m., by catalogue, price 6d. each, from Auctioneers' Offices or from the R.A.F. Station, Handforth, on view and sale days.

Auctioneers' Offices: 17, Warren Street, Stockport. Tel. STO. 2252/3. 1257

BY ORDER OF THE MINISTER OF SUPPLY

MINISTRY OF SUPPLY STORAGE DEPOT,
ROTHERHAM, HEREFORD
(about 2 miles from the Centre of the City)

RUSSELL, BALDWIN & BRIGHT LTD. are instructed to sell by auction at the above Depot, on Tuesday, Wednesday, Thursday and Friday, 16th, 17th, 18th and 19th November, 1948, at 11 a.m. punctually each day, approximately

600 ELECTRIC MOTORS AND SWITCHGEAR EQUIPMENT

200 Auxiliary Generating Sets, 8 Portable Generating Sets, 450 6-volt and 12-volt Batteries, 300 lots of Radio Receivers, Radio Components and Power Units, 100 Motor Vehicles by Chevrolet, Austin, Crossley, Bedford, Fordson, G.M.C., Guy and Dodge, etc., 90 Two and Four-wheeled Trailers, 10,000 10" and 20" diameter Rubber-tired Bogie Wheels; and a large quantity of Miscellaneous Stores, including Wheels with Pneumatic Tyres, Bogie Wheel Assemblies, Hand Tools, Hydraulic and other Lifting Jacks, Jack Blocks, Inspection and other Lamps, Oil and Petrol Cans, Instrument Panels, Grease Guns, Picks and Shovels, etc., etc.

Admission (on view days and sale days) on production of catalogue only. One catalogue will admit two persons on view days and one on sale days.

View Days: The lots may be viewed on Tuesday, Wednesday, Thursday and Friday, 9th to 12th November, and on Monday, 15th November, between the hours of 9 a.m. and 4 p.m., and on sale days from 9 a.m. to 10.30 a.m.

Catalogues (Sixpence each, postal orders only) may be obtained from the Auctioneers' Offices, 20, King Street, Hereford (Tel. 2184); also Leominster and Tenbury Wells. 1239

FOR SALE

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

A B. & W. Water Tube Boiler will cut down your fuel costs. Two 40,000 lb. evap., 310 lb. w.p.; one 20,000 lb. evap., 175 lb. w.p.; two 16,000 lb. evap., 190 lb. w.p.; two 12,000 lb. evap., 200 lb. w.p. We install complete, including brickwork. Also one Turbo-Alternator, 5,000 kW.—Burford, Taylor & Co. Ltd., Boiler Specialists, Middlesbrough. Tel. Middlesbrough 2622. 32

A Cooksley & Co. Ltd.: A.C. and D.C. Motors, Portland. 46
A hole Fans Switchgear, etc.—21-25, Tabernacle St., London, E.C.2. Phone: MON. 3357/4/9. 46

A number of brand new and unused Rotary Convertors with specification as follows: .5 kVA, input 230 volts, 3.2 amps. D.C., output 110 volts, 4.5 amps. A.C., temperature rise 40 degrees, single-phase, fitted with smoothing chokes and condensers. A very reasonable price to clear.—Box 8631.

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A C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22. Forest Hill 2278-9. 102

A C. 400/440/3/50 Motors: 150-h.p. Higgs, 975 r.p.m.—slip-ring, ball-bearing, drip-proof, cont. rating, new (Ref. 3213); 85-h.p. Metro-Vickers, 380/400/3/50, 485 r.p.m., squirrel-cage, ball-bearing, drip-proof, complete with auto transformer starter (Ref. 2564); 75-h.p. Higgs, 730 r.p.m., slip-ring, ball-bearing, drip-proof, cont. rating, new (Ref. 3211); 75-h.p. L.D.C., 485 r.p.m., slip-ring, ball-bearing, screen protected, cont. rating, outrigger bearing, complete with B.T.H. pedestal mounting stator/rotor starter (Ref. 2540); 60-h.p. D.P., 485 r.p.m., slip-ring, ball-bearing, screen protected, cont. rating, outrigger bearing, complete with Allen West floor mounting cubicle type starter, P.B. control operating contactors automatically on stator and rotor (Ref. 2513); 50-h.p. Metro-Vick, 1,460 r.p.m., slip-ring, ball-bearing, screen protected (Ref. 2830); 45-h.p. Crompton Parkinson, 1,470 r.p.m., slip-ring, ball-bearing, totally enclosed type, cont. rating (Ref. 2826); 40-h.p. Brook, 1,500 r.p.m., slip-ring, ball-bearing, screen protected, cont. rating, complete with H.C.A.B. starter, N.V. and O.L. combined rotor/stator type (Ref. 3189);—Cox & Danks Ltd., Plant & Machinery Dept., Fages Road, Feltham, Middx. Phone, Feltham 3471. 1253

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A C. and D.C. Motors, large stocks, fully guaranteed.—Lytton Electric Co., 7, Picton Place, W.1. WELbeck 8096. 154

A C. Generating Sets, petrol, 3-phase, 50 periods, 400 volts and 230 volts; 50 periods, single-phase, 5 to 15 kVA; 40 sets available.—Midland Counties Elec. Eng. Co. Ltd., Grace Street, West Bromwich. 43

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DIESEL Driven Generating Sets: 312-kVA, Paxman radiator-cooled, 12-cyl. Diesel Engine and 312-kVA, 440/250-volt, 3-phase, 50-cycle Alternator and Switchgear, and Automatic Voltage Regulator; 125-kW Cummins 6-cyl. Diesel Engine, speed 750 r.p.m. and 125-kW, 400/230-volt, 3-phase, 50-cycle Alternator and Switchgear; 75-kVA, Davey Paxman 5-cyl. Diesel Engine, 1,000 r.p.m. and 75-kVA, 440/250-volt, 3-phase, 50-cycle Alternator and Switchgear; 75-kVA, General Motors 6-cyl. Diesel Engine, 75-kVA, 400/230-volt, 3-phase, 50-cycle Alternator and Switchgear; 54-kW, Perkins 6-cyl. Diesel Engine, 54-kW, 220-volt compound wound inter-polar D.C. Generator and Switchgear; 50-kVA, Davey Paxman 4-cyl. Diesel Engine, speed 1,500 r.p.m., 50-kW, 440/250-volt, 3-phase, 50-cycle Alternator and Switchgear; 30-kW, Hercules 6-cyl. marine type Diesel Engine and 30-kW, 120-volt, D.C. Generator, 1,000 r.p.m.; 27.5-kVA, Lister 4-cyl. Diesel Engine, 1,000 r.p.m.; 27.5-kVA, 3-phase, 50-cycle, 400/230-volt Alternator and Switchgear (six available); 20-kW, Gardner 4-cyl. vertical marine type Diesel Engine and 20-kW, 115-volt D.C., 1,150-r.p.m. Generator; 16.9-kVA, Ruston 3-cyl. Diesel Engine, 1,000 r.p.m., 16.9-kVA, 3-phase, 50-cycle, 400/230-volt Alternator and Switchgear; 15.5-kVA, Hill 4-cyl. Diesel Engine, 1,000 r.p.m., 15-kVA, 230-volt, 1-phase, 50-cycle Alternator and Switchgear (three available); 15-kVA, Lister 3-cyl. Diesel Engine, 1,000 r.p.m., 15-kVA, 230-volt, 1-phase, 50-cycle Alternator and Switchgear; 15-kW, Lister 3-cyl. Diesel Engine, 1,000 r.p.m., 15-kW, 230-volt, D.C. Generator; 9-kVA, Lister twin-cylinder Diesel Engine, speed 1,000 r.p.m., 9-kVA, 230-volt, 1-phase, 50-cycle Alternator and Switchgear; 5-kW, Lister single-cylinder Diesel Engine and 5-kW, 230-volt, D.C. Generator.—Newman Industries Ltd., Yate, Bristol (Phone, Chipping Sodbury 3311-17): London: 32, Victoria St., Westminster, S.W.1 (Phone, Abbey 2023); Manchester: Calder St., Regents Bridge, Salford, 5 (Phone, Blackfriars 5423); Glasgow: Baltic Chambers, 50, Wellington St., C.2. Phone, Central 2534. 1230

DIESEL Generating Sets, English manufacture, direct current, all voltages, from 50 kW to 260 kW.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 158

DIESEL Generating Sets, brand new and guaranteed, all sizes, e.g., 68 kVA, £1,830; 25 kVA, £850; 5.6 kVA, £270.—Box 93.

