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THE

# ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

19



ME 20

*Designed for service  
in all parts of the world*

BY close attention to technical detail the Company has maintained its position in the forefront of Telecommunication Engineers throughout its long experience. Its products enjoy a world-wide reputation for sound design and technical excellence.

The Company undertakes the supply and installation of complete Automatic and Manual Telephone Exchanges for Public and Private service, Automatic and Manual Trunk Exchanges, all types of Telephone Cables for Trunk and Local Service, Carrier Transmission Equipment and Cables, Radio Equipments for Ships.

### AUTOMATIC TELEPHONE EXCHANGES

including the following types

- Trunk T.A.X.
- Main M.A.X.
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- Private P.A.X.
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**SIEMENS BROTHERS & CO., LIMITED**

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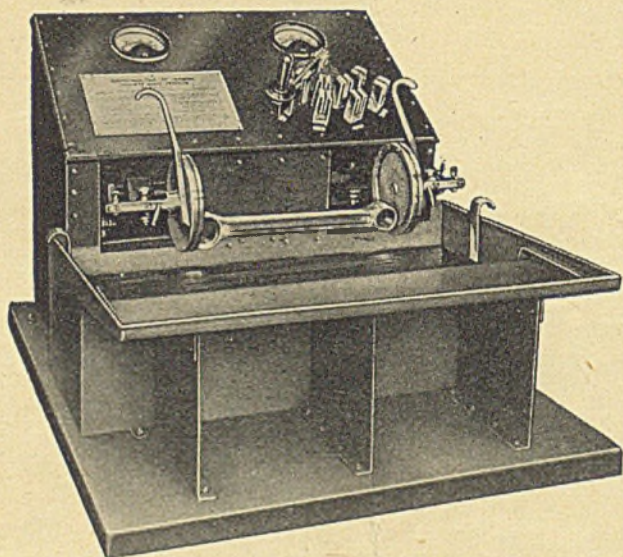
WOOLWICH. LONDON. S.E.18

TELEPHONE: WOOLWICH 2020

30 MAY 1947  
SIXPENCE

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# CRACK DETECTION



..... *by the* **ELECTROFLUX**  
**MAGNETIC CRACK  
DETECTION APPARATUS**

The Electroflux Universal Crack Detector will locate cracks in all directions.

It is ideal for the rapid inspection of mass produced articles.

Semi-automatic operation.

*Send for*  
LEAFLET N° 904/5-1



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

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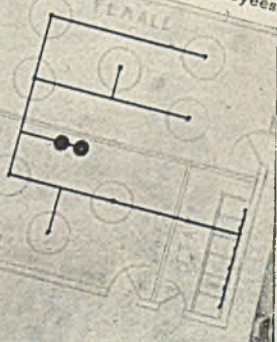
# The Factory Manager gets into hot water!

**Q** In our new factory employing some 500 female and 300 male workers a hot water system will be required to feed 8 wash fountains, and a staff toilet with 6 wash basins. Can you advise us if electric water heating is practicable under these.....



The model illustrated is just one from the wide range of G.E.C. water heating appliances designed to meet every domestic and industrial application.

**A** Two G.E.C. 350 gallon water heaters with a loading of 27 kW each as illustrated, would provide an abundance of hot water to cover the requirements indicated on the sketch plan. Equipped with suitably arranged thermostatically controlled mixing valves the installation would supply water at the correct temperature to meet the needs of up to 1,000 employees.



## G.E.C. ELECTRIC WATER HEATING

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, W.C.2

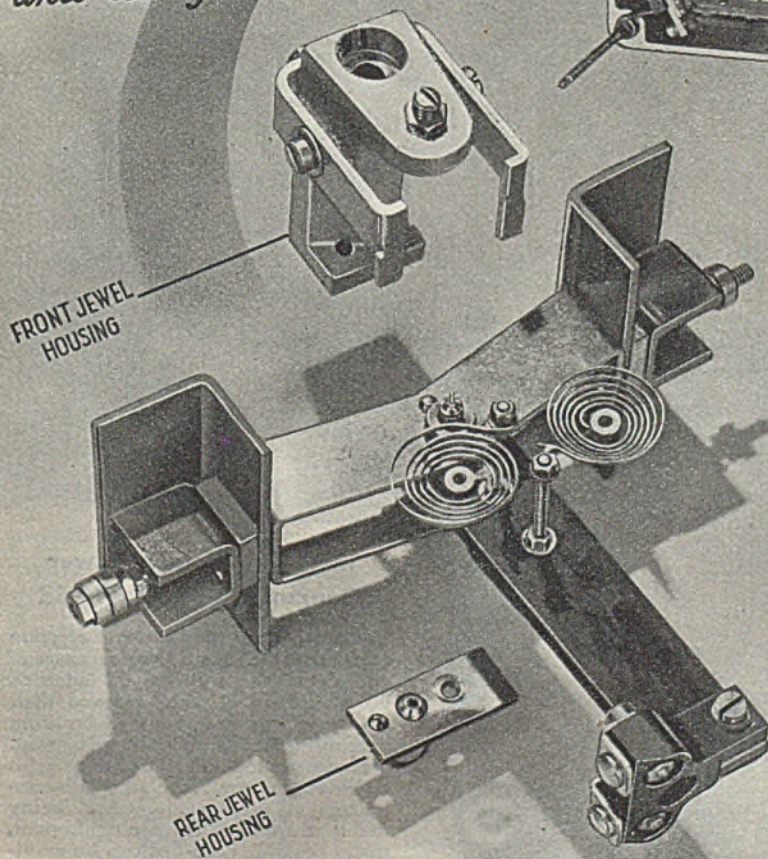
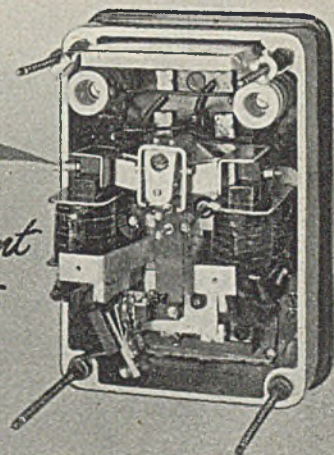
**B.I. Callender's**  
**RADIO MASTS**

At Brookmans Park a new land mark has recently appeared; the 500 feet aerial mast which B. I. Callender's designed and constructed for the B.B.C. Supported by insulated guys and resting on cylindrical porcelains at base, the mast which is pivoted at the 400 ft. level on oil-filled porcelain insulators is typical of the kind we are doing on radio masts and towers in all parts of the World.

**BRITISH INSULATED CALLENDER'S CABLES LIMITED**

# Accessibility in Relays

*An outstanding feature of Reyrolle type US balanced-beam electromagnetic Relays is a completely removable beam giving full access to front and rear jewels and pivots*



**REYROLLE**  
HEBBURN-ON-TYNE                      ENGLAND

# REBUILDING?



## Installing Electric Power Demands GOOD TEAMWORK

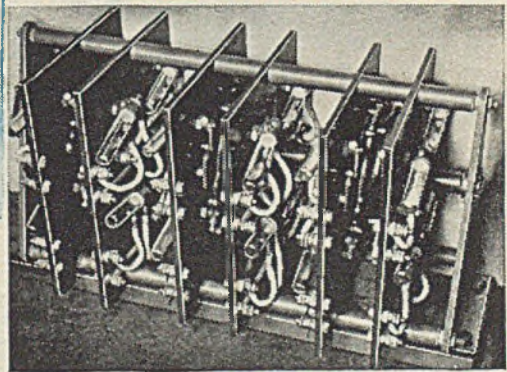
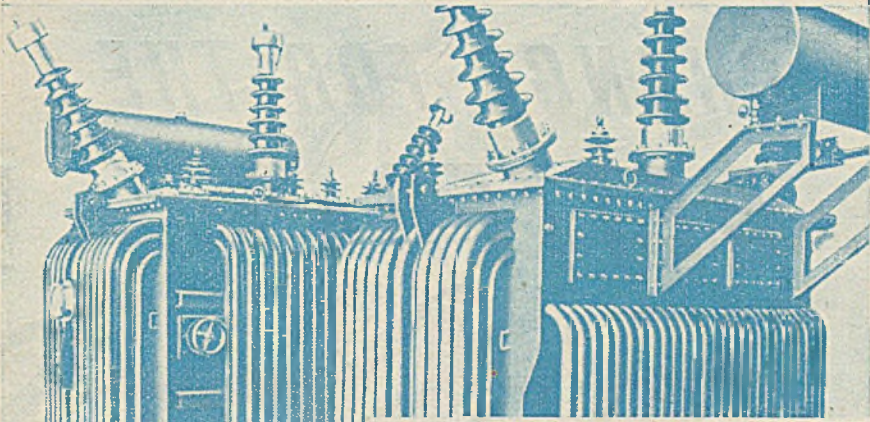
There must be no hold-ups if erection costs are to be kept down; no cases of one contractor waiting on another. For their part, J. & P. proved their ability at working on fast building schedules during the war years, and are accustomed to co-operating with architects, consultants and sub-contractors at every stage. And being manufacturers of the main equipment, many possible hold-ups can be eradicated at source.

*Co-opt J. & P. at  
the Planning Stage*



**JOHNSON & PHILLIPS LTD., LONDON, S.E.7**

## WHERE THEY USE BAKELITE LAMINATED



**No. 1—MERCURY TYPE ON-LOAD  
TAP CHANGING SWITCH**  
of Johnson & Phillips Ltd.

Because the tapping switches are immersed in transformer oil at high temperatures, Messrs. Johnson & Phillips Ltd. have adopted BAKELITE Laminated as the insulating material most suitable for standing up to these onerous conditions. The insulating properties of BAKELITE Laminated are

good, and the material not only resists the action of heat and oil, but is also light in weight and is easily fabricated. It is available in sheets up to 4 inches thick, and rods and tubes.

The switch illustrated is designed for use with power transformers up to 11 kV working voltage.

TREFOIL

# BAKELITE PLASTICS

REGD. TRADE MARKS

*Essential Materials for Essential Work*

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

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Your output will increase immediately you change to the Linread Phillips Screw, which grips the driver, never slips, and ensures faster, cheaper, and safer assembly. Burred screw heads, scratched work and loss of time are things of the past once you use the screw of the future. Do it now.

## CHANGE TO

# Linread Phillips Screws

Write to:  
LINREAD LTD.,  
Dept. xx,  
Sterling Works,  
Cox Street,  
Birmingham 3,  
for our illustrated leaflet.



# RIPAULTS

*fine range of:-*

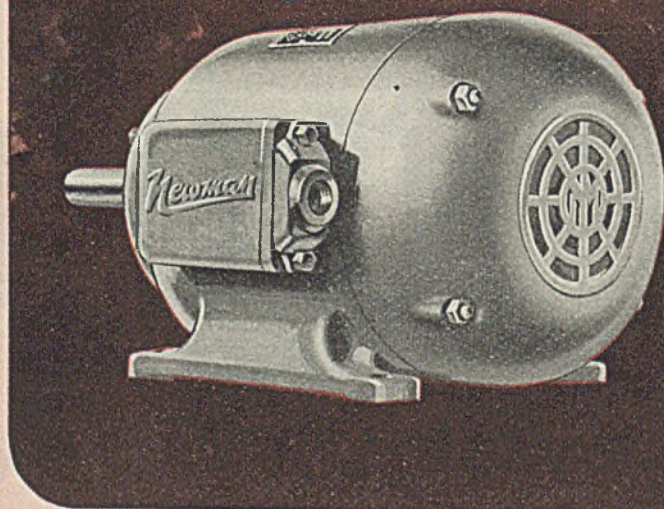
**DOMESTIC  
CABLES AND  
FLEXIBLES!**

**cables**

Ripaults Ltd, Southbury Road, Enfield, Middlx.

Totally enclosed -

at no extra cost!



### THE BASIC NEWMAN IDEA

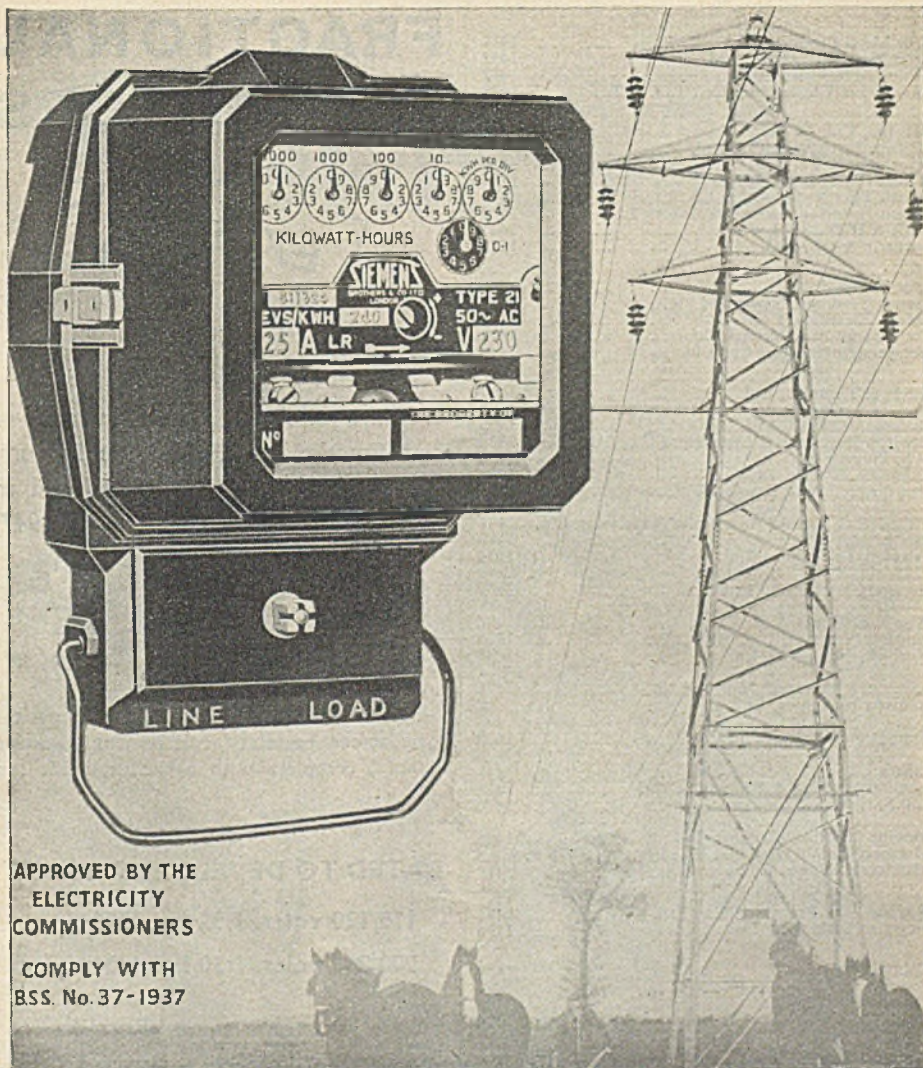
By standardising on the totally enclosed motor and concentrating manufacture on the more popular sizes, Newman secure important production advantages.

The benefits of the totally enclosed motor are thus made available at prices which permit its universal application. No other motor offers such supreme value.

**Newman**

*Pioneers in the universal application of Totally Enclosed Motors*

NEWMAN INDUSTRIES LIMITED, YATE, BRISTOL, ENG. London Office: 32, Victoria St., Westminster, S.W.1



APPROVED BY THE  
ELECTRICITY  
COMMISSIONERS

COMPLY WITH  
BSS. No. 37-1937

# SIEMENS

**SINGLE-PHASE  
ALL-INSULATED**

## ELECTRICITY METERS

**TYPE 21**

Advt. 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

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Multicore Solders, Ltd. ... ..	1473
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**EX STOCK**

We have purchased a large quantity of new Fractional H.P. Electric Motors, available EX STOCK NOW, and in monthly batches from May, 1947, onwards.

## BRIEF SPECIFICATION :

Single phase, 50 cycle 4 pole, capacitor type, screen protected, ball bearing induction motors, complete with capacitor condenser.

## RATED TO DEVELOP OUTPUTS :

110/120 volts. 1/32 hp. 1390 rpm.

200/240 volts. 1/30 hp. 1400 rpm.