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DIESEL Generator Sets available up to 300 kW, A.C. and D.C.; Metro-Vick 8" Frequency Meter and Carbon Pile Voltage Regulator.—Stone & Co., 39, Spring St., W.2. PAD. 4667. 8548

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ELECTRIC Motors, Brand new 400/440-volt, 3-phase, 50-cycle Electric Motors from stock: Six 1-h.p. Kandem, S.C., screen protected, 1,425 r.p.m.; two 1-h.p. Brook, S.C., screen protected, 1,450 r.p.m., complete with B.T.H. push-button starters; five 3-h.p. Brook, S.C., screen protected, 1,450 r.p.m., with B.T.H. push-button direct to line starters; ten 5-h.p. Brook, S.C., screen protected, 1,450 r.p.m., with star/delta starters. Following fully reconditioned 400/440-volt, 3-phase, 50-cycle Motors: Nine 5-h.p. Crompton Parkinson, S.C., screen protected, 1,450 r.p.m.; seven 7.5-h.p. B.T.H., S.C., screen protected, 1,450 r.p.m.; three 10-h.p. Metro-Vick., S.C., screen protected, 1,450 r.p.m.; five 15-h.p. L.D.C., S.C., screen protected, 960 r.p.m.—Halux Manufacturing & Trading Co. Ltd., 171, Victoria St., London, S.W.1. Tel. Victoria 4826/7; Cable, Halux/London. 787

ELECTRIC Motors, Dynamos, Alternators and Motor Generator Sets of all sizes. We hold one of the largest stocks in England. New and reconditioned with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 13

ELECTRIC Motors, 1/2 h.p., 3,000 r.p.m., D.C., 110 volts. Also 220 volts, £8 each.—John E. R. Steel, Dept. 39, Bingley, Yorks. 51

ELECTRIC Welding Plant, Engine and Electric, A.C. driven, 300 amps. output, complete with weather-proof covers.—Box 34.

ELECTRICAL Motors A.C. and D.C. available from stock up to 100 h.p., new and reconditioned, guaranteed. Send for list.—Stone & Co., 39, Spring St., W.2. Pad. 4667. 8552

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20-h.p. H.E.M., 230-volt, single-phase, 50-cycle Slipping Motor, 1,440 r.p.m., rotor volts 280, amps. 34, continuous, complete with starter and recently overhauled by Messrs. Burdette, £75. Inspection can be arranged by appointment.—Monks, 139, The Broadway, S.W.19. LIB. 6915. 1270

25-h.p. Brooks 400/3/50 Slipping Motor, 950 r.p.m., complete with new switchgear; same specification, 30 h.p.: also 5, 10, 15, 40 and 250 h.p., slip-ring, same voltage, for immediate delivery; large number of S.C. Motors available.—Saville-Calvert (Machinery) Ltd., Warwick Rd., Stratford-on-Avon. Tel.: Snitterfield 1354

60-kVA English-made Alternator, redesigned for 400/440 volts, 3-phase, 4-wire, directly coupled to G.M.C. 6-cylinder, 2-cycle Diesel Engine, radiator cooled, complete with electric starting gear, fuel tanks, instrument panel. Mounted on common bedplate. Price on application.—Houchin Ltd., Garford St., E.14. Telephones: East 3768 and 3817. 58

100, 50, 30 and 20-kVA, 400/230-v. Diesel Engine-driven Generating Sets. Immediate delivery.—The Horseshoe Supply Co. (Spalding) Ltd., Horseshoe Road, Spalding. Phone 2535. 49

100-kVA English made Alternators, 4-wire, 3-phase, 400/230 volts, directly coupled to G.M.C. 6-cylinder, 2-cycle Diesel Engine. Radiator cooled, complete with electric starting gear, fuel tanks, instrument panel. Mounted on common bedplate, ex works.—Houchin Ltd., Garford Street, E.14. Telephones, East 3768 and 3817. 137

30-amp. Fused Mains Switches, 2 and 4 ways; Splitters; Consumer Units, 15-amp. Distribution Boxes, 2 to 12 ways, D.P. and S.P. & N. Deliveries from stock. Send for lists.—Winco Industries, 17, Stretford Rd., Manchester, 15. 218

66-h.p. Motor, 1,450 r.p.m., slipping, with starter, £345; 13-h.p. Motor, 1,450 r.p.m., £11.—Walden, 2, Tudor Gates, Highfield Av., N.W.9. 8647

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. 30

400/1/50 A.C. Mofors and Starters, etc.: 2 35-h.p.m., 720-r.p.m., Sq.-Cage, B.B., L.D. & C. Auto Transf., O.I., Allen West; 1 30-h.p., 905-r.p.m., Sq.-Cage, B.B., M.V. Auto Transf., O.I., G. Ellison; 1 15-h.p., 715-r.p.m., Sq.-Cage, B.B., E.E.C. Star-Delta A.B., Brookhirst; 1 15-h.p., 1,440-r.p.m., Sq.-Cage, B.B., E.E.C. Motor only; 1 15-h.p., 1,500-r.p.m., Sq.-Cage, B.B., M. & P. Motor only; 1 12-h.p., 940-r.p.m., Sq.-Cage, D.R., Westinghouse Motor only; 1 16.5-kVA Transformer, input 400/3/50, output 110/1/150; 10 10-line Intercomm. Telephones, G.E.C., 314 yds., 15-core lead cable. For further particulars apply to—Thomas Crompton & Sons Ltd., Ashton-in-Makerfield, Nr. Wigan. 1308

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500 Electric Motors, Dynamos, Transformers, Converters, etc., etc., at low prices.—S. C. Bilby, A.M.I.C.E., A.M.I.E.E., Crosswells Road, Langley, near Birmingham. Phone, Broadwell 1359. 21

500-kVA Scott connected Transformer, 7,000 v., 2-phase primary, 400 v., 3-phase and neutral secondary, manufactured by British Insulated.—Hobson & Partners, 7a, Old Rd., Linslade, Leighton Buzzard. 1351

500-kVA, single-phase Transformer, 7,000 v. primary, 400 v. secondary, manufactured by British Insulated.—Hobson & Partners, 7a, Old Rd., Linslade, Leighton Buzzard. 1352

500-kVA B.I. Transformer, 7,000 volts, 2-phase primary, 400 volts, 3-phase secondary, 2½, 5%, 7½ and 10% tappings.—Hobson & Partners, 7a, Old Rd., Linslade, Leighton Buzzard. 1349

800-kVA Transformers, Scott connected, 2-phase, neutral, 7,000 v. primary, 3-phase, neutral, 3,000 v. secondary, manufactured by Metro-Vick., year of manufacture, 1942. Hobson & Partners, 7a, Old Rd., Linslade, Leighton Buzzard. 1350

800-kVA B.T.H. Transformer, 7,000 volts, 2-phase primary, 3,000 volts, 3-phase secondary, with neutral brought out on L.V. side, 1942 manufacture.—Hobson & Partners, 7a, Old Rd., Linslade, Leighton Buzzard. 1348

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5,000 yards 7.044 Twin V.I.R. Lead-covered H.S. L.F. Cable, on 500-yard drums; also 500 yds. of .15 Single V.I.R. B. & C. L.T. Cable.—Slaters Electricals Ltd., Princes Way, Team Valley Estate, Gateshead, 11. 1044

18,000 yards Lead-covered Cable, 3-core, rubber insulated, 1/036, on drums of 2,500 ft.; 4,000 yards Lead-covered Cable, 5-core, rubber insulated, 1/064, on drums of 500 yards.—S. J. Barnett & Co. Ltd., Barkingside Metal Works, Mossford Green, Ilford. 1228

£115. One brand new Stuart Turner 24-kW Lighting Plant, 230 v. A.C., suitable for land use, fitted with built-in radiation. Supplementary to requirements.—317, Regent's Park Rd., N.3. Finchley 5143. 215

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A number of 3-phase Transformers are required immediately. H.V. windings 3,000-3,300 v., L.V. 400-440 v. Two or three transformers of from 500 kVA to 1,000 kVA each are required.