*Full specification for home and export.*

# CIVITAS

## TRADING CORPORATION LTD.,

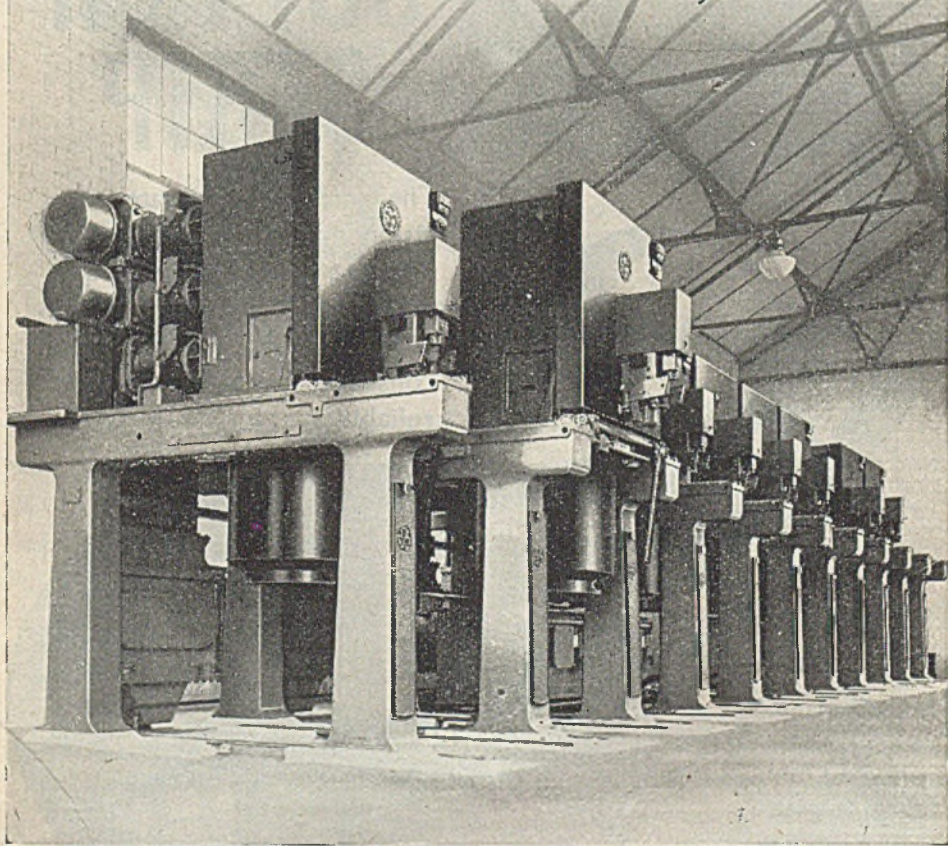
10, PORTMAN STREET, LONDON, W.1

Tele: MAYfair 6522. Cables: Civitas, London.



# COMPOUND-FILLED SWITCHGEAR

*Class MF 36  
33 KV., 750 MVA.*



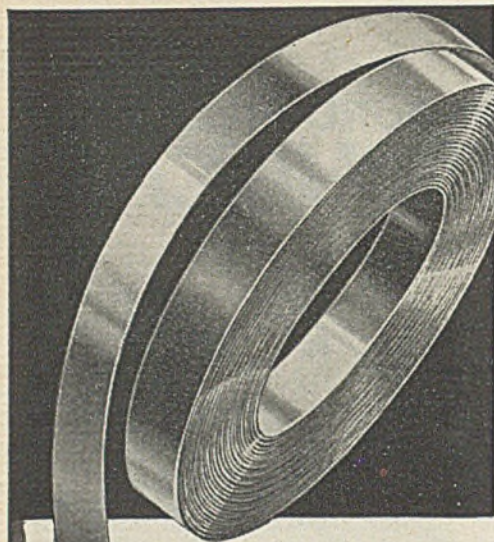
# BTH

# WILLESDEN

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



A 2884



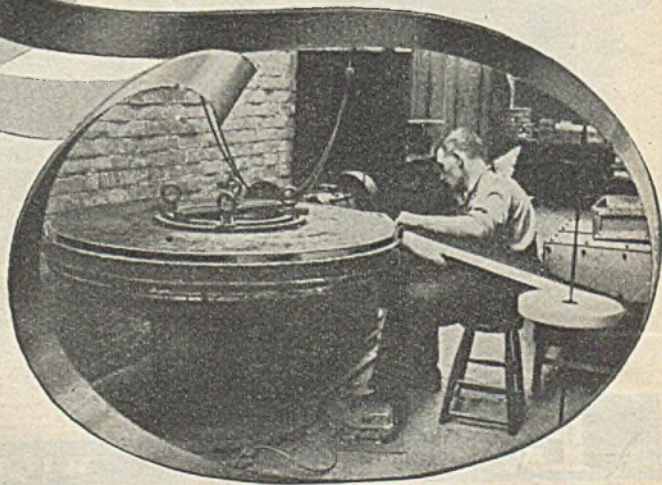
# ANACOS

REGD.

## COPPER STRIP

The most up-to-date precision machinery and highest quality materials are employed in the manufacture of Anacos Copper Strip, with consequent accuracy and reliability.

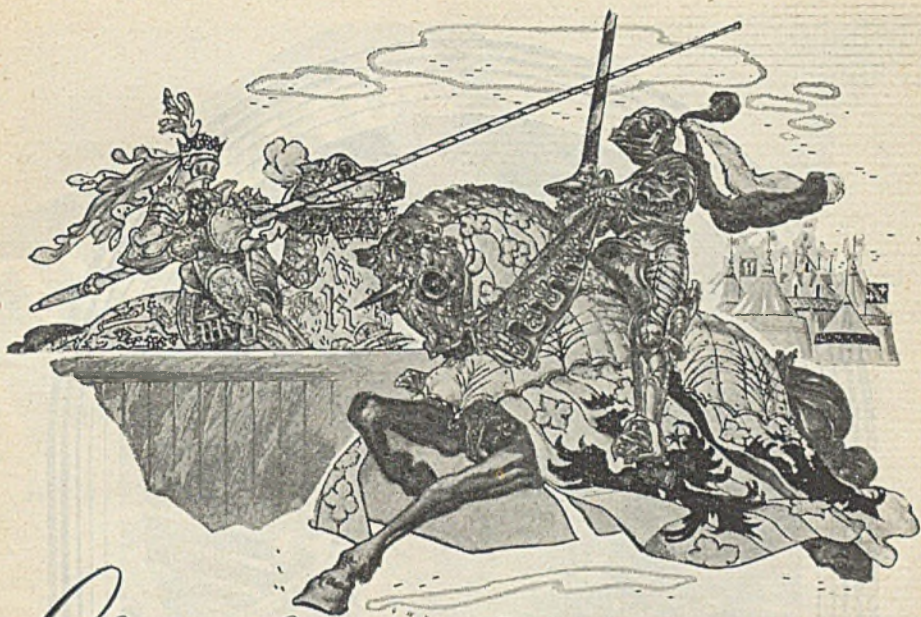
*Anacos Copper Strip being used in the manufacture of a circular Lifting Magnet.*



TELEPHONE  
BLACKFRIARS  
8701 (9 lines)

**FREDERICK SMITH & COMPANY**  
(INCORPORATED IN THE LONDON ELECTRIC WIRE COMPANY & SMITHS, LIMITED)  
ANACONDA WORKS, SALFORD, 3, LANCS

TELEGRAMS:  
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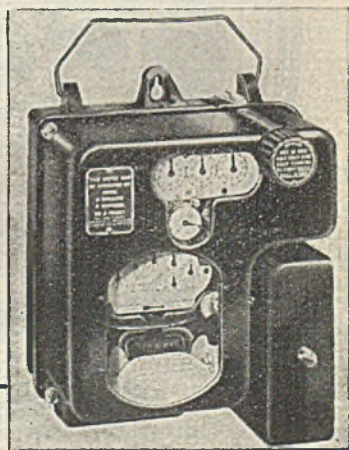


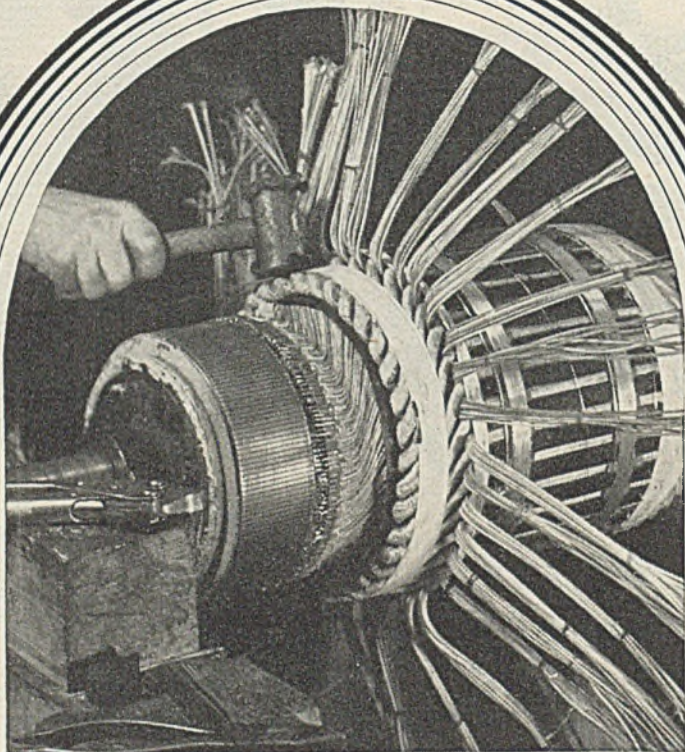
# Chivalry

*In olden times, chivalry was a feature of the jousts. In modern business, the spirit of chivalry will not overcome all our supply problems, but courteous and prompt attention to individual requirements will often help to speed deliveries. It is in this spirit of real helpfulness that we are making every effort to meet the present demand for Sangamo Weston electricity meters and time switches. You can rest assured that we shall continue to accord your needs every consideration and that we will do our best to assist you in spite of a difficult supply situation.*

## SANGAMO WESTON METERS & TIME SWITCHES

Great Cambridge Road, Enfield, Middlesex  
Telephone: Enfield 3434 & 1242





REPAIRS • REWINDS • REDESIGNS

# COLLINS

*Collins Electrical Ltd.*

*Head Office 115 Clerkenwell Road London E C 1*

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*West London Works*

*9 & 11 Featherstone Road Southall*

*Phone Holborn 0212-4 Canonbury 3227-8*

*or Southall 0168*

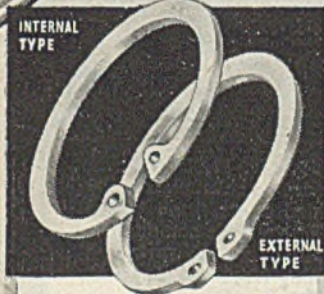
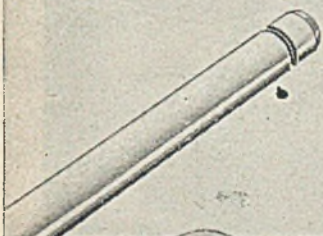


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A SIMPLE AND

EFFICIENT RETAINING DEVICE

*for  
small diameter spindles*



## SEEGER CIRCLIPS

FOR LARGE SHAFTS & BORES

The only circlip which always remains truly circular on the contact periphery. It exerts great and uniform pressure on the groove in which it is fitted and can be relied on as a completely safe fixture.

Engineers who have felt the need for a really small circlip will welcome the Twicklip which fits in a groove just like a Seeger Circlip and which is made in sizes from  $\frac{1}{8}$  to  $\frac{15}{32}$ .



*Write for descriptive literature*

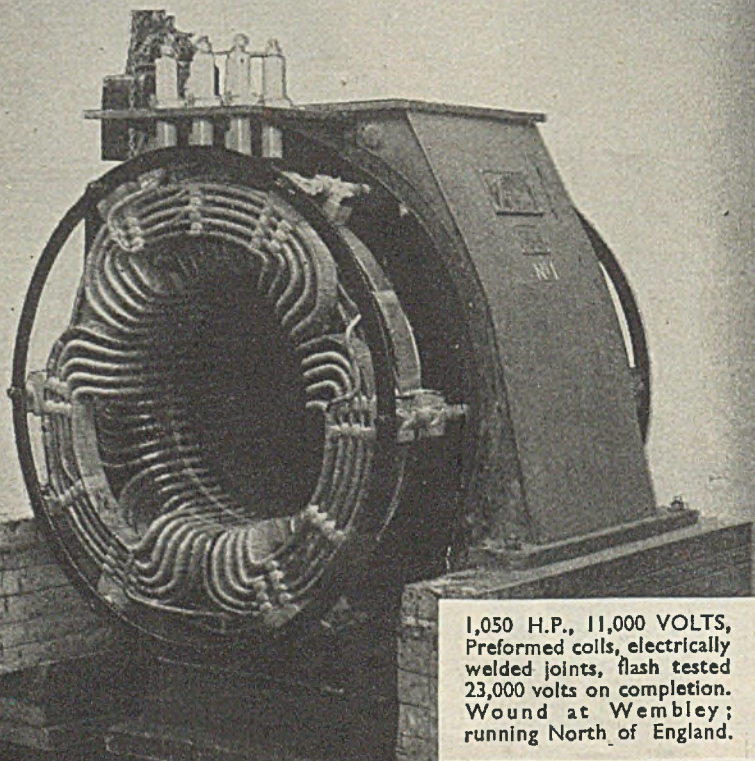
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**The AUTOMOTIVE ENGINEERING Co. Ltd.  
THE GREEN, TWICKENHAM, MIDD.**

PHONE POPESGROYE 2206 P.B.2

Smee's AESO

REPAIRING                      REWINDING  
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1,050 H.P., 11,000 VOLTS,  
Preformed coils, electrically  
welded joints, flash tested  
23,000 volts on completion.  
Wound at Wembley;  
running North of England.

DYNAMO & MOTOR REPAIRS LTD.

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# The New KANGO 'S' TYPE HAMMER



The new "S" Type Kango Hammer has been introduced to fill an essential need for a light, handy, yet powerful hammer designed to stand up to hard and continuous work within its very useful capacity.

A most important feature of this new "S" type hammer is that owing to its light weight it can be used for all ceiling work where the much heavier hammers are outside the physical capabilities of the workman to operate, furthermore its use will, in the majority of cases, dispense with the elaborate staging that the work usually entails.

## SPECIFICATION

Length	-	-	19 inches
Weight	-	-	12 lbs.
Number of blows	-	-	1,550 per min.

## Drilling in Concrete, Depth 2'

No. 6 - 12 Secs.	No. 12 - 23 Secs
No. 8 - 18 "	No. 14 - 26 "
No. 10 - 21 "	No. 16 - 30 "
No. 18 - 32 Secs.	

The current consumption of the "S" type is less than 360 watts.

For heavier work, either the Kango C or D type Hammers, of which we have good stocks, are recommended.

# BUCK & HICKMAN LTD

*Electric Tools Division*

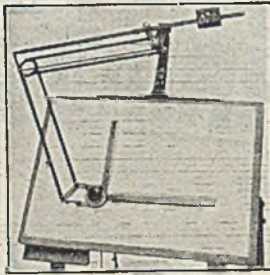
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Head Office:- WHITECHAPEL RD.  
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Branches:- ALPERTON-BIRMINGHAM  
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Perfect balance at any slope. Take any board. Ball Bearing. Perfect parallel movement...

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The nearest to perfection in drawing office equipment—"MAVITTA" DRAFTING MACHINES made of steel tube with adjustable ball-bearings. Main angles located automatically, intermediate angles by lock.

Scales have inlaid celluloid edges and divided to order on two edges.

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**THE MAVITTA DRAFTING MACHINES LTD.,**  
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Tel.: EAST 482    Telegrams: MAVITTA Birmingham.

## Flat SOLDER TAGS



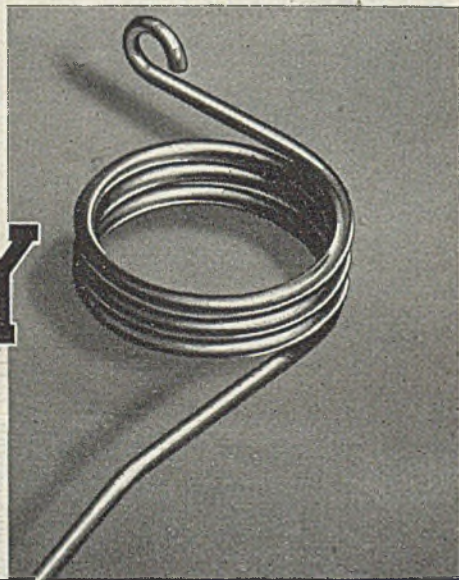
ALL  
SIZES

The HAMPTON WORKS  
(STAMPINGS) LIMITED  
PRESSWORK EXPERTS

TWYNINGS ROAD, STIRCHLEY, BIRMINGHAM.  
Tel.: KINGs Norton 2901 (3 lines). Grams: Radiagills B'ham

# Springs BY RILEY

Queer looking springs, ordinary springs, large or small springs; springs tipped with precious metals, whatever your needs consult Riley of Rochdale, makers of quality springs and technical leaders since 1821.