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NUMBER 4-pin 400-volt Ironclad Plugs and Sockets for connecting cables, also switch plugs.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford, B.S. 1000/1. 1318

ONE 50/100-kVA, 11,000/415-3-50 Transformer, preferably outdoor type. Full particulars to—J. Jones & Co. (Nottm) Ltd., Canal St., Nottingham. 1276

POWER Factor Meter for 400/440/3/50 supply.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 1317

SIX (not necessarily duplicate) 7½-h.p., 500-volt D.C. Motors at about 1,500 r.p.m. Ball-bearing machines preferred.—Box 1231.

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WANTED, Rotary Converters, any size.—Universal, 221, City Road, London, E.C.1.

2 350-h.p., 1,000-r.p.m. Auto-synchronous or Slipping Motors, 3,300 or 500 volts, 3-phase. Other voltages or size considered for rewinding. Full details, date of manufacture, condition, price, etc.—Box 1344.

150-h.p. o.l. Stator Rotor Starter, 400/440/3/50.—Box 1071.

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ENGINEERS, Precision, South England, seek manufacture of electrical, mechanical or domestic assemblies or components. Press tools, gauges, small stampings, capstan turning, also Internal and External Grinding. Write—Metal Components Ltd., Dolphin Rd., Shoreham-by-Sea, Sussex. 74

PRECISION Engineering, capstan and centre lathe work, welding, spot welding, tube bending, finishing, assembly, experimental work, product improvement, complete production runs. All enquiries to—Herbert W. Baker (Engineering) Ltd., 2a, Kilburn La., W.10. I.A.D. 4006. 75

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ACTIVE London company desires represent progressive electrical manufacturers, old or newly established.—Box 81.

ADDITIONAL Agencies required for South of England, including London: (a) Cables and Flexibles; (b) Small Switchgear; (c) Transformers, and any lines suitable for distributing through wholesalers.—Box 40.

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WASHING Machines, Mixing Machines (electric and hand-operated), Cooking Stoves, Refrigerators (gas or electric) required on exclusive distributive terms. Please quote in first instance with illustrated leaflets (full specification) to the Electrical Equipment Co. Ltd., Equipment House, 106, London Road, Leicester. Telephone 60291 (3 lines); Telegraphic Address. "Elequip, Leicester." 1073

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OWNERS of old-established businesses wishing to retire should consult British Brokers Ltd., 46, St. James's Place, London, S.W.1 (Regent 4720). Many buyers available, particularly for large propositions. 197

WANTED, small electrical installation business by contractor with small business wishing to expand, London area. State price and full details.—Box 8649.

PATENT NOTICES

NOTICE is hereby given that The General Electric Company Limited seek leave to amend the complete specification of Letters Patent No. 564716 entitled "Improvements in electric radiators and like apparatus." Particulars of the proposed amendment were set forth in the Official Journal (Patents), No. 3116, dated November 3rd, 1948. Any person may give Notice of Opposition to the amendment by leaving Patents Form No. 19 at the Patent Office, 25, Southampton Buildings, London, W.C.2, on or before the 3rd December, 1948.—H. L. Saunders, Comptroller-General. 1341

PATENT No. 528068 for "Instructive and Demonstration Apparatus or Toy for the Construction of Various Electric Machines." Owner desires to meet all demands for the utilisation of this patent and invites enquiries from manufacturers in Great Britain prepared to assist in its commercial exploitation. Address in first instance—Messrs. Pollak, Mercer & Trench, Chartered Patent Agents, 134, Cheapside, London, E.C.2. 1310

THE proprietors of British Patent No. 571062, relating to "Improvement in Method of and Apparatus for Coating Wire," desire to grant licences under the patent on reasonable terms for the purpose of ensuring the full commercial development and practical working of the invention. Enquiries should be addressed to—Reddie & Grese, Chartered Patent Agents, 6, Bream's Buildings, London, E.C.4. 1275

MISCELLANEOUS

BRITISH ELECTRICAL POWER CONVENTION EXHIBITION

THE British Electrical Development Association has been invited to arrange an Exhibition in connection with the British Electrical Power Convention which is to be held at Torquay from the 13th to the 17th of June, 1949. Manufacturers desirous of representation in the Exhibition are requested to notify the General Manager and Secretary, British Electrical Development Association, 2, Savoy Hill, London, W.C.2, not later than 30th November. 1289