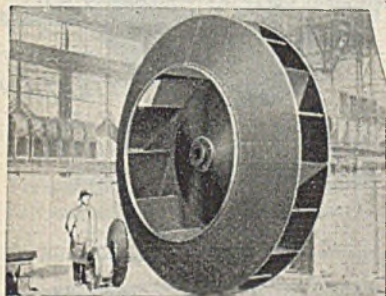
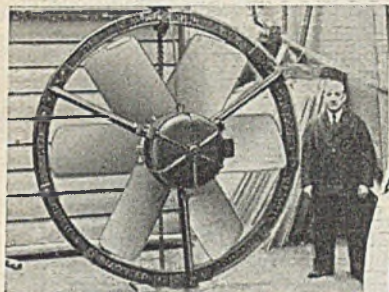


**ROBERT RILEY LTD.**  
MILKSTONE SPRING WORKS, ROCHDALE LANCs.

Telephone: ROCHDALE 2237-8

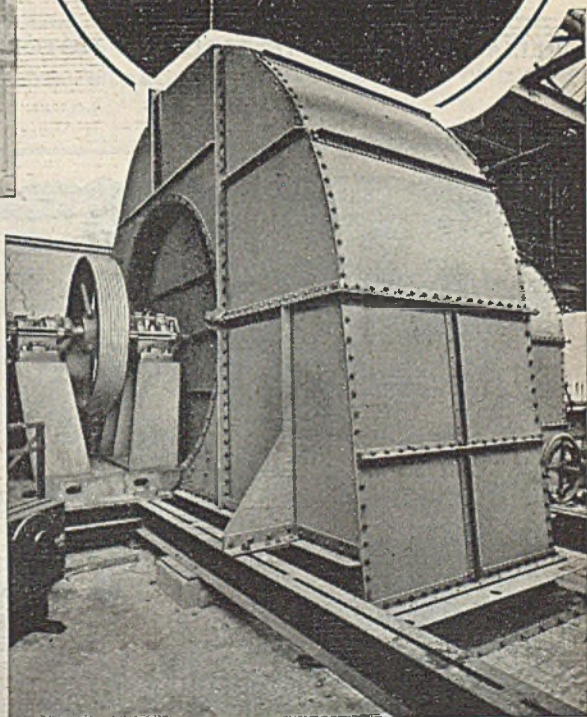
Telegrams: "RILOSPRING" ROCHDALE

There is a "KEITH-BLACKMAN" FAN for every purpose for which a fan is essential.



# "KEITH-BLACKMAN" FANS

HEATING  
VENTILATION  
DUST REMOVAL  
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We invite your enquiries.

ELECTRIC MOTOR & ARMATURE REWINDS  
**AUTOMOBILE GENERATOR**  
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**STARTER ARMATURE REWINDS**  
**OUR SPECIALITY**

**48** HOUR SERVICE

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PROMPT ATTENTION GIVEN TO ALL ENQUIRIES

RELIABLE SERVICE IN ELECTRIC MOTOR RE-WINDS.

**DURAWIRES**      **DURACABLES**

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*Durawire the World....*      *Durastrip...*

**DURASTRIP**      **DURATHREAD**

**DURAWIRES**      *Trustworthy Friends*      **DURACABLES**      **DURAWIRES**      *Trustworthy Friends*      **DURACABLES**

**DURAWIRE**  
 YOUR ELECTRICAL WORK AND BE SURE

• Sole Manufacturers: **DURATUBE & WIRE LTD., FELTHAM, MIDDLESEX, ENGLAND** •

TACHOMETERS

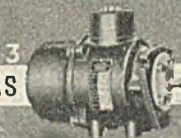


TACHOMETERS



TACHOMETERS

TACHOMETERS



TACHOMETERS



TACHOMETERS

1. Aircraft Type Indicator and Transmitter.
2. Water Tight Generator Transmitter.



3. General Purpose Generator Transmitter.
4. \*Circscale Engine Room Indicator.

Special Types available for Motor Buses and Trolley Buses, Rail Cars, Locomotives, etc.

\* Circscale 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.**

Tel.: Altrincham 3221/2.

\*Grams.: "Infusion," Altrincham.

London: 28, Victoria Street, S.W.1.

Tel.: Abbey 5148

**IMMEDIATE  
DELIVERY !  
BUT  
ORDER EARLY**

## MOTOR SLIDE RAILS

We are pleased to be able to introduce the new steel "ROGERAIL" which is vastly superior to the standard cast iron rails: they are:—

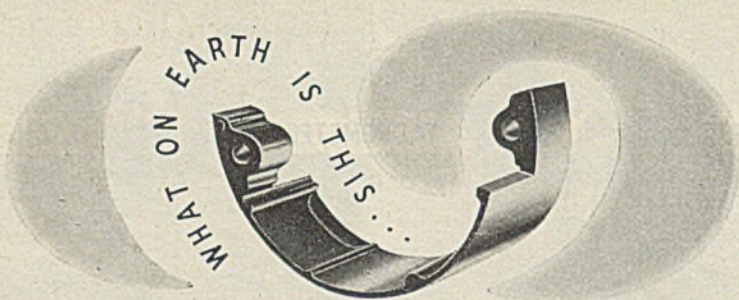
- ▶ STRONG IN CONSTRUCTION
- ▶ EASY TO FIX
- ▶ MADE TO ANY SIZE
- ▶ LIGHTER THAN CAST IRON
- ▶ UNBREAKABLE

Please advise length in slide required or give particulars of motor when ordering

**SPECIAL TERMS TO STOCKISTS**

**MOTOR SLIDE RAILS EX STOCK FROM**

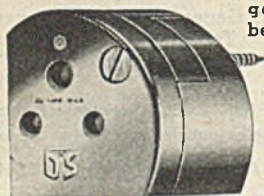
**THE LONDON SHAFTING & PULLEY CO. LTD.**  
"COLLINGWOOD" IRONWORKS, NORTHDOWN ST,  
KINGS CROSS, N.1. Tel:- TERMINUS 4731



The rather rummy looking object above is one section of the new DS skirt for surface mounting the DS conduit box type socket. The other section is an absolute twin, and they get together as shown below.

This enables the skirt to be fixed after the wiring has been completed and means greater ease for the wireman.

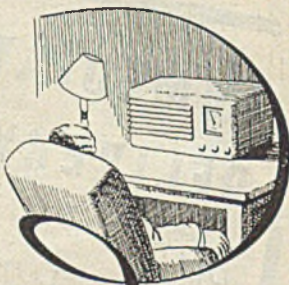
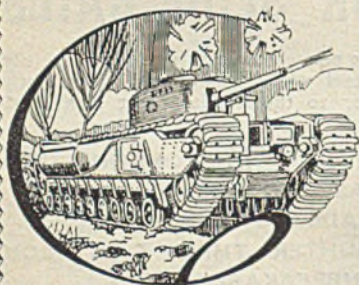
Just another ingenious addition to the DS Fused Plug and Socket range.



FUSED PLUG AND SOCKET

Announcement of DS Plugs Ltd., Manchester - London - Glasgow.

EIM47



*For a quarter of a century, in War and Peace,  
K.E.W. wire has meant the best in insulation*

**If you require Cotton, Silk or Enamel covered copper wires . . .**

'Phone: Prospect 1032 (3 lines). Wire: "Encosil, Richmond, Surrey"

or Write to:

**KENT BROS. ELECTRIC WIRE CO. & E. H. PHILLIPS LTD.**  
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 When through an Alpine village passed  
 A youth who, to the mountains high,  
 Uttered this most mysterious cry  
 "Try DATIM!"  
 "You've got it wrong!" the old man cried,  
 But still that clarion voice replied  
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A unique electronic instrument for research and routine testing in Hospital Radium and X-ray Therapy Departments.

It has an input impedance of  $10^{15}$  ohms, and an input capacity of less than  $0.5 \mu\text{F}$ . Developed primarily for use in Radiological work, where small condensers of the Stevert type are used extensively for the measurement of gamma and X-ray intensities.

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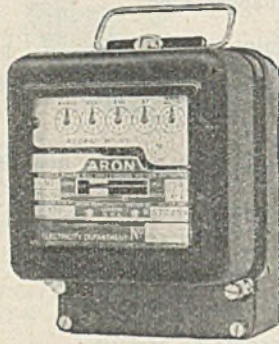
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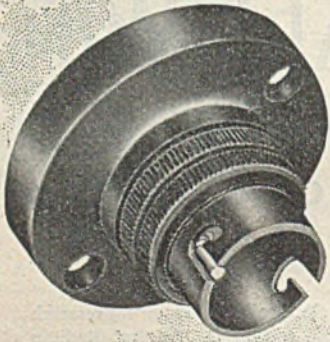
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Open marine-type switchboard controlling three 200 kW generators and circuits and incorporating Dorman XL air-break circuit breakers and Dorman "F" type switches as installed on the L.N.E. Railway's new cargo liner S.S. Arnhem (John Brown & Co., Ltd.)

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## MISCELLANEOUS ADVERTISEMENTS

### TENDERS

#### CITY OF BIRMINGHAM ELECTRIC SUPPLY DEPARTMENT.

Specification O.E.140—One 20-MVA 32/11-kV Outdoor O.N. Type 3-phase Transformer.

THE Electric Supply Committee invites tenders for the supply and delivery of the above mentioned equipment.

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

Sealed tenders, enclosed in the official envelope provided and endorsed for the purpose, must be delivered to the undersigned not later than 10 a.m. on Tuesday, 1st July, 1947, when they will be opened. Non-complying tenders will be rejected. The Committee does not bind itself to accept the lowest or any offer.

F. W. LAWTON,  
Chief Engineer and Manager.

14, Dale End,  
BIRMINGHAM, 4.  
May, 1947.

SALE BY TENDER BY JOHN SULLEY AND SONS OF MODERN PLASTIC ELECTRICAL AND FANCY GOODS. "LACEY HULBERT" SPRAYING PLANT, Pedestal Desks, Filing Cabinets, Typewriter Chairs and numerous other items, IN 14 TENDERS, which have been removed for convenience of Sale to Mitchells Depository, 22, Hilda Road (Mostyn Road), Brixton Road, S.W.9. Schedule, Particulars and Conditions of:—The Liquidator, N. G. Randall, Esq., A.S.A.A., Messrs. Albert A. Henley and Co., 19/20, Grosvenor Place, S.W.1, or JOHN SULLEY AND SONS, Auctioneers, 46, CANNON STREET, E.C.4. TEL. CITY 2231 and 5503. VIEW DAY, Monday, 9th June, 1947. TENDERS must be received at the offices, 46, Cannon Street, not later than noon on the 11th June, 1947. Catalogues 2d. each.

### SITUATIONS VACANT

#### COUNTY COUNCIL OF THE STEWARTRY OF KIRKCUDBRIGHT.

APPLICATIONS ARE INVITED for the appointment of Surveyor/Draughtsman—Electricity Department—Salary Scale £330 rising to £375 (APT 1) plus bonus £60.

The appointment is subject to the Scheme of Conditions of Service made by the National Joint Industrial Council for Local Authority Services in Scotland (Administrative, etc., Staffs). The appointment will be superannuable, and the successful candidate will be required to pass a medical examination.

Applicants should have had previous experience of Electricity Department Drawing Office work, including the keeping of mains records, must be able to carry out profile surveys for overhead lines by theodolite or level, and should be capable of taking charge of a small drawing office.

Applications, stating age, qualifications and experience, with copies of not more than three recent testimonials, should be lodged with the undersigned not later than 18th JUNE, 1947.

ROBT. C. MONTEATH,  
County Clerk.

County Offices,  
KIRKCUDBRIGHT.

### SITUATIONS VACANT

#### FIRST GARDEN CITY LIMITED.

THE following vacancies are open:—

- (a) SHIFT CHARGE ENGINEER, for generating station, N.J.B. conditions, Grade 8, Class F, commencing salary £442 p.a.
- (b) RELIEF SHIFT CHARGE ENGINEER, as above, Grade 8a, Class F, commencing salary £413 p.a.
- (c) ENGINEERING TRAINEES with H.N.C. in electrical and/or mechanical engineering to receive two years' intensive practical training in generation. Details upon request.

Applications in writing to the undersigned not later than June 3, 1947.

W. A. BROWN,  
Electrical Engineer and Manager.  
Works Road, Letchworth,  
HERTFORDSHIRE.

ELECTRONIC Engineer required by old established firm of Paper Converters in Liverpool, mainly in connection with the registering of print and paper through rotary presses, flame proof equipment, special drives, etc. Only those fully qualified and under 45 years of age should apply. Full assistance with removal, housing, etc. Excellent prospects.—Write Gregory's of Liverpool Ltd., 9, Grafton Street, London, W.1.

YOUNG man required for Lancashire as outside representative of well-known Company of Manufacturers in the electrical industry. Experience of the industry, or selling experience, essential. Applicants must live in area. Apply by letter stating age, experience, to Box PK. 622, Deacons Advertising, 36, Leadenhall Street, E.C.3

EXPERIENCED Drawing Office Personnel for automobile and aircraft electrical wiring systems, cable assemblies, junction boxes, terminations.—Ward & Goldstone Ltd., Sampson Works, Frederick Road, Manchester 6.

ENGINEER required, West Middlesex Area, to take charge of Steam and Diesel Electric Generating Plant, knowledge of Boilers, Electrical Equipment and Steam Heating Plant essential.—Apply Box L.E.U., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

### SITUATION WANTED

ELECTRICIAN, aged 27, with 13 years' experience in all types of electrical installation and maintenance work, with wide experience of conduit installations, desires post as maintenance electrician in any branch of industry.—Box L.E.V., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

### SITUATION FILLED

#### BEDFORD CORPORATION ELECTRICITY UNDERTAKING.

THE position of Mains Assistant has now been filled. The applicants are informed and thanked.

The successful candidate was Mr. E. C. Cooper, of the Sheffield Corporation.

### BUSINESS OPPORTUNITIES

SOEMCO LTD., Fluorescent Lighting Specialists, wish to contact manufacturers of electrical equipment and accessories, including Domestic and Industrial Lighting Switches, all "Original" and "Improved" electrical appliances, Fluorescent Tubes, Fittings and Components, both Domestic and Industrial, of particular interest. Where possible complete output will be taken and full co-operation given in exchange for sole distribution rights. Replies will be treated with strictest confidence.—Managing Director, Soemco Ltd., Soemco House, 6/7, Soho Street, London, W.1.

## FOR SALE

**PATRASSES** (Switch Blocks).—Wholesale and Retail. Round, Square and Rectangular. Well finished I.W. and W.E. from seasoned hardwood. List Free. Samples 5s.—E.M. Manufacturing Co., Dept. E., 9a, Sansome Place, Worcester.

**200** ELECTRIC Motors in stock, from  $\frac{1}{4}$  h.p. to 25 h.p. State requirements.—Victoria Engineering Co., Maidenhead. Phone 50.

**31** IN. gap bed screwcutting lathes, £38. 2 Brand new. 25 available for immediate delivery. Also 6 with  $\frac{1}{4}$  h.p. motors. Specification on request.—Victoria Engineering Co., Maidenhead, Berks. Phone 50.

**115**-VOLT D.C. input 9.6 amps. 110-volt A.C. output 60 cycles, 4.5 amps., .5 kilowatt. Complete with A.C. Voltmeter, voltage regulator and rotary "on" and "off" switch. (Latter needs attention).—Charles Alexander and Co. Ltd., 74, Portsmouth Road, Surbiton, Surrey.

**24**—230 volt 1 phase 50 cycles Capacitor Start Motors with Condenser 4th h.p., 1450 r.p.m.—Oldfield Engineering Company Limited, 96, East Ordsall Lane, Salford, 5.

**IRONCLAD SWITCHPLUGS**.—15 ampere 3 pin surface with  $\frac{3}{4}$  in. conduit entry. £1 each complete. Add 6d. each for post and packing. Limited number only. **PENCIL TYPE ELEMENTS**, complete with dural screwed on end caps and terminals, 200/220 or 230/250 volt

1000 watts, 10 in. 4s. 6d. each, 12 in. 4s. 5d. each. Adjustable 10 in./12 in. 5s. each. Add 6d. each for single samples. Dozens and over post free. Special quotations for quantities.—Pruden and Pope, 38, Church Road, Upper Norwood, London, S.E.19. Telephone: Livingstone 1426.

**FOR SALE**.—P.V.C. Sheathed Cables.—Screened Copper Wire Braided and Polythene Core. Conductors from 1/022 to 7/032. Also Lead Sheathed Solid Polythene with Single Conductors and semi-air-spaced Poly Spider Copper Wire Braided and P.V.C. Sheathed. Large quantities, new condition.—Box L.E.W. "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

**400** VOLTS 3 phase 50 cycles Squirrel Cage Induction Motors. Flange Mounted. fitted with ball and roller bearings, screen protected type, 5 off.—Crom-Park, 2 h.p. 960 r.p.m. 4 off.—E.E.C., 2 h.p., 960 r.p.m.—Oldfield Engineering Company Limited, 96, East Ordsall Lane, Salford, 5.

**SWITCHES**.—Ex-Min. Toggle 250 volt Through switches by ARROW. 200 available at 4s. each.—Modern Electrical Industries Ltd., Sidcup.