EDUCATIONAL NOTICES

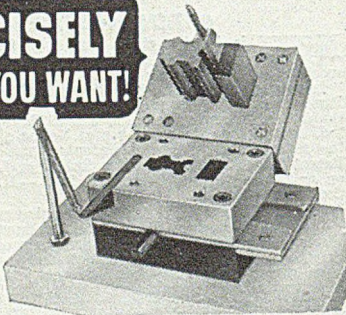
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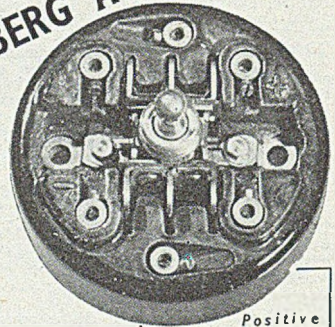
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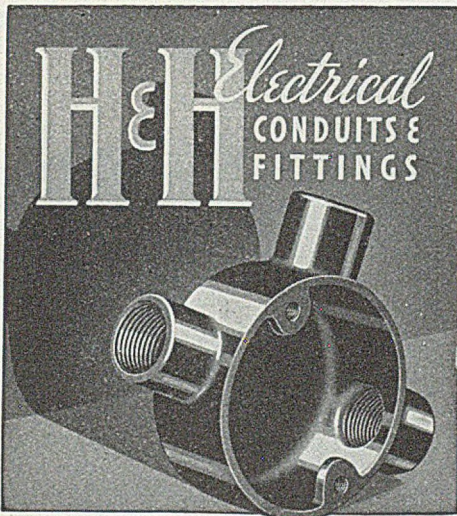
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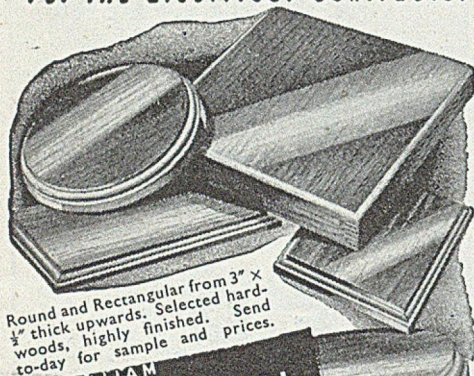
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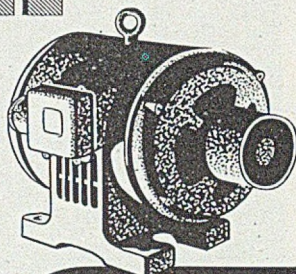
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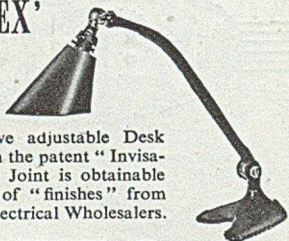
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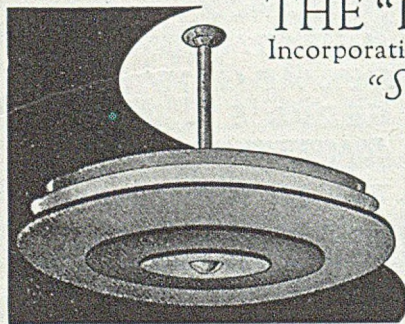
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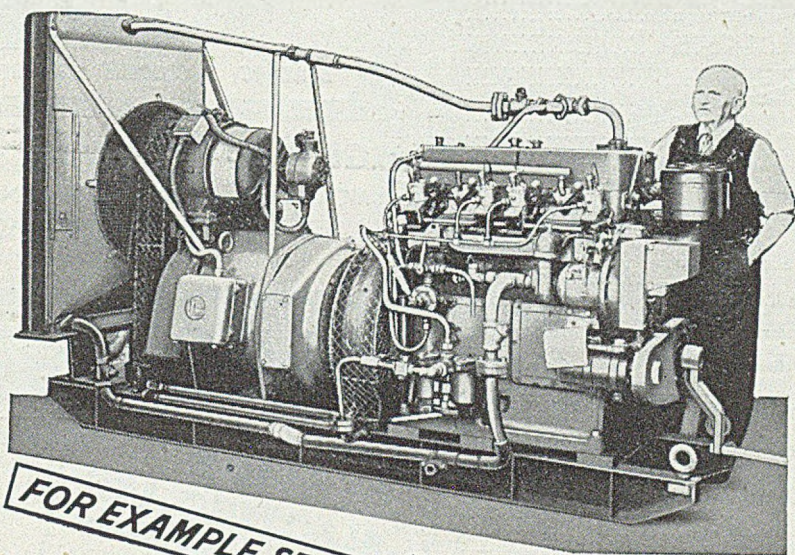
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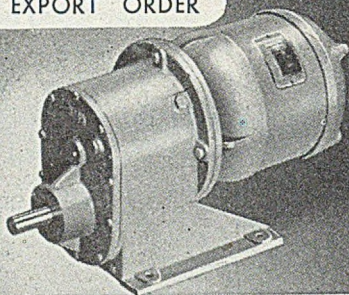
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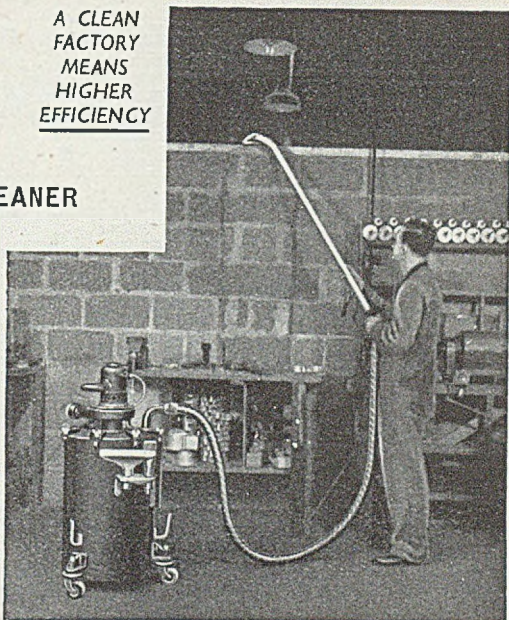
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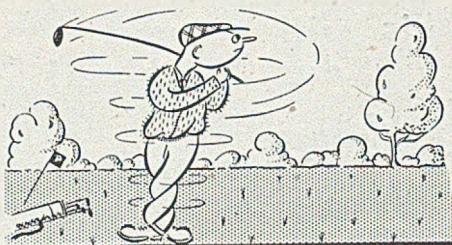
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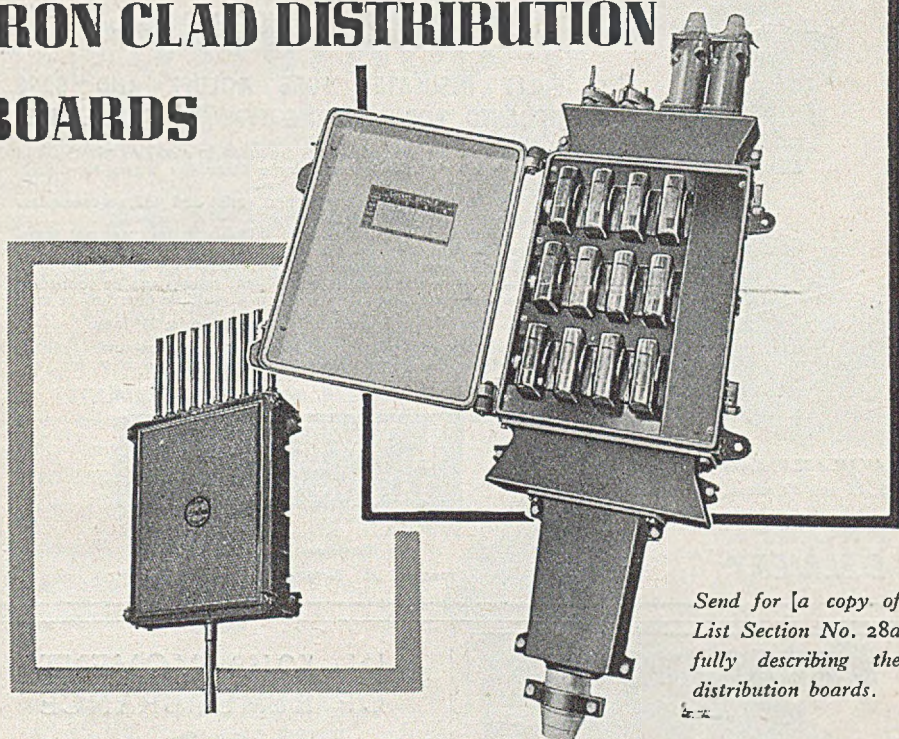
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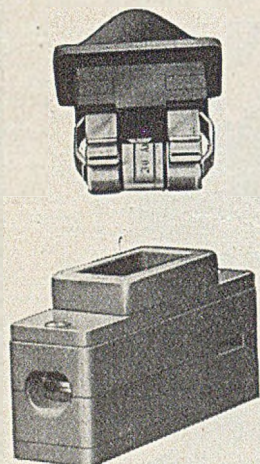
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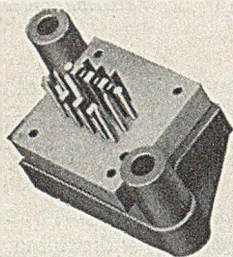


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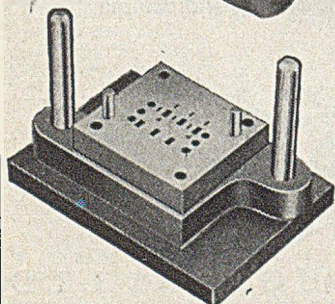
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FOR THE

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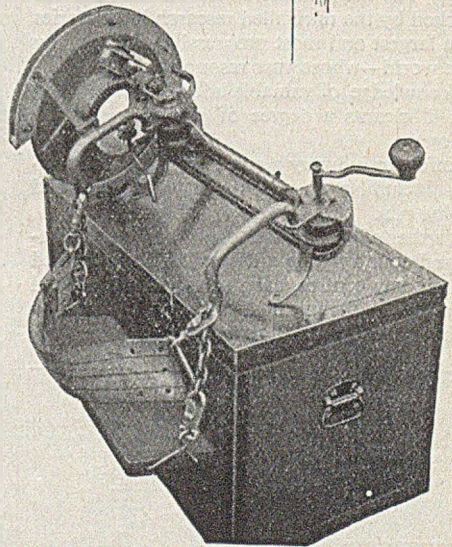
*Employing the Neale Spinner, for which
P.G. are the manufacturers in this
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This machine is suitable for binding cable to new or existing Catenary wire. Its application eliminates the use of cable suspenders or rings.

Further details are given in our Technical Instruction Sheet 19f which will be sent on request.