**ADAPTORS**.—Combined Plug and Lamp adaptors, 18 dozen available at 1s. 5d. each.—Modern Electrical Industries Ltd., Sidcup.

**ELECTRIC HOIST BLOCKS**, capacity 5-cwt. to 7 tons. Reasonable delivery.—A Morgan and Co., 50, Wilkin Street, London, N.W.5. Phone: GUL 1147.

**"RELIABLE"** Thermostats for Rooms, Greenhouse, etc. A.C., D.C., wire, plugs and warning lampholder fitted. 45s., post paid (registered).—Reliable Thermostat Co., 167, Wickersley Road, Rotherham, Yorks.

**ATLAS** lamps from stock, delivery in London, Surrey, Sussex and Kent; other lines include clocks, toasters, fires, irons, kettles, fans, fittings, chargers, speakers, etc.—Drubel Radio Distributors Ltd., 39a, Stafford Road, Croydon, Croydon 1107.

**LEATHER FINGER STALLS**.—Made of Chrome Hide. Very strong and hard wearing. Length 3 in. Price 4s. per doz. Prompt delivery. Sample on application.—Wilson Brothers, Industrial Clothing Manufacturers, Epsom, Surrey.

**WESTINGHOUSE** Slip Ring Induction Motor, 400 volts 3 phase 50 cycles, 120 h.p. 295 r.p.m., with Control Gear.—Oldfield Engineering Company Limited, 96, East Ordsall Lane, Salford, 5.

## FOR SALE

**SPECIAL OFFER** of Government surplus new timber window sashes: Size 4 ft. by 4 ft., 21s. each; 4 ft. 6 in. by 4 ft., 23s. 6d. each. Less 5 per cent. for fifty or more, 10 per cent. for one hundred or more. Carriage paid; cash with order. These are made of 2 in. by 2 in. deal, in three sections with centre window opening with casement. Not glazed.—D. McMaster and Co., 21c, Mount Bures Works, near Colchester.

**JUNCTION** Electric Irons, superior design and quality, supplied with suitable stand. Also Junction Nickel plated Torch Cases. Supplied for home trade and export. Also large selection of household electrical appliances, Fires, Radiators, other electric Irons, Toasters, Table Lamps, Torch cases, Dry batteries, etc. Vacuum Cleaners, various makes, Fluorescent fittings good variety with fluorescent tubes, wash boilers, actually in stock. Please write for full list.—Brooks & Bohm, Ltd., 90, Victoria Street, London, S.W.1. Tele.: Vic. 9550/1441.

**TIME SHEETS**.—Our stock-printed Time Sheets are remarkably cheap compared with specially printed ones. On decent quality 8 in. by 10 in. paper.—100, 3s. 6d.; 500, 15s.; 1000, £1 7s. 6d. Post Free. Send for sample.—F. H. Brown Ltd., P.O. Box 26, Burnley, Lancs.

**TINNED STEEL ARMATURE BINDING WIRE**.—All even numbered sizes from 16 s.w.g.-28 s.w.g. supplied from stock on 7 lb., 14 lb. or 28 lb. reels.

**FREDERICK SMITH & CO. WIRE MANUFACTURERS LTD., CALEDONIA WORKS, HALIFAX.**

**LIGHT ALLOY SHEETS** available in large quantities for immediate delivery ex-stock in all gauges from 6 ft. by 2 ft. to 8 ft. by 4 ft. from 1s. 6d. to 2s. per lb.; also Light Alloy Tubes, Bars, Strip, Coils, Angles, etc.—Box L.E.N. "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

**ELECTRIC MOTORS**, A.C. and D.C. We supply all types and sizes of Electrical Machinery.—Slow Speed Reduction Gears can be supplied to customers' requirements with short deliveries. Send your enquiries to The Electro Power Co. Ltd. (formerly Be-Be, Eng.), 3, Retreat Close, Kenton, Middlesex. Tel.: WORDSWORTH 4928.

**WHY** not assemble your own Fluorescent Fittings? We can supply 5 ft. Troughs, Chokes, Power-Factors, Suppressors, Starters, Lamp Holders, etc., at a special all-in price, or separately, 5 ft. and 4 ft. Fittings complete with tubes at a keen price.—Write, call or phone L. Goodman (Radio) Ltd., 9, Percy Street, Tottenham Court Road, W.1. MUSEUM 0216.

**LAMP SHADES**, Modern designs, beautifully presented at attractive prices. Generous trade terms. Agents wanted.—Thanet Industries (Kent), Clarence Road, Ramsgate.

**DYNAMO & MOTOR REPAIRS LTD.,**

Wembley Park, Middlesex.

Telephone: Wembley 3121 (4 lines).

Also at Phoenix Works, Belgrave Terrace, Soho Road, Handsworth, Birmingham. Telephone: Northern 6838.

**REBUILT MOTORS AND GENERATORS.**

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**SACKS and Bags in excellent condition for all commodities, as low as 4½d. each. Write: John Braydon Ltd., 230, Tottenham Court Road, W.1. Tel. No.: Museum 6972.**

**A.C./D.C. Motors can be supplied from stock or at short notice.—JOHN PHILLIPS AND CO. ELECTRICS, 31, Fortune Green Road, N.W.6. Hampstead 8132.**

**BRITISH Electric Co. (Beco) Ltd., can supply most types of A.C. and D.C. Motors from stock.—British Electric Co. (Beco) Ltd., Electra House, 25/29, Lower Road, Rotherhithe, S.E.16. Bermondsey 3449.**

**A.C. Motors. One 50 h.p., Laurence Scott, 400/3/50, S.C., 960 r.p.m.; one 36 h.p., G.E.C., 400/440/3/50, S.C., 1,450 r.p.m., with O.I.S.; one 30 h.p. Verity, 415/3/50, S.C., 720 r.p.m., with starter, one 30 h.p., Newton 415/3/50, S.C., 970 r.p.m., with O.I.S.; one 25 h.p. Verity, 415/3/50, S.C., 720 r.p.m., with starter; one 7.5 h.p., Crompton, 400/440/3/50, S.C., 940 r.p.m., with O.I. starter and side rails; one 300-amp, 400-volt Ellison O.I. Circuit Breaker; one 25-h.p. Star/Delta Starter, E.A.O.—A. W. Barker and Co. Ltd., Colnbrook, Slough. Phone: Colnbrook 140.**

**PREFOCUS Projector Lamps, 10 to 110 volts, 100 to 1500 watts, brand new, ex-Govt., ring makes at less than half list prices. Also one million ditto Lamps, various types, 2 to 250 volts, various wattages and caps. Send for list or state your requirements; we probably have it. Example, 80-v., 1500-w. Prefocus, 10s., post free (20 000 in stock). Large enquiries invited, special prices.—Auto Collections Ltd., 126, St. Albans Avenue, Bedford Park, W.4. Tel. Chiswick 1601.**

**SELF-PRIMING ELECTRIC PUMPS.—300 g.p.h. 214 5s.—John E. Steel, Clyde Mills, Bingley. Phone 1066.**

**FLUORESCENT lighting fittings, 4 ft., 40 watt, Flush and Trough complete with tubes and guaranteed control gear from stock.—Apply: Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. GER. 1461/2/3.**

**FLUORESCENT LIGHTING.—CHOKES, extra quality, elongated, 4 ft., 40 W, tapped 200/250 V, silent working, each unit guaranteed, measurements 1½ in. by 1½ in. by 8½ in. Price £1 6s. each net. Carriage extra.—Write Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.**

**FLUORESCENT LIGHTING.—Daylight and Warm White. 30 watt fittings complete with self-contained control gear and 36 in. tubes. Immediate delivery with guaranteed component and tube replacement service.—Apply Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.**

**FLUORESCENT LIGHTING.—Write for details of our amazing OUTDOOR UNIT. Guaranteed weatherproof with rubber insulated unbreakable glass covering with 1, 2 or 3 tubes. Ideal for garages, sports stadiums, wharfs, etc.—Apply, Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.**

**FLUORESCENT FITTINGS.—Trough or Flush type fitted "Constead" or Hi-Craft Ballast control gear, complete with tubes. Delivery from stock.—Apply: Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.**

**FLUORESCENT FITTINGS.—Fluorescent wise from Scemco buys. For details of Fittings, Control Gear and accessories. Send for our Comprehensive List price pamphlet. Generous discounts to Exporters, Wholesalers, and Trade. Apply: Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.**

**B.I.-UNI.—The New Push-Button Flush-Fitting Domestic Switch. Wholesale Enquiries Only. Send for details—Scemco Ltd., Scemco House, 6/7, Soho Street, London, W.1. Tel.: GER. 1461/2/3.**

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**LADDERS, Trestles, Steps and Hand Saws (Forlar) Ltd., Forlar.**  
**RUBBER STAMPS can assist in many ways. Are yours satisfactory and in good condition? W. L. Brighton, maker of all kinds, 53, Kenley Road, Merton, London, S.W.19.**

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Without Reserve.

THE MINISTRY OF SUPPLY DEPOT, No. 123, NORTON FITZWARREN, NEAR TAUNTON.

(Within 2 miles of the centre of Taunton.)

SALE BY AUCTION OF  
 ELECTRICAL MOTORS, GENERATORS, ELECTRIC CABBING AND WIRING,  
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FIELD TESTING UNITS, LARGE QUANTITY HOSE,

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INNER TUBES, WHEEL HUBS, TOOL BOXES AND CABINETS, FIELD MAINTENANCE TENTS AND OTHER MISCELLANEOUS STORES.

FORKLIFTS, TUGS AND 3 MOTOR VEHICLES.

AUCTIONEERS:

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Acting in conjunction.

SALE DATES: TUESDAY, WEDNESDAY, THURSDAY AND FRIDAY, JUNE 10th, 11th, 12th and 13th, and on

TUESDAY AND WEDNESDAY, JUNE 17th and 18th.

At 11 o'clock punctually each day.

VIEW DAYS: THURSDAY, FRIDAY AND MONDAY, JUNE 5th, 6th and 9th, from 10 a.m. to 3 p.m.

AND ON SALE DAYS from 9 a.m. to 10.30 a.m.

CATALOGUES: Price 6d., may be obtained from the Auctioneers:—

W. R. J. Greenslade and Co., 3, Hammet Street, Taunton (Tel.: 2601).

F. L. Hunt and Sons, 9, Hammet Street, Taunton (Tel.: 2743), and

A. W. Parker and Co., 53, East Street, Taunton (Tel.: 2101).

Applicants for Catalogues:—Please mark envelopes M.O.S.

ADMISSION WILL BE BY CATALOGUE ONLY.

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**RUNBAKEN ELECTRICAL REPAIRS.—Re-winding to trade. Fractional h.p. motors a speciality, a.c. and d.c. Prompt service. Guaranteed work—45, Oxford Road, Manchester. Tel.: ARD. 2507 (3 lines).**

**COOKERS.—We can give good deliveries of Sheet Metal Vitreous Enamelled Electric Cooker parts.—JOHN KING & SON (ENAMELERS), LTD., PYRO WORKS, CHESTERFIELD. Phone: 5305.**

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MEWBURN, ELLIS &amp; CO.,

PATENTS, DESIGNS AND TRADE MARKS.

70 &amp; 72, Chancery Lane, London, W.C.2.

Grams: "Patent, London." Phone: Holborn 0437 (2 lines)

And at—NEWCASTLE: 3, St. Nicholas Buildings.

## WANTED

**LAMP HOLDERS**, bakelite or brass, cord grip and  $\frac{1}{2}$  in. plug bases, 5 and 15 amp., 2- and 3-pin; plug heads, 5 amp. 2-pin.—Quotations and delivery dates to Frank O. Kitching, 429, Stanforth Road, Sheffield, 9.

**A.C. MOTORS**, all sizes and voltages, best prices offered.—**JOHN PHILLIPS AND CO. ELECTRICALS**, 31, Fortune Green Road, Hampstead, N.W.6. Hampstead 8132.

**URGENTLY** wanted, A.C., 3-phase, 50-period, 2-speed Induction Motors,  $\frac{5}{8}$  h.p., 1430/730 r.p.m. and 10/10 h.p., 1430/730 r.p.m., for 415, 380 and 220-volt circuits. Protected enclosure preferred, but other enclosures considered.—**W. E. Sykes Ltd.**, Staines. Tel. Staines 978.

**URGENTLY** wanted, A.C., 3-phase, 50-period Induction Motors,  $\frac{1}{2}$  h.p., at 935 r.p.m., and  $\frac{3}{4}$  h.p. at 1430 r.p.m., for 415, 380 and 220-volt circuits.—**W. E. Sykes Ltd.**, Staines. Tel. Staines 978.

**A.C. MOTORS**, 1-100 h.p., 500-1500 r.p.m. Any make fitted with ball and roller type bearings. Must be good machines, such as you yourselves would buy. Alternatively motors for rewinding will be considered.—**Oldfield Engineering Co., Ltd.**, 96, East Ordsall Lane, Salford, 5.

**ELECTRICAL** steel sheet or laminations of reputable make, .014 in. to .020 in. thick will be purchased for cash in any quantity by **Davenset Electrical Works, Leicester**.

**AN** unlimited number of modern A.C. motors urgently required for essential work. Highest cash prices paid for suitable units. We also want all types of motors for conversion and rewinding. Send details to **Sales Dept., A. P. Watson, 104, Upper Brook Street, Manchester, 13**.

## WORK WANTED

**BILLHEADS**. Letterheads, Business Cards 250 5s.—**Geo. Hankins, Dept. E., Queen's Road, Hershham, Walton-on-Thames, Surrey**.

**REWINDS** and repair. Motors and electric tools rewound and repaired. Guaranteed work and prompt service. Phone, **FOR. 3397**.—**C. A. Penny (Elec. Engineers)**, 43, Benson Road, Forest Hill, S.E.23.

**VACUUM CLEANER REWINDING SERVICE**, commutators and bearings. Prompt delivery and full guarantee.—**Thomas Anderson, 117, Bowses Street, Blyth, Northumberland**. Phone: Blyth 405.

**PRESSED METAL PRODUCTS (LEICESTER)**, Middleton Street, Aylestone, Leicester, have capacity for light press work and would be pleased to receive your enquiries, for which a quoted price will be given to your drawing and specification.

**ARMATURE Rotor, Stator and Coil Rewinding**, any size.—**J. E. Fowler, 241, Kirkgate, Wakefield**. Tel. 3948.

**COIL** winding capacity available.—**Modern Armature and Coil Winding Co. Ltd.**, Liphook, Hants

**V.A.C. armatures** rewind, 27s. 6d., 12 days' delivery.—**Home Electric Services, 12, Cromer Grove, Keighley, Yorks.**

**ARMATURE** rewinds.—Speciality, vacuum cleaners, r-grams, small motors, dryers, electric tools; fields; keen prices; prompt service; guaranteed work.—Send s.a.e. for list to **A.D.S. Co., 261-315, Lichfield Road, Ashton, Birmingham, 6**.

## AGENCIES

**THE Calcutta Engineering Co. (India) Ltd.**, P.O. Box No. 598, Calcutta, desire agencies and invite offers from manufacturers and exporters of Electrical Household Appliances, Radios, Wires and Cables, Electric Light Fittings and Accessories, Electric Motors. Our bankers are The Eastern Bank Ltd., Calcutta and London. Trade reference: Messrs. W. H. Jones and Co. (London) Ltd., "Rusper," Barnet, Herts, England.

**WELL-KNOWN** and influential importing house having very good connections and a vast field of clientele desires sole representation of all electrical goods. Please contact **Vyas Brothers, Post Box 2036, 33, Nanabhai Lane, Churchgate Street, BOMBAY**.

## EXPORT.

London Firm of Exporters with World-wide connections, solicits enquiries from Manufacturers.

Communications to—

**SILVAN TRADING COMPANY LTD.**, 7 and 8, Forest Lane, London, E.15.

## NOTICE

## ELECTRICAL POWER ENGINEERS' ASSOCIATION.

## NOTICE.

## BRIGHOUSE.

**Appointment of Deputy Electrical Engineer.**

**THE** Electrical Power Engineers' Association desires to point out that the post of Deputy Electrical Engineer, Borough of Brighouse, has not been advertised in accordance with the National Joint Board Agreement, nor at the appropriate salary rate.

**ALL ENGINEERS, WHETHER ENGAGED IN THE ELECTRICITY SUPPLY INDUSTRY OR NOT, ARE REQUESTED NOT TO APPLY FOR THE POST.**

**IF AN APPLICATION HAS BEEN MADE ALREADY IT SHOULD BE WITHDRAWN.**

**J. F. WALLACE,**

General Secretary,

Electrical Power Engineers' Association.

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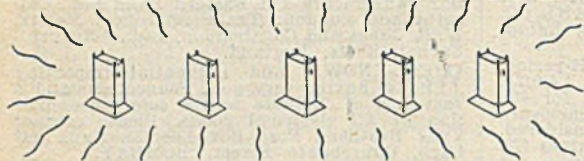


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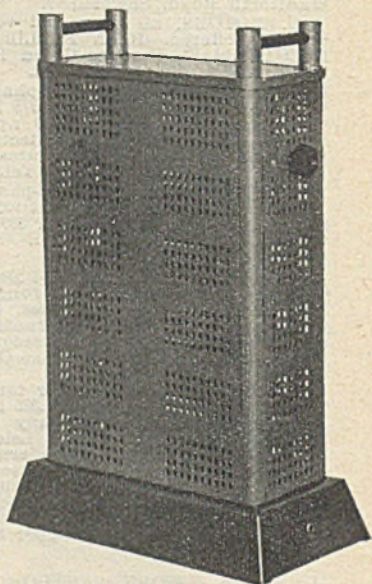
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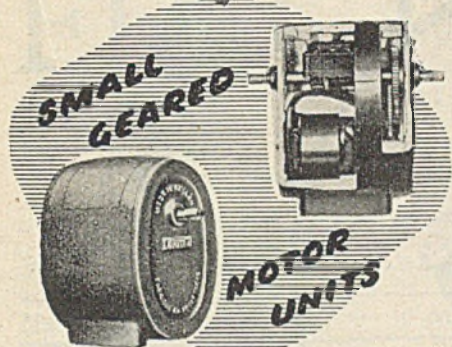
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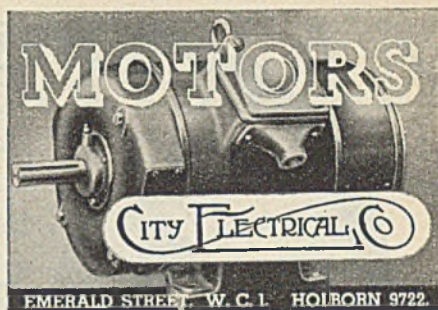
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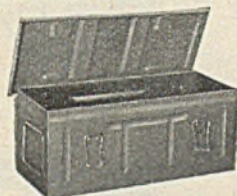
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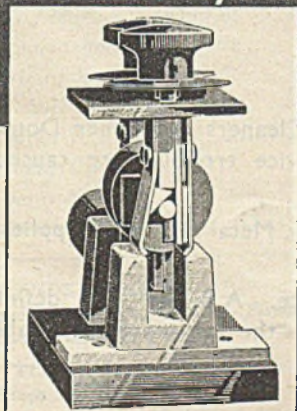
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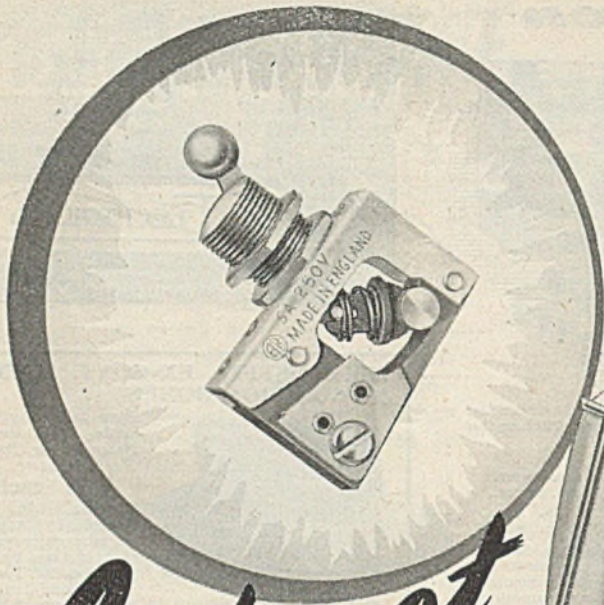
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# ELECTRICIAN

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## CONTENTS

<i>Views on Current Affairs</i> .....	1441
<i>Switchgear Developments</i> .....	1444
<i>Book Reviews</i> .....	1446
<i>The Paris Fair</i> .....	1447
<i>H.T. Cable Testing</i> .....	1448
<i>Overseas Trade</i> .....	1452
<i>Electrical Personalities</i> .....	1453
<i>Illuminating Engineers</i> .....	1454
<i>Junior Boards of Management</i> .....	1455
<i>Organisation of Industrial Research</i> .....	1457
<i>Speed Control of D.C. Motors</i> .....	1458
<i>In Parliament</i> .....	1459
<i>Electricity Bill in Committee</i> .....	1460
<i>Starting Marine Auxiliaries</i> .....	1461
<i>Equipment and Appliances</i> .....	1462
<i>Electricity Supply</i> .....	1463
<i>Loan Authorisations</i> .....	1464
<i>Industrial Information</i> .....	1465
<i>Contracts Open</i> .....	1468
<i>Company News</i> .....	1470
<i>Commercial Information</i> .....	1472

## Training Executives

WHILE it is not suggested that training for management by following certain courses of study would in all cases result in the attainment of executive rank, the report of the Urwick Committee on Education for Management, published by the Stationery Office, contains recommendations which, if acted upon, would bring about a co-ordination of the requirements needed for professional status, while at the same time permitting specialisation in the later stages of training.

There are, according to the report, some 19 professional bodies in this country and so long as most require their own syllabuses, multiplication of courses in our technical schools and colleges must result. To overcome the difficulty, the Urwick Committee suggest the introduction of a common syllabus for all professional bodies with as large a common management content as possible and with specialised demands reduced to a minimum. The adoption of such a measure would release to an appreciable extent the load imposed on teaching staffs, and once the ground common to all interests was covered, would allow of more freedom for specialised forms of study.

Progress in this form of training has already been made in the United States, where also has been adopted a form of training known as "multiple-management" for raising young executives from the personnel of any given firm. Theoretical study alone cannot make an executive, but a combination of both technical learning and practical manage-

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ment, however junior, might well be worth a trial. The question of training executives has been engaging the attention of the electrical industry for a long time, because with the highest technical standards set by the industry in attempts to capture export trade, and because of the developments made during the war years in fields which are relatively new—not only is the need for more executives greater, but the position is aggravated by the fact that between 1939 and recently, the industry was denied access to a high percentage of the personnel suitable for training in management. Neither the Urwick recommendations nor the multiple management method may be the right answer to the problem but, we submit, each is worthy of careful consideration. The first is obtainable from the Stationery Office and the second is dealt with at some length in this issue.

### **The Fair and the Press**

NOW that the B.I.F. is over, the attention of its promoters is drawn to the facilities afforded to the Press, so that the arrangements in future years may be more in keeping with those provided at the Continental fairs. It was customary before the war to invite the Press to see the Birmingham and London Sections of the Fair on the Friday prior to the opening on the Monday, when the stands were far from complete. With the resumption of the Fair this year it was hoped that the pre-opening view to which the Press were invited would provide a picture more in keeping with an exhibition of manufactured goods and less of a display of packing cases and boxes, but as the visit was again made three days before the opening date, the confusion of pre-war Press views was repeated.

### **Lost Overseas Opportunity**

SUCH an arrangement as above is disappointing to both exhibitors and trade and technical Press, for the latter hope each year to be able to include in the issues coinciding with the opening date of the Fair a comprehensive impression of what the Fair is like. Many of the journals under such headings have appreciable overseas circulations and their readers abroad expect to see in those issues coincident with the opening of the Fair, the Editors'

reactions to all they have seen. As it is, the unfinished state of the Fair at all the Press pre-views so far attended has been unsuitable for stimulating favourable comment and Editors have had to rely upon the exhibitors furnishing information in advance through channels in no way related to the Fair. An improvement in the Press arrangements would not only permit further publicity being given to the Fair, but would, too, relieve exhibitors of many of the inquiries so generously answered when put to them by the technical Press.

### **Electrical Exports Rising**

EVIDENCE that electrical exports have resumed the upward trend that was particularly marked last autumn, was contained in the Trade and Navigation Accounts for April, the total value being £5 778 944, the highest figure by over £200 000 registered for any month of this year, and nearly £2½ million more than the aggregate for April of last year. The biggest jump was in the value of shipments of generators from £494 776 in March to £953 780, largely accounted for by purchases by the Soviet Union of Russia, amounting to £521 525, and by British India, value £184 229. Other notable increases were in consignments of electric cables and wires with insulation other than rubber, accumulators, electrical instruments and parts, and X-ray apparatus and vacuum tubes. The continued effects of the shut-down due to the coal crisis in February were reflected in decreases from the March totals in the exports of submarine and rubber-insulated cables, domestic radio receiving sets and valves, electric lamps, batteries, house service meters, motors and other electrical machinery. Less cause for satisfaction may also be found in the fact that electrical imports increased from £125 916 in April last year to £200 757, the greatest rises being in acceptances of electronic valves, furnace carbons and electrical instruments.

### **Manufacturing in Australia**

THE remarkable growth of the electrical manufacturing industry in Australia is indicated in a survey, entitled "Electrical Machinery and Equipment," issued by the Commonwealth Bureau of Census and Statistics covering the ten

years 1934-35 to 1944-45, which shows that the value of output has increased by 440 per cent. In 1934-35, 280 factories employing 7 100 persons had an output valued at £3 822 000, and in 1944-45 there were 475 factories employing 21 670 persons and with an output valued at £16 892 000. Of the total value of the output for the last year of the survey, £334 000 represented generators; £840 000 motors; £732 000 transformers; £1 467 000 telephone and telegraph equipment; and £1 134 000 starters. While this inevitable development must restrict the demand for comparable British products there remains a considerable market for other electrical goods, particularly heavy motors, generating plant, switchgear, locomotives and so on. With regard to domestic appliances and light industrial equipment, British manufacturers should not be deterred by the volume of home production from introducing new and more efficient designs, for such still make a strong appeal to Australian and New Zealand buyers.

### Atomic Speculations

SINCE the publication of the now-classic "Smyth Report" on atomic energy and the documents subsequently prepared for the United Nations Atomic Energy Commission, the amount of new information on the subject made available to those not actively engaged on official research has been very small. It is not, therefore, surprising that speculations have run further than the facts so far released strictly justify. A few weeks ago, for instance, a speaker at an electrical function expressed the opinion that all that stood between this country and the production of electric power from nuclear piles on a large scale was the problem of disposing of radioactive waste material. That the design of an economic heat-producing atomic pile has by no means reached this stage of finality was suggested, last week, by Sir WALLACE AKERS, one of the leaders of the British atomic energy project in the early days of the recent war. Sir WALLACE, who was delivering the May Lecture of the Institute of Metals, made it clear that one of the major factors determining the cheapness of electric power gained from nuclear energy was whether a working pile had to be fuelled entirely with fissile material, such as

U235, plutonium or U233, the artificial element derived from thorium, or whether the relatively abundant natural uranium or thorium, perhaps enriched with fissile material, could be used instead. So far as public knowledge is concerned, the latter course remains a theoretical possibility only. There were also many complex metallurgical problems involved, in the solution of which, Sir WALLACE believed, this country was by no means backward, and the first atomic energy power plant in the world—in the U.S.A.—was not likely to be in operation before 1949.

### Coal and Granite

IF there could be traced from Sir WALLACE'S remarks a faint blueprint of the type of pile with which the power station engineer of the next generation is likely to be familiar, it would appear to show a relatively small unit, employing rods of "enriched" fuel encased in aluminium tubes and using, probably, carbon as a moderator. As the heat-exchanging medium, some substance like liquid bismuth, with a high rate of heat transfer and a low neutron-capture cross-section, was likely to be preferable to water. Because of its relative abundance on the earth's surface, thorium had much to recommend it as the prime source of nuclear fuel. At the end of his lecture, Sir WALLACE permitted himself a few speculations. The consumption of one kilo of fissile material, he said, was the equivalent, in terms of heat, of 2 500 000 kilos of high-grade bituminous coal. Taking the output of British power stations as 50 000 million kWh per annum, and an atomic pile efficiency of 27 per cent., this energy could be obtained from only 7½ tons of nuclear fuel. Even granite contained radioactive material which, if it could be extracted, would give one ton of the rock the same calorific value as 40 tons of coal. The quality of recent coal deliveries might suggest this latter fact to have been fully appreciated in some quarters, but, even so, power station engineers with memories of last February will find the figures tempting. If when Prof. J. D. COCKROFT rises to address the I.M.E.A. delegates at Bournemouth next month he speaks on the same subject, he can be assured of earnest attention.

# Switchgear Developments

## A Low Voltage Synchronous Circuit-Making Unit\*

By H. W. BAXTER, B.Sc.(Eng.), A.M.I.E.E.

(1) **Introduction.**—The switch described has been used mainly in connection with model single pole tests on fuses, the current

possible source of inaccuracy, common to all switches of this type, may be caused by "hunting" of the driving motor.

Little trouble has been experienced from this source and on the relatively few occasions when hunting has occurred it has been detected aurally from the variable pitch of the note and has usually ceased after a few seconds.

To minimise contact bounce the line of the lower contact surface (a-a in the diagram) is made to pass below the pivot L. The reason for this is that when the member K reaches the stop M the upper contact is brought to rest, and

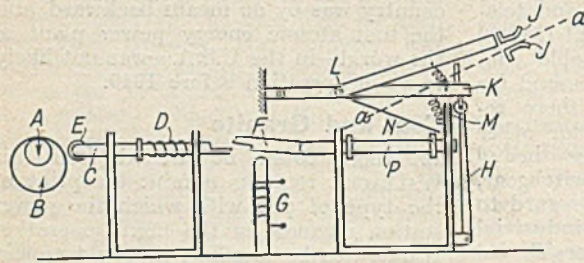


Fig. 1.—Illustrating the operative principle of the switch

being restricted to a maximum value of about 1500 A r.m.s. at 240 V, but it could be adapted for other uses or to deal with heavier currents and three-phase operation.

(2) **Principle of Operation.**—The layout of the switch is shown diagrammatically in Fig. 1. The shaft A, which carries a cam B, is driven by a synchronous motor. The cam causes the rod C to reciprocate, the rod being held against the face of the cam by the spring D. The ball bearing E reduces friction and wear at the cam face.

The tripping link F is normally held, by means of a light spring, just above the reciprocating rod C. The switch is tripped by energising the electromagnet G† which attracts the link F, causing it to engage with the end of rod C which moves it, and the link H, to the right, thus allowing the contacts J to close. Tripping is effected when the axis of the cam is approximately vertical as the rod C is then moving at about its maximum velocity.

As the link H is positively driven from the cam the performance of the device up to this point is very consistent. Changes in the contact separation will, however, cause a variation in the timing, as will changes in the friction of link K on its pivot. To reduce this possible source of variation to a minimum the contact separation is kept as small as practicable, the distance being about  $\frac{1}{32}$  in. Another

if the line a-a passed above the pivot L the momentum would produce a counter-clockwise turning moment which would tend to lift the contact. To avoid this the line a-a is arranged to pass through, or below the pivot L. In addition to this some frictional damping is applied at the pivot L by means of spring washers.

The catch N holds the rod P to the right after the switch has tripped. It is not essential to the correct working of the

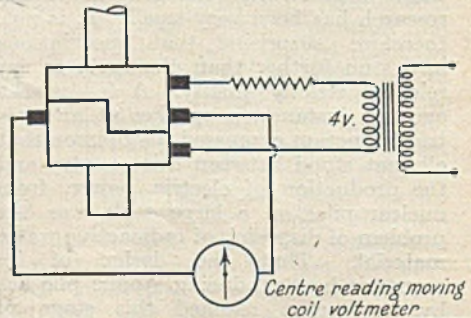


Fig. 2.—Commutator connections for checking sense of synchronisation

switch, but serves to prevent rebound which may cause an unpleasant rattle.

To change the point on wave at which the switch trips, the cam B is rotated on its shaft and clamped by means of a nut. A scale graduated in degrees is provided.

(3) **The Working Model.**—The working model of the switch is shown in the photo-

\* Based on Report Ref. G/T200 of the British Electrical and Allied Industries Research Association.

† This is energised from 230 V d.c. mains but it can be wound for any convenient voltage.

graph (Fig. 3) and in the scale drawing in Fig. 4.

The 400 V 3 phase motor of  $\frac{1}{4}$  H.P. runs at a speed of 3 000 r.p.m. It is of the self-synchronising††, synchronous-induction type and can synchronise in two positions differing by  $180^\circ$ . This slight disadvantage is overcome by mounting a rectifying commutator on the motor shaft which rectifies the output from a small 4 V transformer which is applied to a centre reading moving coil voltmeter, as shown in Fig. 2. The pointer will then deflect to one side or the other, according to the sense in which the motor synchronises, and if the sense is wrong the motor control switch is momentarily opened and re-closed—a process which does not usually need to be repeated more than two or three times to obtain the desired sense of synchronisation.