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PG

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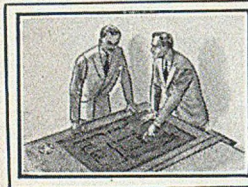


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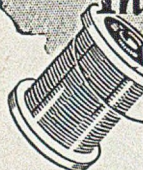
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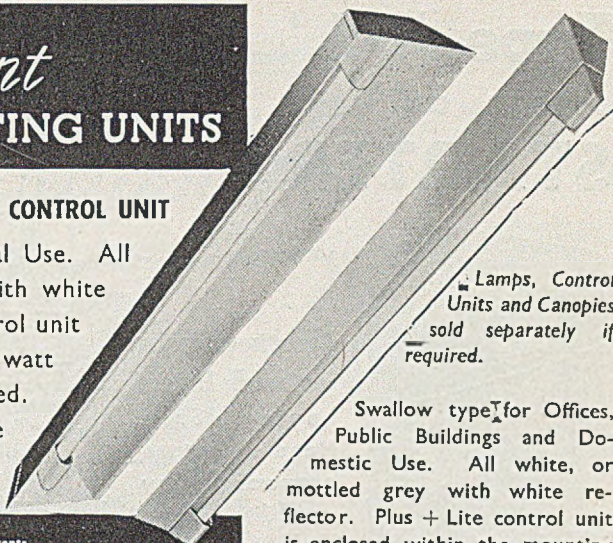
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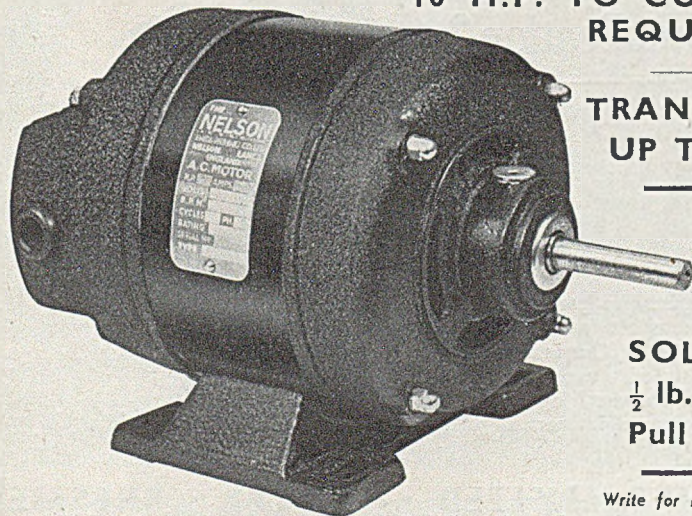
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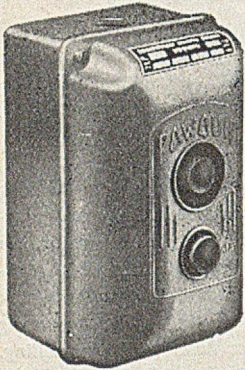
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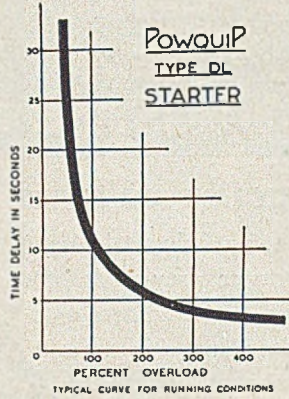
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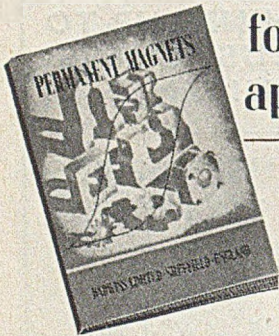
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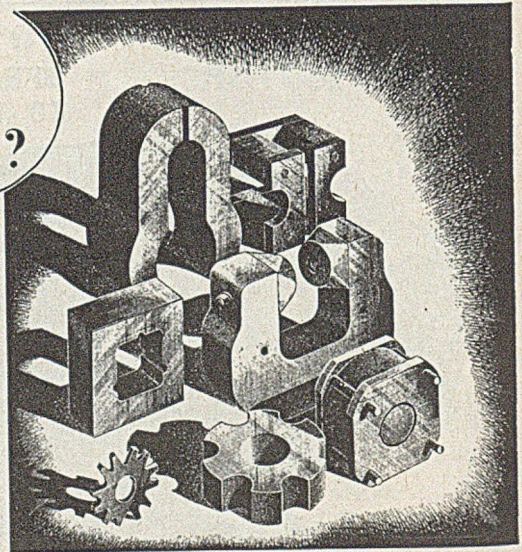
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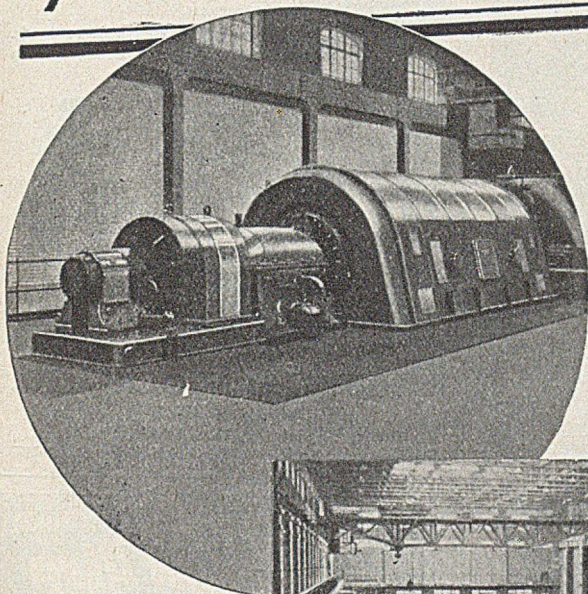


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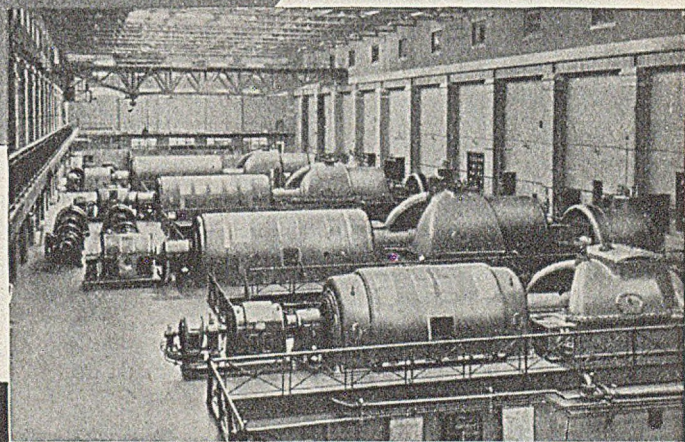
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Left: One of two 50,000-kW Metrovick turbo-generators which are installed, with condensing plant, at the Neepsend station, Sheffield

Right: Interior of the Portishead Generating Station, Bristol, containing three 51,250-kW and two 20,625-kW Metrovick turbo-generators and condensing plant



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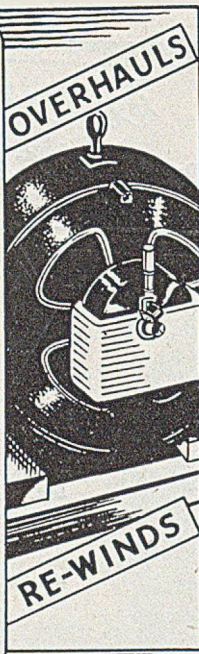
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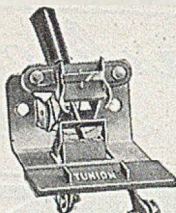
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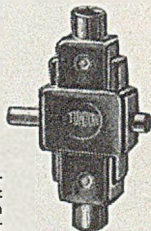
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TM 73



M 245



TM 247

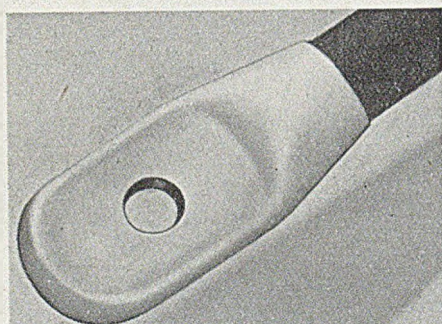


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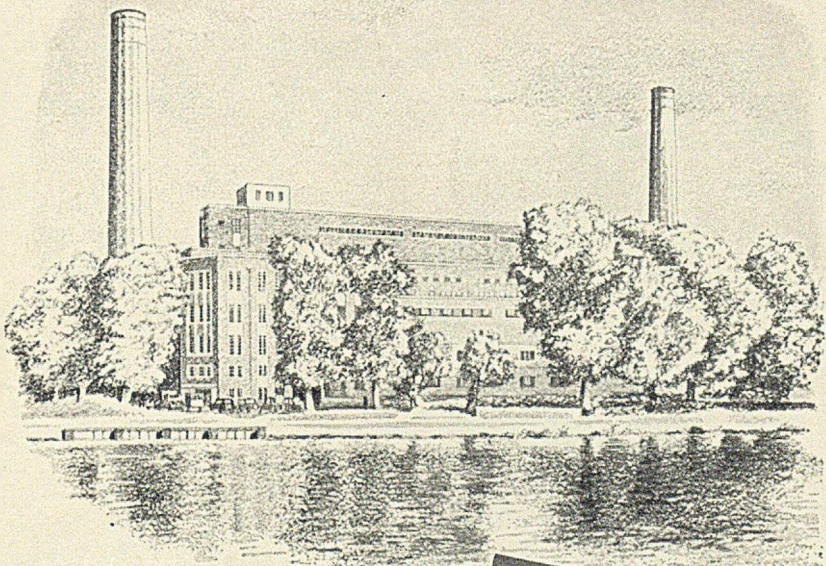
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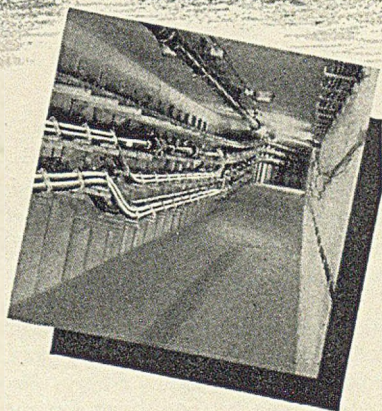