(4) **Consistency of Performance.**—It was hoped that the switch would repeat with a tolerance of  $\pm 3^\circ$ . Actually, the performance is rather better than this, the

ting of moving parts, and those parts subjected to much wear are case hardened. This applies especially to the ends of the rod C and the link F which are subjected

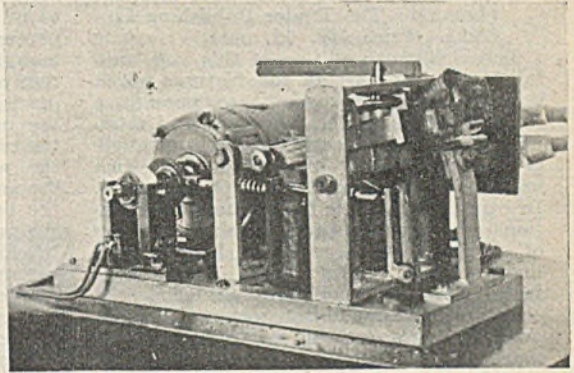


Fig. 3.—Reproduction of a photograph of the switch

to the force of impact when the switch is tripped.

Maintenance seems to be quite nominal and the switch has recently operated two hundred times without attention, apart

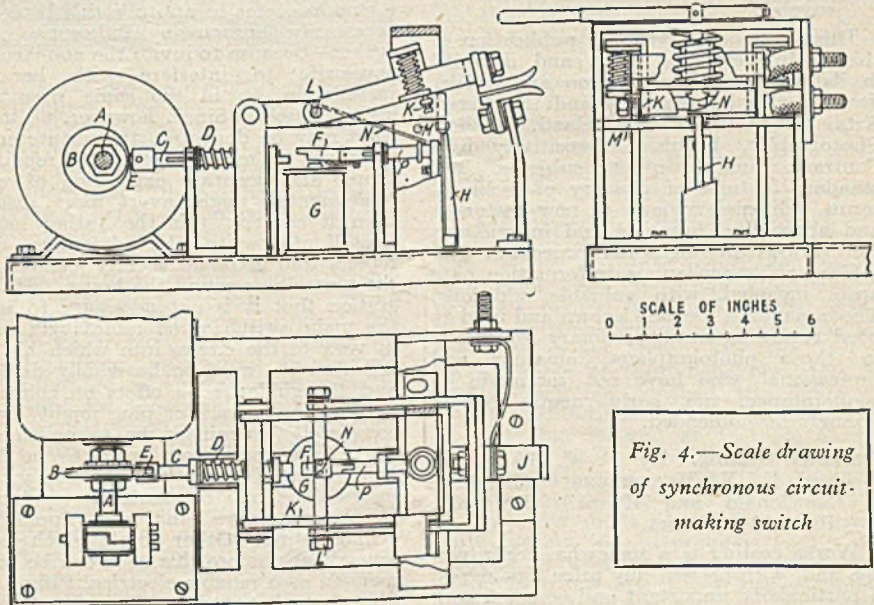


Fig. 4.—Scale drawing of synchronous circuit-making switch

variation in repeat tests usually being within  $\pm 2^\circ$ . The temperature of the laboratory in which it is housed does not fluctuate widely, which may account in part for the consistent performance.

Care was taken to ensure accurate fit-

from setting the cam to the appropriate "point on wave."

†† As this type of motor is made by relatively few firms the following details of that used are given:—Klaxon 400 V 3 ph.  $\frac{1}{4}$  H.P. 3000 r.p.m. type AK11 YBr. An extra long shaft was specified to accommodate the commutator.

# Book Reviews

**The "Trader" Year Book, 1947 Edition.**  
(London: The Trader Publishing Co., Ltd.). Price 10s. 6d. net.

The eighteenth edition of this very useful annual contains all the features which have in the past made it so popular a reference book in the wholesale and retail electrical and radio trades. A legal guide gives up-to-date information on such matters as purchase tax and price control. In other sections are found short specifications of post-war radio receivers, tables of supply voltages in Great Britain, and many other useful data. The main features of the book are, as usual, the comprehensive trade directory and buyers' guide and the valuable list of proprietary names, which has been further extended to take account of many new arrivals in the domestic appliance field.

**British Journal Photographic Almanac, 1947.**—Editor, ARTHUR J. DALLADAY. (London: Greenwood and Co., Ltd.) Pp. 444 + 35 pp. pictorial photography supplement. Price 5s. net (cloth bound), 4s. net (paper bound covers).

This is the 88th year of publication of this useful reference book, and included in its pages on this occasion are articles dealing with Photography and the Visual Arts, the Camera in Ireland, Medical Photography, Emulsion Sensitivity and Contrast, among other subjects. The standard features of glossary of technical terms, editorial reviews of new materials and apparatus, formulas and instructions for various photographic processes, and tables of miscellaneous information are again included, with valuable additions. The almanac is too well known and used to need reviewing in the ordinary sense, but to those photographers, amateur and professional, who have not yet made its acquaintance, its early acquisition is strongly recommended.

**Marginal Costing.** By F. C. LAWRENCE and E. N. HUMPHREYS. (London: Macdonald and Evans.) Pp. 117. Price 12s. 6d. net.

Works costing is a somewhat controversial and, with present-day price tendencies, a particularly important and complex subject, and the authors, analysing the imperfections of conventional methods of Total Costing, find that it leaves much to be desired. The system of marginal costing which they put forward, backed with the claim of successful trials in a number of industries, should therefore receive the

attention of those who find their methods of relating selling price to production expenses unsatisfactory. The components of manufacturing cost, they explain, can be resolved, on the one hand, into fixed overheads, which in general are unrelated to the number of articles produced and, on the other hand, to direct cost incurred in the production of a single article. The proportion of the overheads appearing in the final cost of each article will vary as the number of articles produced, and it is to offer a means whereby these variables, the one a constant ratio and the other a constant quantity, can be manipulated into a sound equation, that the book has been written. The accounts of an imaginary firm are used to compare, side-by-side, the traditional and suggested costing systems, and it must be admitted that the authors' proposals show some clear advantages.

**Household Electricity.**—By J. F. K. NOSWORTHY. (London: Staples Press, Ltd.) Pp. 27, with 11 figs. Price 1s. 6d. net.

One hesitates to approve this book—not necessarily through any deficiencies of the author—because to invite the non-electrical housewife to interfere with her own installation is, in the same breath, to invite trouble. Since, however, no matter what may be desirable, the untutored will continue to make emergency repairs, a simple and accurate exposition of wiring fundamentals might avert more disasters than it caused: this the author has set himself to write. He describes minor repairs and explains clearly enough how the power gets round the house. His suggestion that it is not necessary to isolate the main switch when removing fuses is, in view of the circles into which his book will find its way, to be wholly deplored. and the guidance he offers on connecting up the flex' to a b.c. plug might, by the completely untrained, be taken to mean that both conductors were to be bared and twisted together. Similarly, the instructions on dismantling a standard lamp might prove lethal when applied to a ceiling fitting. Other points which require amendment before this book can be recommended as a reliable electrical "first-aid" are the references to the white wire in three-cored flex, which may well cause confusion when only coloured conductors are found, and the statement that Number 8 batteries consist of one cell unit only. The special dangers of bathroom installations should have been much more thoroughly explained.



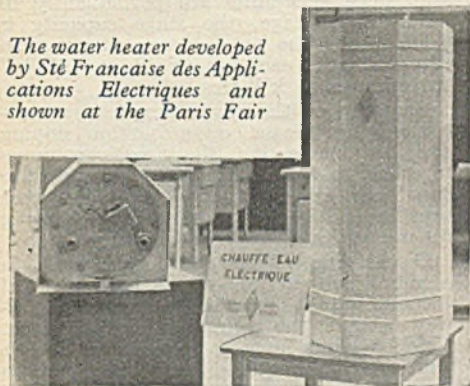
# THE PARIS FAIR

## NEW EXHIBITS IN THE DOMESTIC FIELD—ORDERS WELCOMED

THIS year's Paris Fair was the first occasion since the war that French manufacturers were able to take orders with any hope of their fulfilment within a reasonable time, and as materials in France are now more plentiful the products exhibited were of special interest.

For the first time in its history the Fair had to be split up, in that the ground at

*The water heater developed by Sté Francaise des Applications Electriques and shown at the Paris Fair*



Versailles was not large enough to hold all the exhibitors, and the Grand Palais on the Champs Elysees had to be taken for the electrical section, exclusive of heavy electrical machinery. With regard to the latter, there was little novelty to be seen, except that electric motors with steel cases instead of cast iron were shown. On the domestic side, the French electrical industry had produced many new things, though fewer in number than was the custom before the war. Our correspondent was given to understand that the reason for this is that Frenchmen are at the moment more interested in quality than novelty, as the need for apparatus is so acute that buyers want to ensure that their selection is good and will last. Several manufacturers in fact made a feature of this point. The Croissant Company, for instance, which showed a small electric cooker and a radiator mounted on wheels, listed its products as "armoured" and stated that they would "never wear out." Messrs. Oderiam showed a bath complete with water heater installed in the under part of the bath. The heater is not visible, and access to it for maintenance is given by sliding away one side of the bath casing. The heater is of 125 litres capacity and consumes 1 800 W. Electrically heated blankets in jute and glass fibre were to be seen and Messrs. Jean Blattner showed a

cooker with a handle for lifting oven shelves without the necessity of having to open the oven door, the advantage claimed being that a shelf can be placed at any height while the oven is in use.

Eldac showed a toaster which will take any shape of slice. This was badly needed in France, since toasters of normal design do not easily accommodate slices from the long French loaves. The same firm also staged a special heater for babies' bottles and an electric hotplate to keep babies' food warm.

The Sté Francaise des Applications Electriques showed a novel water heater which, it is claimed, can be taken to pieces at home and cleaned. This is the first water heater of its kind in France, in that heaters in general have to be sent to their makers when sediment has to be removed.

Only one British firm had a stand in the electrical section, namely, the British Vacuum Cleaner and Engineering Co., Ltd. Our correspondent was told that British-made electric irons are proving particularly attractive to French women, probably because they are smaller than the French irons and do not weigh so much.

An impression at the Fair is that British prices are far below the French; unfortunately, most British houses were represented through agents and one found the British firms only with difficulty.

### *Electricity at Norwich*

A slight decrease in the year's figures for units sold from 115.5 million to 114.4 million is shown in the report of the Norwich electricity undertaking for the year ended March 31, 1946. The total number of consumers connected, at 62 311, had not reached the figure of 63 111 connections before the air raids of 1942, but showed an increase of 832 during the year. The income from the year's working was £778 719 (£757 059) and the expenditure £625 758 (£561 144), giving a net profit of £20 334, compared with £30 915 in the previous year. An analysis of sales within the undertaking shows that the city power load remained stationary at about 30 per cent. below the pre-war figure, and while quarterly domestic supplies in the city had returned only to 1939 levels, there had been a remarkable increase in supplies to pre-payment consumers. Largely due to bombing, the city supplies are not yet back to a pre-war basis.

# H.T. CABLE TESTING

## 1 200 000 V IMPULSE AND 400 000 V LABORATORY PLANTS

IN THE ELECTRICIAN of June 23, 1939, was described and illustrated the then re-designed and re-equipped high-voltage laboratory of W. T. Henley's Telegraph Works Co., Ltd., at Gravesend, and at the invitation of the company we were last week afforded an opportunity of inspecting a 1.2 megavolt impulse plant which has now been added to the power frequency equipment in order to obtain information on the behaviour of prototype cable systems under impulse conditions.

The impulse testing plant consists in brief of a 200 kV d.c. charging unit, seven-stage condenser columns, a capacity potential divider for voltage measurement, and a high-speed continuously evacuated cathode-ray oscillograph for surge recording.

The last-named component in the plant is a particularly sensitive piece of apparatus, capable of giving visual indication of high speed transients or of recording such transients photographically, and was designed and constructed completely in the Henley Research Laboratories.

The charging unit of the impulse plant consists of a transformer and condenser and a rectifier bank. The incoming 50 cycle supply is fed through a 10 kVA, 0-250 V moving-coil regulator to the primary of a 6 kVA, 80 kV transformer, the core of which operates at a potential half that of the output. The top plate is connected to an oil-immersed porcelain clad 0.015 mfd. condenser rated at 100 kV d.c. The supply from this condenser is taken through a resistance to the mid-point of a pair of oil-immersed porcelain-clad selenium rectifiers, each of which is rated at 200 kV reverse peak, and is capable of giving 5 mA continuously or 20 mA for one hour. The rectifier bank is isolated from earth by four pedestal insulators so that positive or negative d.c. can be obtained by connection to the top or bottom of the bank, the opposite end being earthed. The output from the charging unit is fed to the first stage of the condenser bank through a resistance: contact is made to earth at the output side of this resistance by means of a movable rod, which makes contact when the transformer is de-energised and is automatically disconnected by a copper disc motor when the transformer is energised.

The main condenser bank consists of four columns, each made up of condensers

and insulating members alternately. The front and back columns are identical, each consisting of condenser units and spacer units erected vertically. The front and back columns are permanently paralleled by the spark gap supports. Each condenser unit has a capacity of 0.0875 mfd. and, since two units are permanently in parallel per stage, the stage capacity is 0.175 mfd. The total energy output with seven stages, each energised at 167 kV in series, is 17 kW-secs.

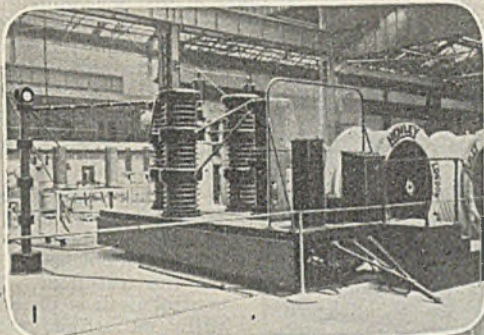
Charging of the seven stages is accomplished by means of a set of sloping resistors connecting the front columns together, and a similar set connecting the two back columns together. The rear resistances, besides acting as charging resistances, also control the wave tail.

Discharging of the condenser bank is accomplished by means of hemispherical 150 mm. gaps supported horizontally midway between the front and back columns. The left-hand hemispheres can be set at any position required and then remain fixed. The right hand hemispheres are connected by means of cam mechanisms through gearing to a vertical rod. This rod is made up of insulating members and the design is such as to allow a certain latitude in alignment. The rod is driven through gearing by a small motor at the base of the generator. This motor also operates a Selsyn unit which, with a similar unit on the control desk, permits of remote indication of the gap setting.

In the majority of the gap circuits, small damping resistances are inserted which also serve as part of the wave front control. Connection from the condenser bank to the sample is effected by means of a wire wound resistance which controls the wave front of the impulse.

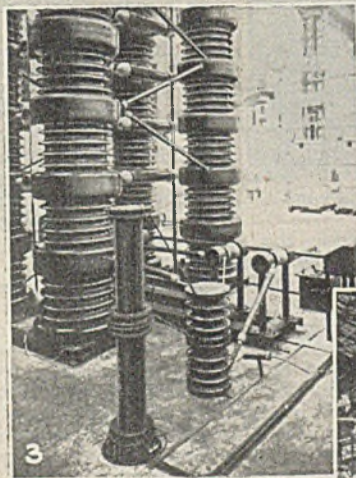
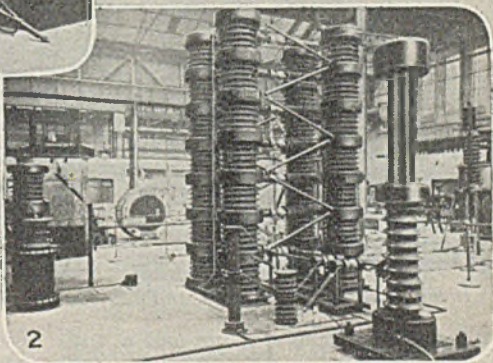
The capacity potential divider is made up of two h.v. condenser units, each capable of withstanding 600 kVp and having a capacity of approximately 60 mmfd. These units in series form the high voltage arm of the divider and are mounted on a steel base provided with rollers for mobility. In the base is mounted the low voltage element of the divider, together with the recording cable matching resistor. Special care has been taken to ensure that the low voltage capacitor is adequately screened, and from this point the recording cable of low capacity is taken to the

(Continued on p. 1450.)

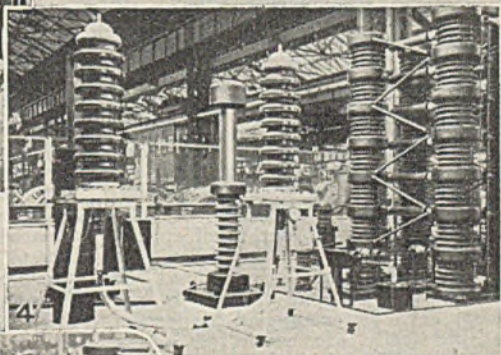


(1). 400 kV, d.c. transportable testing set

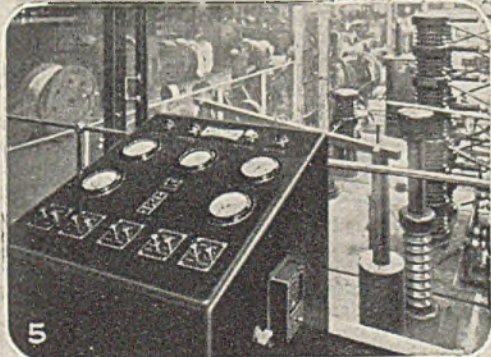
(2). Impulse plant showing d.c. charging equipment, main condenser bank and potential divider



(3). Base of the condenser bank and controlled tripping mechanism



(4). Complete impulse plant showing capacity potential divider and 132 kV cable sample



(5). Impulse plant control desk. The switching arrangement is described in the text

cathode-ray oscillograph by the most direct route.

The tripping mechanism for the main condenser bank consists of two three-electrode gaps, two condensers with

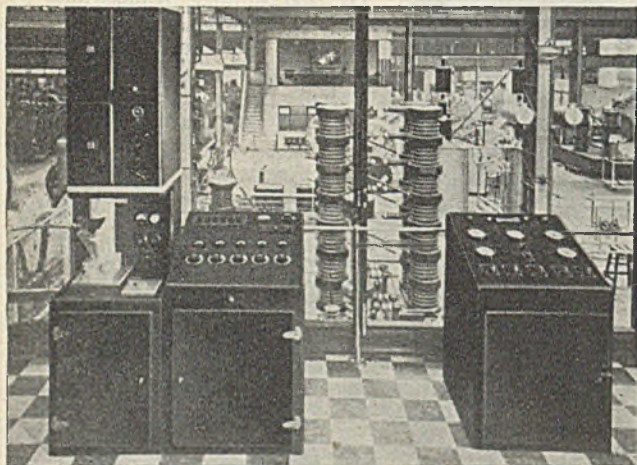
forming part of the tripping mechanisms. The resistors are oil-immersed, porcelain-clad 100 kV units of 200 megohms each, and together give a total of 400 megohms. The lower end of the two in series is connected to earth through a d.c. micro-ammeter calibrated to read mean kV, and protected by the usual protective devices.

The impulse generator is controlled from a pedestal situated in the control room overlooking the test floor. The control desk is provided with indicating instruments, those on the left giving the low voltage input, the centre one reading mean stage kV, and those on the right, driven by Selsyns underneath, indicating the settings of the main and auxiliary gaps respectively. A push button in the centre is the final control which energises the tripping transformer and causes the generator to operate.

On the side of the cabinet is a Castell switch and a relay which ensures that the plant cannot be energised unless the input switchgear cubicle and the control pedestal are closed and locked. Since the area is served by an overhead crane, an additional electrical interlock on the crane supply is fitted in the supply cubicle to de-energise the crane when nearing the impulse plant if the latter is in operation.

The high-speed cathode-ray oscillograph, situated alongside the control desk in the control room, is of the continuously-evacuated type employing a rotary backing pump and a mercury diffusion pump. The tube is fed from a 40 kV, d.c. supply and is mounted on a cubicle containing the backing pump. The main tube, which is approximately 5 ft. long, consists of three sections, a discharge tube at the top fitted with pre-anode electro-magnetic concentration, a trapping chamber in the centre to which is fitted the main concentrating coil, and a deflection chamber at the bottom containing the two pairs of plates and the recording mechanism at its base. The trapping and timing circuits are arranged on one side of the trapping chamber and the whole oscillograph tube is contained in an aluminium screen. Mu-metal screens are also inserted in the main oscillograph tube.

The controls are situated in an adjoining control cabinet which also houses the power pack for supplying the timing cir-



*Impulse plant, control desk and cathode-ray oscillograph*

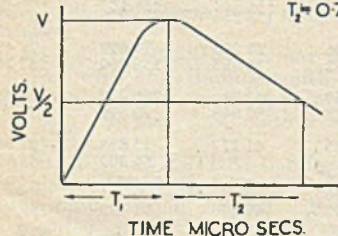
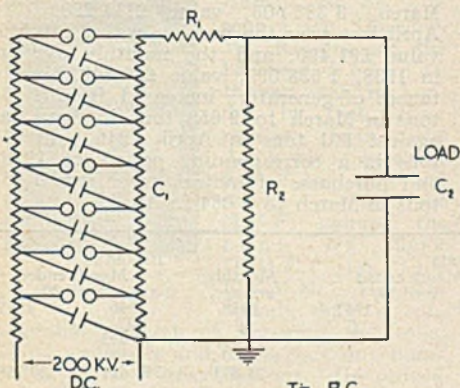
associated stabilising resistors and a tripping transformer. All electrodes are driven by cam mechanisms ganged together to a motor-driven insulated shaft. The motor drive, together with a Selsyn unit for remote indication of the gap settings, is housed in a metal box in the foreground. This drive is identical with that for the main gaps.

The tripping transformer injects a voltage of up to 30 kV into the common electrode of the first two gaps when energised, and this initiates operation of the generator. This transformer is of special design to have a suitable wave form, and damping windings are incorporated to ensure that the injected voltage is not oscillatory. Two porcelain-clad condensers mounted vertically are connected across the two three-electrode gaps so that the potential of the various electrodes is maintained at the correct value for positive operation in sequence, immediately the balance is upset by the injected voltage from the tripping transformer. In order to maintain the voltage on the condensers in the correct ratio in spite of the vertical mounting, two porcelain-clad resistors are connected across the combination. From the left-hand hemisphere to the base of the lower condenser a tapped wire wound resistor is connected, from which is taken the initiating cable for the cathode-ray oscillograph.

In order to measure the voltage on the first stage, use is made of the resistors connected in parallel with the condensers.

cuts and for calibration purposes, and the oscillator for producing the timing oscillations. The waves from the impulse generator can be examined visually from two ports at right angles, and the fluorescent screen can be moved for recording photographically either on plates or on films.

Another addition to the laboratory is a 400 kV, d.c. plant consisting of an assembly of condensers, rectifiers, spacers and transformers, erected as four columns on a trailer which also houses the moving coil regulator and the switchgear cubicle. Energy is fed into the transformer stack,



*Theoretical considerations of the impulse testing plant condenser columns*

in the same way as for the impulse plant, from which connection is made to a 200 kV condenser and then to four 200 kV metal rectifiers arranged in pairs. The output of this set at 400 kV, d.c. is 5 mA continuously, 20 mA for one hour; and at 200 kV, 10 mA continuously, 40 mA for one hour.

The equipment permits of the continuous application of high voltage d.c. to prototype systems and is simple in operation. The rectifiers, transformers, and moving-coil regulator of the d.c. plant are interchangeable with similar units on the impulse plant for obvious reasons.

The d.c. plant is believed to be unique in that it employs high voltage oil-immersed metal rectifiers at the extreme voltage of

400 kV at which it operates. The set has also been used for testing many of the 132 kV cable installations already carried out for the Central Board by the W. T. Henley's Telegraph Works Co., Ltd.

Prior to our inspection of the plant, Mr. W. C. Barry, Henley's research manager, explained that although the use of impulse plants developing extremely high voltage surges of short duration is becoming increasingly and widely known for all classes of electrical equipment and for investigational work, it is believed by the company that the plant described is the only one of its kind so far installed in this country expressly for high voltage cable development work.

For the explanatory details given in the description we are indebted to Mr. T. R. P. Harrison, chief of the company's high voltage research and testing laboratories.

The impulse generator and the 400 kV d.c. set were both manufactured by Ferranti, Ltd.

## Motor Maintenance

THE stripping and re-assembly of large traction motor cases has been facilitated by the development of the ring-stand principle in the Acton works of London Transport. The poles and interpoles are fixed to the motor case by bolts adjusted from the outside and on a normal stripping bench, one set of main pole bolts is covered and the adjacent interpole bolts are difficult to get at. Consequently the case has to be tilted—by crowbars and wedges or an overhead crane. When replacing poles, it is essential to ensure that the coil is firmly in position and that the pole-piece is in absolute magnetic contact with the case. To seat the washer correctly over the pole before tightening-down on to the coil is difficult, especially when replacing the side poles; the washer often slips down and tightens across the pole-piece instead of the coil.

The ring-frame stand as used on the L.T. 100 motor cases consists essentially of two parts—base and rings. The case is partially closed at the brush end but open at the other. The open-end ring is 3 ft. across and carries four cranked lugs projecting radially inwards, which bolt on to the end-cover holes. The brush-end ring is fixed at three points. The case is located by a chordial bar and fixed by a lug plus a bolt through the ring itself. This leaves the brush end overhanging the base, making for easier access to the brush coil leads. When mounted in the rings, a circular cage is formed. The base is a simple welded angle-iron structure 2 ft. 6 in. high and carries a roller-bearing at each corner. The rings rest on these and can be rotated by hand.

# Electrical Overseas Trade

## Exports for April Show Steady Increase in Value

THE total value of electrical exports during April, as briefly reported in our last issue, was £5 778 944, compared with £5 438 004 in the previous month, and £3 535 919 in April of last year. The monthly average for 1938 was £1 829 189. For the first four months of this year the value of electrical goods and machinery despatched overseas was £21 799 531, contrasted with £14 041 843 for the corresponding period of 1946. Electrical imports for April were of the value of £200 757 as against £152 109 in March, £125 916 in April last year, and a monthly average of £328 117 in 1938. In the first four months of the year the value of imports was £658 285, against £1 226 972. The number of radio receiving sets

shipped fell from 32 635, value £364 754, in March, to 26 755, value £287 262, in April. In April, 1946, 15 477 sets, value £136 060, were exported, and the monthly average for 1938 was 7 053, value £36 755. There was also a falling off in the number of electric lamps supplied to overseas buyers, the number for April being 2 412 568, value £89 837, and that for March, 3 386 605, value £114 220. In April last year the number was 2 189 155, value £91 490, and the monthly average in 1938, 1 638 099, value £49 440. Acceptances of generators increased from 1 534 tons in March to 2 658 tons in April, as against 601 tons in April, 1946, and 858 tons in a corresponding period of 1938; and purchases of motors rose from 1 053 tons in March to 1 084 in April.

	IMPORTS			Monthly average, 1938 £	EXPORTS	
	Monthly average, 1938 £	Month ended April 30, 1946 £	Month ended April 30, 1947 £		Monthly average, 1938 £	Month ended April 30, 1946 £
Submarine cables ... ..	—	—	—	17 289	38 993	3 787
Other telegraph and telephone wires and cables ... ..	—	—	—	71 803	383 411	207 585
Electric cables, wires, &c.—						
Rubber insulated ... ..	31 246	3 128	5 782	117 533	211 199	289 163
With other insulation ... ..	—	—	—	153 256	299 510	467 035
Radio and television transmitters (and radar) and equipment ... ..	—	—	46 906	28 296	79 699	78 459
Radio receiving sets ... ..	10 148	10 418	3 282	36 755	136 060	287 262
Radio long distance telegraph and telephone equipment ... ..	9 243	1 018	2 159	242 716	266 432	476 466
Other descriptions ... ..	47 870	73 854	37 018	57 848	90 871	154 709
Transmitting and industrial valves ... ..	10 893	1 134	16 575	41 272	13 858	22 860
Other ... ..	—	—	—	—	56 303	63 520
Furnace carbons, electric ... ..	4 054	2 145	23 318	—	—	—
Other electric carbons ... ..	2 301	5 720	1 936	—	—	—
Electric lamps, complete ... ..	10 265	24	8 195	49 440	91 490	89 837
Other lamps, lighting appliances and fittings ... ..	38 662	1 245	2 877	48 565	138 525	210 658
Batteries and/or cells, primary ... ..	3 549	437	798	13 572	35 497	22 290
Accumulators ... ..	—	—	—	48 647	99 074	160 494
Parts and accessories ... ..	—	—	—	—	41 926	38 236
Heating apparatus and elements ... ..	—	—	—	14 064	63 074	129 991
Other heating equipment ... ..	—	—	—	16 600	25 811	77 490
Commercial electrical instruments and parts ... ..	32 057	2 150	10 704	15 878	42 441	109 342
House service meters ... ..	—	—	—	15 791	39 888	61 017
All other descriptions of instruments ... ..	—	—	—	9 612	32 864	26 202
Electro-medical apparatus ... ..	—	—	—	3 038	9 174	17 749
X-ray apparatus, vacuum tubes and parts ... ..	9 734	9 095	6 978	4 881	82 777	92 830
Insulating cloth and tapes ... ..	—	—	—	7 038	37 556	28 990
Other insulating materials ... ..	—	—	—	12 305	72 325	60 733
Other articles ... ..	52 980	5 611	16 014	108 083	182 275	177 536
Generators and parts ... ..	—	—	—	157 150	191 324	953 780
Motors and parts ... ..	26 033	11 163	3 059	145 045	159 379	320 848
Other descriptions of electrical machinery ... ..	14 455	910	4 790	355 663	401 835	848 742
Vacuum cleaners and parts ... ..	—	—	—	26 662	55 134	166 711
Other portable appliances ... ..	24 627	2 717	4 759	10 394	29 760	10 553
Welding machinery (including electrodes) other than tube making ... ..	—	147	5 607	—	128 454	124 069
<b>Total ... ..</b>	<b>328 117</b>	<b>125 916</b>	<b>200 757</b>	<b>1 829 198</b>	<b>3 536 919</b>	<b>5 778 944</b>

# Electrical Personalities

*We are always glad to receive from readers news of their social and business activities for publication in this page. Paragraphs should be as brief as possible.*

MR. C. J. KING has been appointed Area Engineer in Scotland for the E.L.M.A.

Lighting Service Bureau and is now at the Scottish Bureau, 29, St. Vincent Place, Glasgow. Mr. King joined the Lighting Service Bureau staff in London in 1946, after release from the Army where he spent five of his six years' service with the M.E.F. gaining the rank of Major (E.M.E.) in the R.E.M.E. He has already done a considerable amount of lecturing to design course audiences and taken part in a number of lighting investigations. He proved himself a valuable asset to the educational and advisory work of the bureau in London.



MR. C. J. KING

MR. G. C. MUNRO, senior engineer-in-charge with the Hammersmith electricity department, has been appointed to the position of assistant station superintendent.

MR. T. B. NUTTER, borough electrical engineer, Burnley, intends to retire on superannuation in August. He has been associated with the Burnley undertaking for 47 years, starting as an apprentice. He has been chief of the department since 1942.

MR. F. B. HINSLEY (Cardiff) has been elected president of the South Wales branch of the Association of Mining Electrical and Mechanical Engineers for the year 1947-48. Mr. J. Brodie (Beddau) is first vice-president, and Mr. A. W. Kidd (Pengam) second vice-president.

MR. J. RUSSELL TAYLOR, for 23 years on the staff of the Igranic Electric Co., Ltd., Bedford, and chief engineer since 1937, has accepted an invitation from the directors to join the board. He was apprenticed to a Motherwell firm and joined the Igranic Co. as a junior tester in 1924.

MR. H. J. FINDEN, who is responsible for development and design of test equipment for the Plessey Co., Ltd., Ilford, is giving a lecture on frequency generation

and measurement at the conference on instruments and measurements at Stockholm on June 4-7, arranged under the auspices of the Royal Swedish Academy of Engineering Sciences (IVA) and the Association of Technical Physicists (TFF).

MR. J. C. CULLIFORD has received the customary gold watch on the completion of 50 years' service with the Edison Swan Electric Co., Ltd., at Enfield. The presentation was made by Mr. C. G. Seeley, managing director. Mr. Culliford is continuing his work in the lamp sales department.

MR. JOSEPH WESTWOOD, M.P., Secretary of State for Scotland, on Friday, May 23, laid the foundation stone of a new factory at Hamilton which, when completed, will be occupied by Philips Lamps, Ltd., and will provide employment for about 1,000 people by the end of the year and 2,500 within two years in the manufacture of radio sets and components.

MR. CHARLES BLAMPIED COLSTON, war-time Regional Controller at the Ministry of Production, and chairman and managing director of Hoover, Ltd., attended at Buckingham Palace on Tuesday, May 20, for the investiture by the King with the honour of C.B.E. Mr. Colston was awarded the D.C.M. and M.C. and twice mentioned in despatches while serving with the Royal Engineers on Gallipoli and in France in the first world war.

MR. HERBERT SHACKLETON has been recommended by the Rochdale Electricity Committee for the post of deputy engineer and manager of the electricity undertaking. He graduated from Manchester University in 1924 with a second-class honours degree of B.Sc. in electrical engineering, and the same year joined the staff of Manchester electricity department with which he served in various capacities until 1944 when he was appointed electro-technical engineer. In 1937 he was awarded the degree of M.Sc. for his work on "Network Fault Resistance."

DR. P. DUNSHEATH, director and consulting engineer of W. T. Henley's Telegraph Works Co., Ltd., was elected an Honorary Member of the Engineering Institute of Canada at a Council meeting held in New Brunswick on March 15. Others elected by E.I.C. at the same time were: Dr. Ernest Brown, former Dean and

Emeritus Professor of Civil Engineering at McGill University; Dr. C. J. Mackenzie, president of the National Research Council, Ottawa; and Dr. F. H. Sexton, president of the Nova Scotia Technical College, Halifax. Readers will recall that Dr. Dunsheath was made the first Honorary Member of the New Zealand Institute of Engineering during his recent tour.