**The new power station
at Kingston-on-Thames**

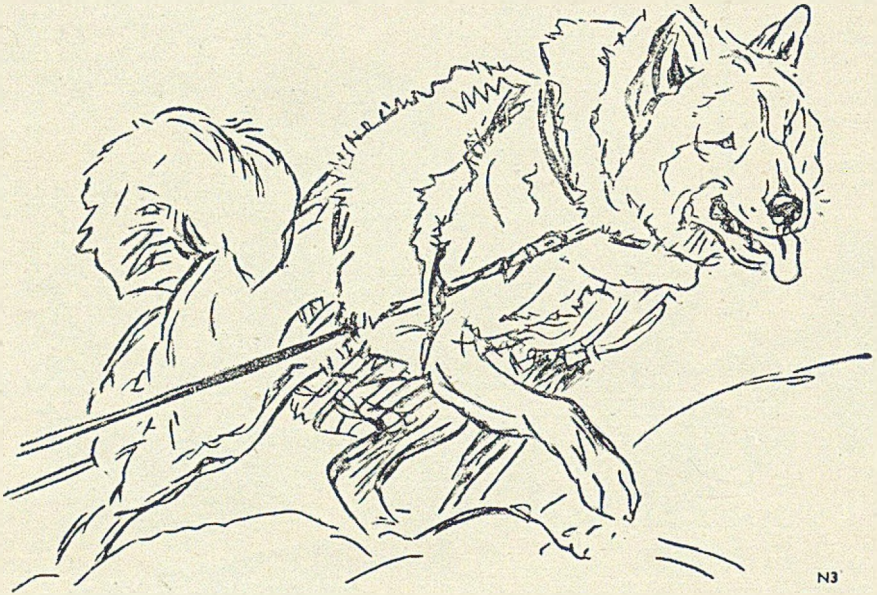
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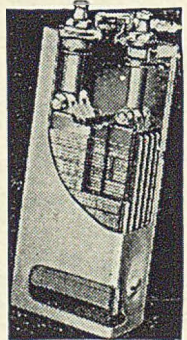
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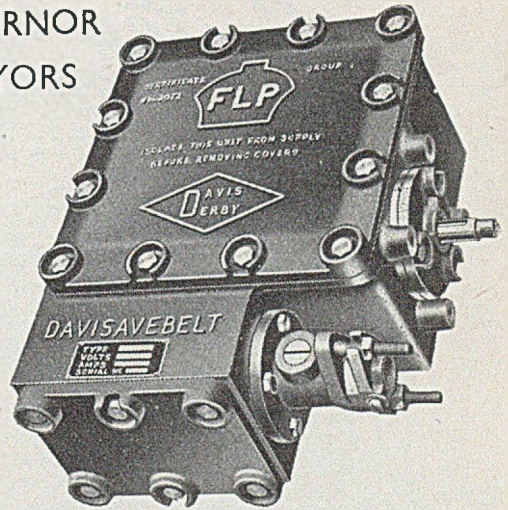
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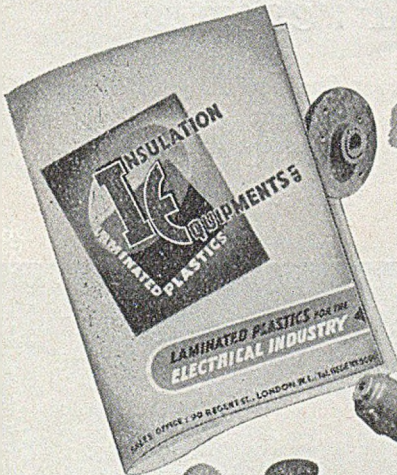
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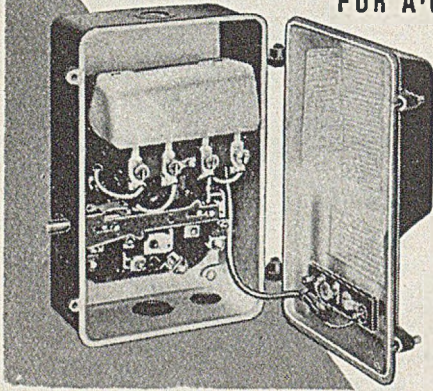


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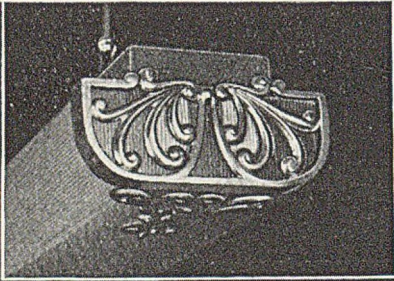


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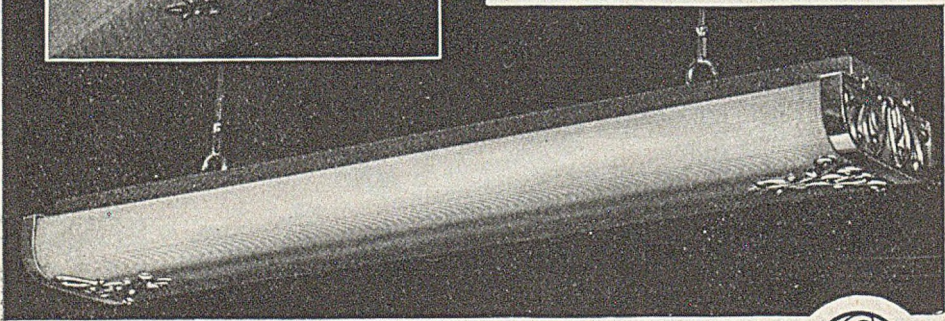
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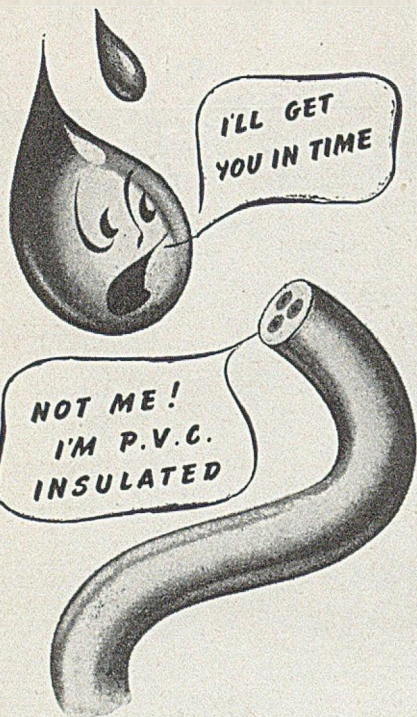
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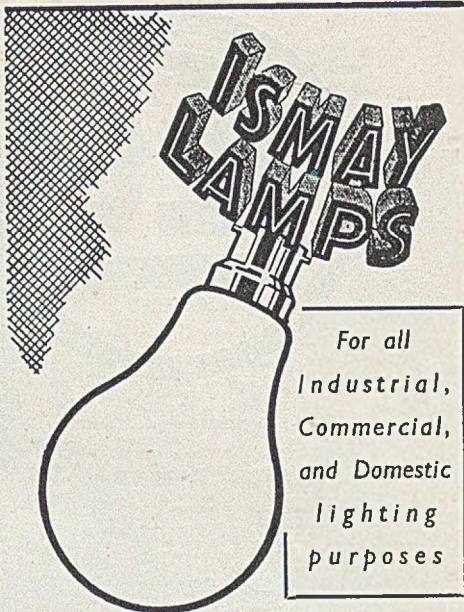
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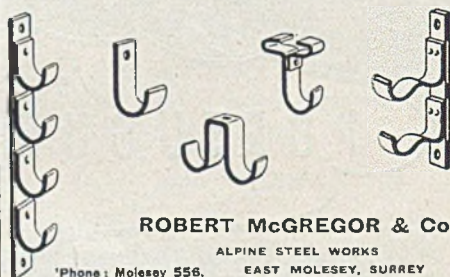
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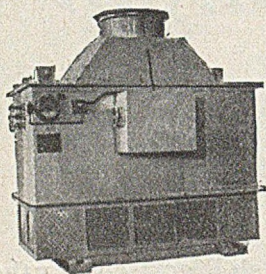
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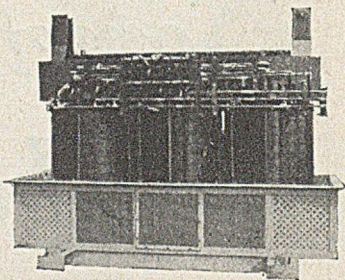
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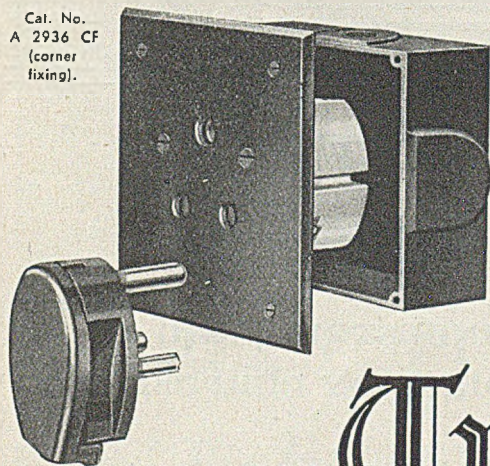
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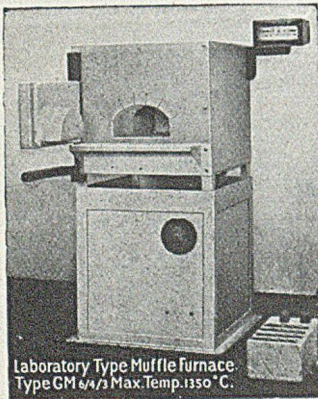
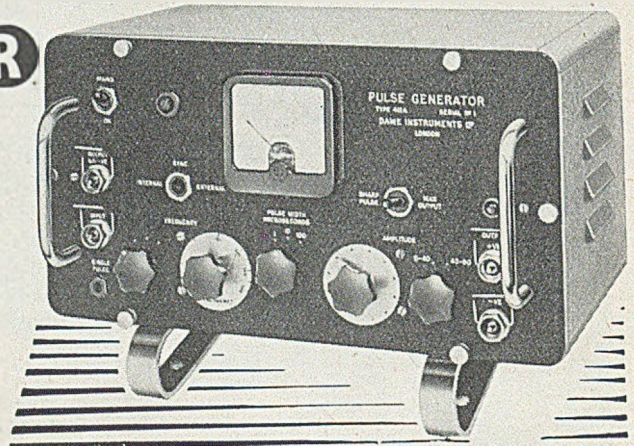
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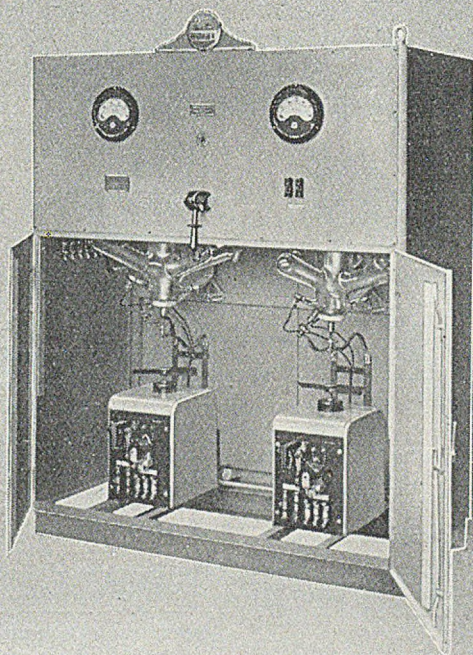
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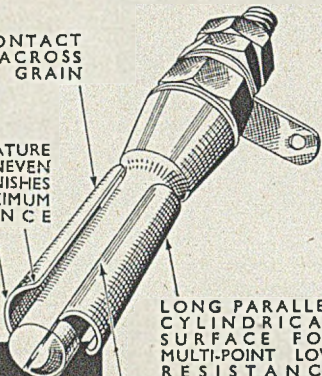
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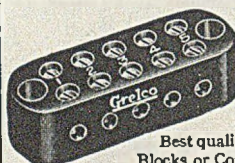
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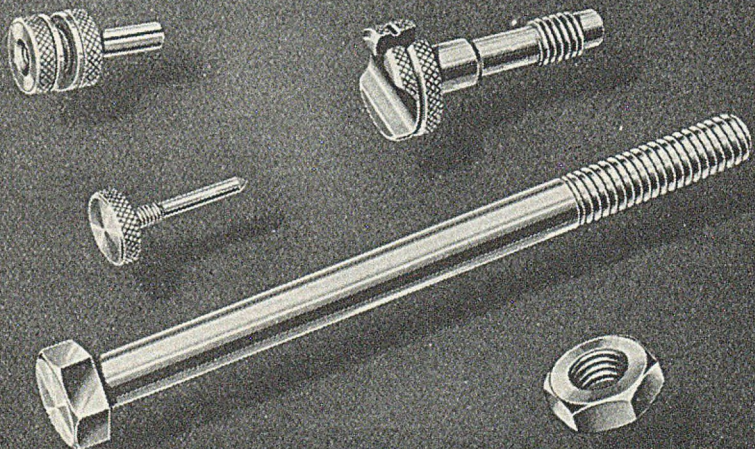
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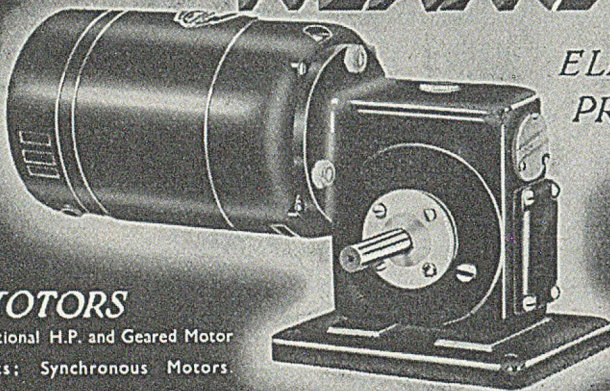
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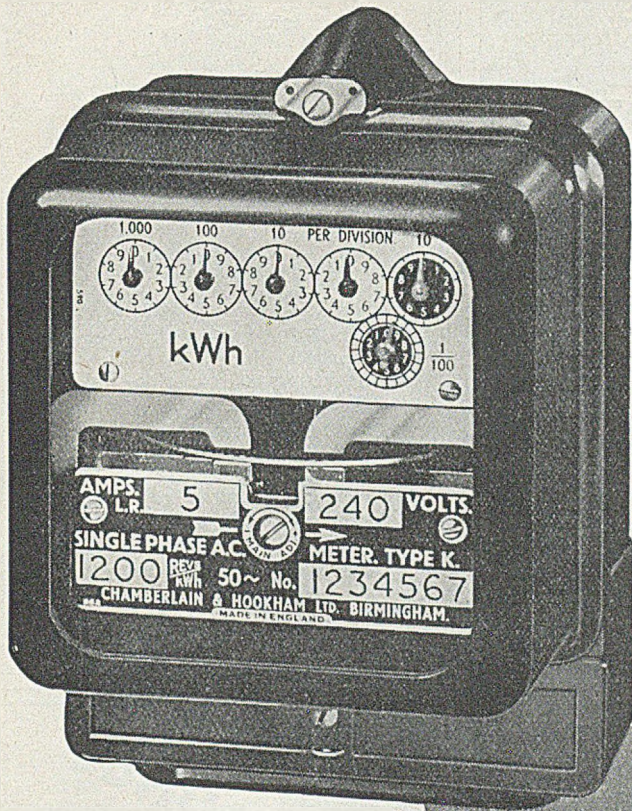
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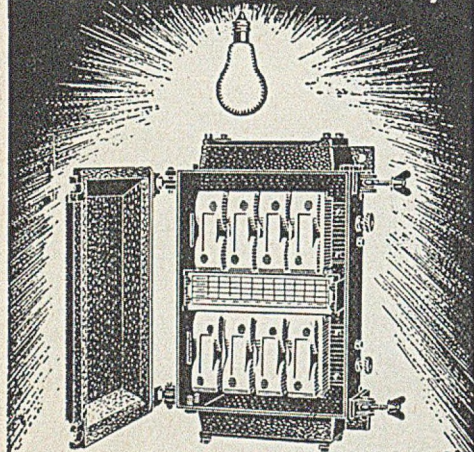


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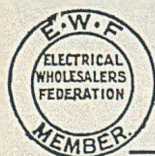
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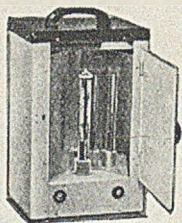
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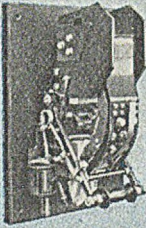
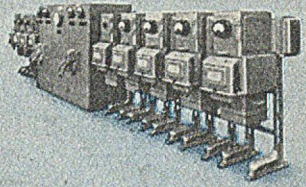
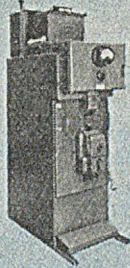
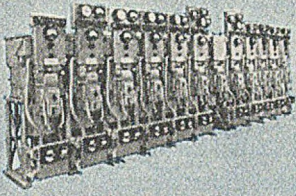
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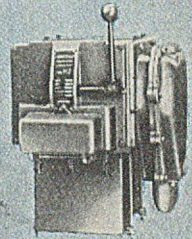
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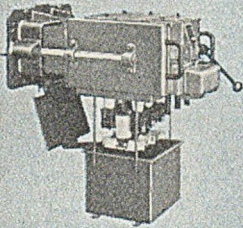
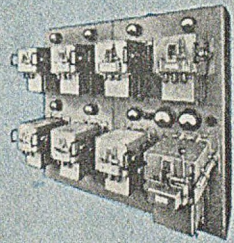
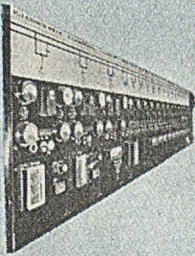



Switchgear



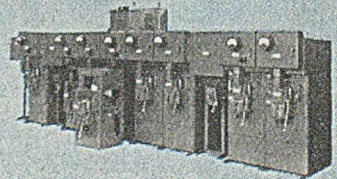
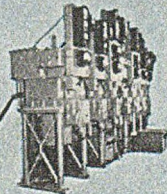
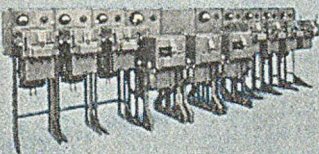
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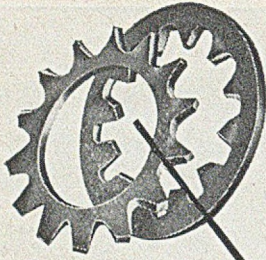
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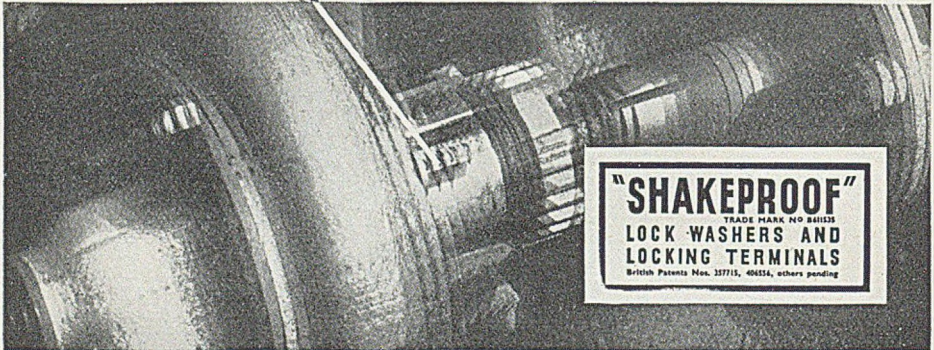
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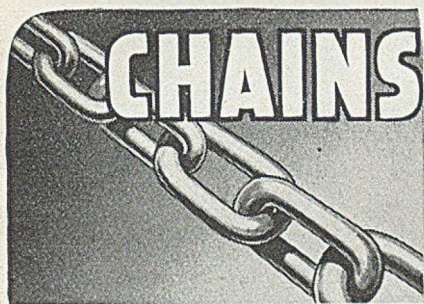
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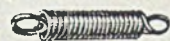
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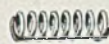
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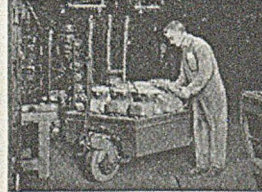
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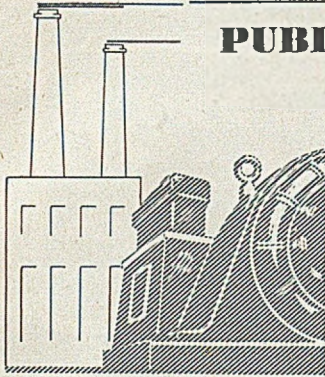
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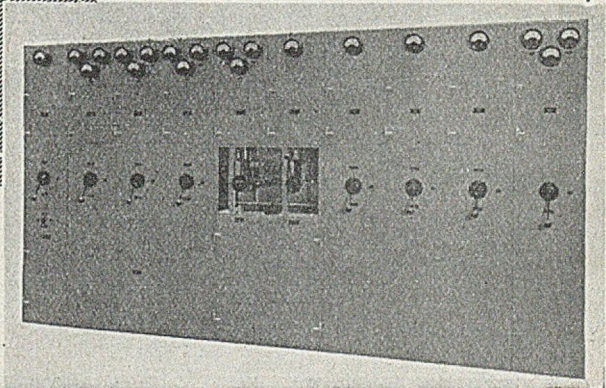
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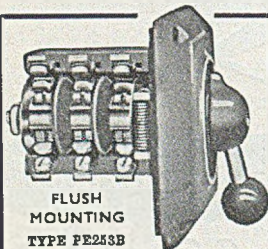
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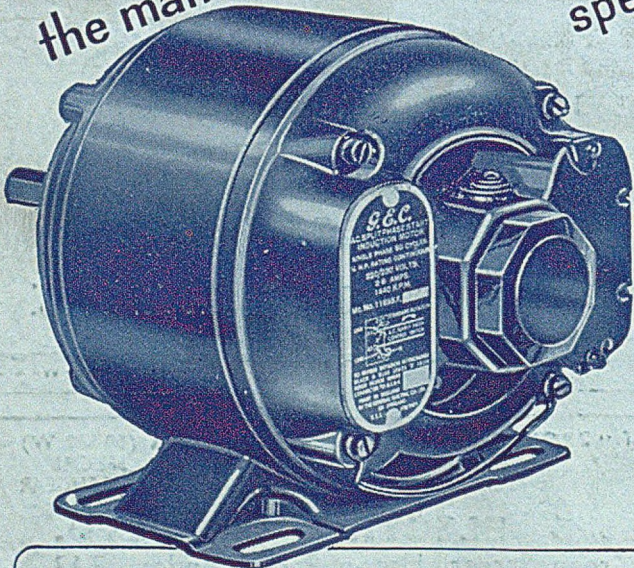


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