MR. AUBREY H. L. GIBSON, governing-director of A. H. Gibson (Electrical) Co. Pty., Ltd., and subsidiaries, with headquarters in Melbourne, and operating throughout Australia, is on a visit to this country until September. He is desirous of contacting firms anxious to export to, or to extend their manufacturing interests in, Australia. His companies distribute all types of electrical and radio supplies, apparatus, appliances, equipment and machinery—they also manufacture certain items in Australia. Mr. Gibson's address whilst in England is c/o the Commercial Banking Company of Sydney, 18, Birchin Lane, Lombard Street, London, E.C.3.

SIR CLAUDE GIBB, chairman and managing director, C. A. Parsons and Company, Ltd., speaking at an "Export Drive" luncheon organised as part of the Advertising Association Conference held at Margate last week, said that already in the heavy electrical industry there is a marked falling off in inquiries and orders, and that in time the Dominion and other overseas markets will produce the great majority of their home needs of consumer goods. The wise industrialist, he continued, was conducting his business as though to-day was a keen buyer's market and he was preparing for the coming fall in demand and better international competition. Sir Claude called for a change of heart in the general attitude towards work, a restoration of the old pride of craftsmanship and an increased output per man hour.

### Obituary

MR. E. S. CONRADI, chairman and manager of the British Central Electrical Co., Ltd., on May 27. For some time Mr. Conradi had worked hard as a collector of funds for the Electrical Industries' Benevolent Association, and raised over £2 000 in that way.

MR. H. C. BABB, general manager until his retirement in 1943 of the Lothians Electric Power Co., at Edinburgh, on May 16, aged 68 years. A past chairman of the Scottish Centre of the I.E.E., he was respected by a large circle of friends. A native of Bristol, Mr. Babb gained a wide and practical knowledge of the electrical industry with various companies at Rotherham, Bristol, Guernsey and Dartmouth. He went to Scotland in 1913 as chief technical assistant at the Hawick

electricity works, and in 1915 he was appointed engineer and manager of Bo'ness electric power station. While holding that position he was also appointed general manager of the Musselburgh and District Electric Light and Traction Co. The Bo'ness undertaking was acquired by the local authority in 1920, and in 1922 Mr. Babb was appointed general manager of the Lothians Electric Power Co., in addition to his post with the Musselburgh company. Before retirement, he had been a member of the Central Scotland C.E.B. Consultative Committee from its inception. In the first world war he was Assistant Coal Controller for Scotland. He was a member of the A.S.E.E.

### Illuminating Engineers

AT the annual meeting of the Illuminating Engineering Society on May 13, the president, Mr. J. S. Dow, presented the report for 1946. Though recovery to normal conditions has not been rapid the society has continued to make good progress both as regards activities and membership; the latter has now topped the 2 000 mark. Centres have been in existence in the principal provincial towns for a number of years and in 1946 a further centre was opened, holding meetings alternately at Gloucester and Cheltenham. The society is now making arrangements for a summer meeting to be held at Harrogate from May 26-29, 1948, when the programme will include papers and social events.

At the meeting it was announced that the officers for the next session would be Dr. J. W. T. Walsh, president; supported by Mr. J. M. Waldram, Mr. J. S. Preston, and Dr. E. C. Walton, as vice-presidents; with Mr. J. C. Holmes, as hon. treasurer; Mr. H. C. Weston, hon. secretary; and Dr. S. English, hon. editor. Dr. Walsh is chairman of the National Illumination Committee of Great Britain and is a Principal Scientific Officer in the Light Division of the National Physical Laboratory. He sets a precedent in that this is the first time that any member of the society has twice been elected to the presidential chair.

A ballot of members on the proposal to form a Register of Lighting Engineers was approved by a large majority.

On conclusion of formal business, Dr. N. A. Halbertsma, president of the International Commission on Illumination, delivered an address entitled "International Relations in Illuminating Engineering."

The next meeting of the International Commission on Illumination, the first since the outbreak of war in 1939, has been arranged to take place in Paris in September, 1948.



# Junior Boards of Management

## American Method of Training Young Executives

*In the following article is explained the McCormick system of training junior staff for executive positions. Its operation and advantages are discussed, while some of the results of the scheme are recounted.*

**T**RAINING schemes of various types have been developed in many progressive firms in this country, in some of which graduates from the universities have been introduced for special training to fit them for executive posts. This type of plan has shown both advantages and disadvantages. There is not always "room at the top" for the number of trained potential executives made available by the training courses, while the relations between the younger men from outside, and the older members of existing staff looking for promotion, have on occasion been difficult.

### MULTIPLE MANAGEMENT

In the circumstances it is of interest to discuss a scheme for training young executives from within the range of a firm, which has been tried out in the U.S.A. The plan is known as multiple management, and is outlined in the October, 1946, issue of "Factory Management and Maintenance." It is essentially a method of selecting and training men and women from all ranks within a firm for more active participation in management, and it has been applied in some 500 firms (mostly in the U.S.A., but some in Australia) of medium size, i.e., within the range of 100 to 5 000 employees. It is claimed that multiple management as a training school for higher executives has not only produced good calibre executives but has, at the same time, made significant improvements in management-labour relations.

In the scheme, the junior executive is regarded as a kind of pivot—as a man who because he is in touch with both top management and supervisors, can act as a two-way transmission centre for ideas, suggestions and interpretations of company policy and information. The scheme originated with Mr. McCormick of McCormick and Co., of Baltimore, who was appointed to take charge of a firm which had got into difficulties and was making losses. He was given a free hand to reorganise the firm. One of his first steps was to establish a junior board of directors with advisory powers, who had access to all company information and were entitled to put forward any suggestions and ideas for improvement after discussing company problems at constitutionally-held junior board meetings.

For this plan to succeed, it was necessary for higher management to initiate and encourage the idea and to give the junior board full access to company books, problems and operations. This board was to have no senior executives on it and was to work in complete independence of the ordinary management hierarchy. McCormick's first move was to call in seventeen young men holding junior executive and administrative positions in the firm, and to explain to them the company's situation, operations, etc. He made them into an official junior board and told them that he would welcome their ideas and proposals. He set only two limitations on their work: (1) all their recommendations must be unanimous, and (2) these must be approved before being put into effect. The board was to be advisory, not executive, but it would be free to discuss any problem and have any information it wanted.

The junior board elected its own chairman and secretary and set up its own operating rules, following parliamentary procedure. It held weekly meetings and was soon producing useful ideas and plans in the fields of sales, packaging and operation. Its work continued to be so successful that the company recovered from its deficit condition and commenced to make a profit. At the same time, there was a noticeable improvement in management-labour relations.

This system of a junior board has been developed in various ways. A number of firms have set up junior sales boards, consisting of salesmen, selected for their ability from among the junior ranks. Generally, the senior management makes the first appointments to the junior board and, later the members of the board elect further members.

### SIX-MONTHLY ELECTIONS

The McCormick Company holds six-monthly elections at which each board member rates every other member on a certain merit-rating plan, designed to gauge executive ability. The six members with the highest resulting "ratings" stay on the board and become a nominating committee to elect new members. A limit of two years consecutive service is imposed. The junior board has put into effect an

interesting "sponsorship" scheme which will interest those concerned with juvenile education. The scheme resembles the "Works Guardian" suggestions made recently by Lord Forrester. The junior board chooses a number of intelligent youngsters from the ranks and gives them a three-months "sponsorship" period. The youngsters work with three junior board members, spending a month with each one. The "sponsor" meets the youngster for whom he is responsible and, once or twice a week, has informal discussions with him. At these talks, a youngster may ask all kinds of questions about the firm, its policy, products, methods, etc. The sponsor has the responsibility of guiding his progress through the company and, as time goes on, each sponsor rates the youngsters whom he has taught, as candidates for future membership of the junior board. In this way, it is possible for a young man who stays with the firm to become a sponsor himself and to initiate and train others more effectively because of his own experiences. The ideas inherent in this scheme have been applied successfully in the U.S.A. to the training (or re-training) of men who have returned to a firm from the Services.

#### POSITION OF FOREMEN

Some firms have developed a junior board for production, called the factory executives board. It has the important quality of selection on merit so that numerous foremen have been put on these boards. The results have been that they have had the opportunity of mixing with management in discussing matters of mutual concern, and the foremen's prestige has been raised by the membership. The foreman obtains a knowledge of the inter-working of his department with others inside the factory, and both foremen and executives learn to appreciate each other's difficulties more clearly. This leads to the point where both groups learn to assist each other to solve these difficulties.

This arrangement is important to-day, for the foreman has seen great advances made by the men whom he controls, while his own position has not advanced to the same degree. His authority has been to some extent reduced by modern factory organisation with its planning department and various "paper" controls. Any constructive steps towards enhancing the foreman's prestige are to be welcomed, for he is, in essentials, part of management and he acquires his position and its authority through a lengthy experience.

It is said that McCormick's keenness in this matter was derived from his ex-

perience in the U.S. Navy during the 1914-18 war. Then, he learned to admire and appreciate the efficiency and capacity of the petty officers. When he returned to industry, he reasoned that the foreman was the "petty officer" of industry and should be treated as such—that he ought to receive the training, knowledge, incentives and prestige corresponding to the U.S. Navy petty officer. It is apparent that where this analogy has been put to test, the factory boards have justified it, have raised the status of supervisors and have made good use of the best men.

#### OPEN MEMBERSHIP TO BOARD

In some undertakings, the chairman of the factory board presides over a monthly meeting of employees at which questions about hours and operations are put to the board. If a worker is discharged, he may appeal to the board for a re-consideration of his case. Membership of the board is open to all junior executives and men who show merit, so that a cost accountant, a foreman or a truck-driver may become a member because of individual ability or originality of thinking, or special contributions to factory problems. In this respect, the scheme provides a genuine non-financial incentive to anyone who has ideas and capacity.

There may be several junior boards, sales, factory and administrative, inside a large undertaking. In these conditions, it is customary to hold a weekly or monthly meeting at which the higher management or the senior board of directors attend to discuss problems and to help the junior boards with advice and information. In some firms, the junior boards arrange a meeting for all employees to attend, at which the higher management give information about production and sales plans, results and problems. In other firms, there is the original feature of directors' fees for members of junior boards. Where profit-sharing schemes are in force, members of junior boards may receive some extra share of the bonuses declared.

#### DIFFERING CONDITIONS

The system of junior boards outlined is American in origin, and some of the features discussed may be more successful in U.S. industry than in the different conditions of British industry. However, the principles set out by McCormick are constructive and, in particular, the analogy between the petty officer and the foreman is significant and instructive. In a period of rapid change in industry where the basic importance of training and education is being realised to a far greater extent

than ever before, it is useful to study original ideas in this field.

There must be both failures and successes in applying the junior board scheme to industrial undertakings. However, "Factory Management" believes that there are certain general principles and rules which govern the successful application of the system. For a small firm of up to 100 employees, one junior board of about seven persons appears satisfactory. For a larger firm, of about 1 000 employees, three junior boards are suggested, namely, a junior executive board, a junior sales board and a factory executive board, each having from 10 to 15 members. The selection of the first board should be made by the higher management, who must be in a position to know who are its most intelligent and wide-thinking men and women. Usually, about half of these people can be put on to a board (or on to the boards required), and the remaining half are available for subsequent elections in rotation, on some merit rating plan. Sponsorship and training courses, established by the junior boards, should be employed to find out the potentialities of younger men and women and of newcomers imported into the factory.

The powers of junior boards must be limited to making recommendations to the chief departmental heads and to the senior board. Junior boards should adopt Parliamentary procedure for their meetings, with standing committees to deal with various problems. Often, there are permanent committees to deal with such matters as safety and production. In labour relations junior boards must not interfere with established methods of working but may act to supplement existing lines of authority.

Evidently, for this method of training junior executives and others to succeed, there must be good personnel relations inside a firm and a feeling of confidence in the management. In an organisation of 100 people there are 100 people who have something to contribute to the efficiency of that organisation; there are, however, perhaps, 20 who have a great deal to contribute. What are the best ways and means of getting those extra contributions and enabling the potentially creative minds and potential leaders to produce their best work? It is in seeking answers to this question that one should examine the system of junior boards as an auxiliary to enlightened personnel management.

## The Organisation of Research Laboratories

THE desirability of a research laboratory being in close touch with the manufacturing industry it was set up to serve was one of the points made by Sir Clifford Paterson, director of the G.E.C. Research Laboratories, in a paper read before the Royal Society recently.

In his own laboratories, Sir Clifford said, there were over 1 000 people, of whom professional scientific and engineering staffs numbered about 250. The laboratories had three main functions: to give scientific advice to the factories and departments of the company; to carry out such longer term researches as would ultimately benefit industry; and to join in any outside activities which might help the professional life of the general community.

The essential fact was that the whole organisation of the laboratory was directed towards giving the company scientific advice, in all ways in which an up-to-date laboratory might help them. This seemed to be a reversal of the more usual set-up in which the industrial research laboratory kept all its thoughts upon new products or processes, but an intimate knowledge of the existing products and processes of an industry formed the most effective

vantage point for the right sort of long and short term researches.

Sir Clifford said that in his laboratory there were some 34 separate research groups nominally responsible to the director. Each group had regular meetings with their opposite numbers from the factory which the group served. This much assisted in the guidance of work. Some of the groups had nucleus production facilities within the laboratory, the test of every new development being in the making of something. The mere making of an article or demonstration of a process could be relatively unimportant compared with putting it into uniform production.

After outlining some of the researches which his laboratory had successfully undertaken since its formation in 1919, Sir Clifford spoke briefly of quality control and operational research and concluded by referring to the stimulating reaction which he believed most research workers felt by being in contact with the actual application of their work, and the progressing of investigations from their early stages in co-operation with the individuals who had to implement them and make them serviceable.

# Speed Control of D.C. Motors

## A SIMPLE SECTIONAL DRIVE SYSTEM

NEW principles are involved in an electric sectional drive developed by the Metropolitan-Vickers Electrical Co., Ltd., to give the accurate speed control of d.c. motors demanded by paper-making machinery, printing presses, linoleum calenders, and so on. The new system

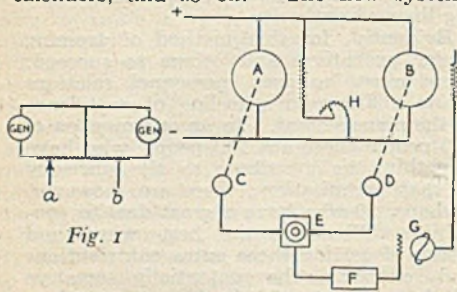


Fig. 1

Fig. 2

has been applied to a large calender, using the existing motors and starting gear and the results, after six months' service, it is claimed, show that the equipment, though extremely simple, gives high sensitivity combined with stability.

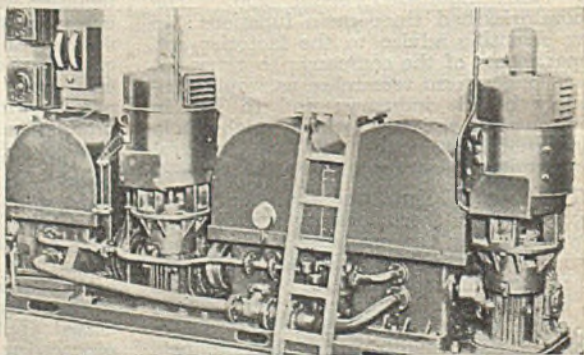
A tachometer generator (Fig. 1), producing a voltage proportional to its speed, is direct-coupled to each motor, and the two outputs are connected in opposition across a potentiometer. If the two voltages developed are equal and the sliding contact *a* is adjusted symmetrically with relation to the fixed connection *b*, there will be zero voltage across *a b*. Should there be a change in speed of either motor, however, the resulting change in generator voltage will appear across *a b*, and this voltage is amplified and applied to the motor field to restore synchronism. If a permanent difference in speed between the two motors is required, the sliding contact *a* is adjusted to give zero voltage *a b* at the desired motor speeds; any variation in the relative speeds of the two motors produces a voltage across *a b*, which restores the original speed relationship as before.

In order to maintain the relative speeds of the two motors with an accuracy of a fraction of 1 per cent. under all conditions, the voltage signal across *a b* requires high amplification, which is effected in

two stages. The first is an electronic amplifier, employing hard valves, and the second is a Metadyne generator, which requires only a minute exciting current and gives an extremely rapid response to changes in excitation, thus forming a suitable link between the output of the electronic amplifier and the field of the main motor.

In the case of the calender drive installation, each section is driven by a 25 h.p. variable speed d.c. motor designed to give a speed range of over 3:1 by shunt field control. It was decided to leave one motor under manual control and to design the control equipment so that the second motor followed the speed of the first. While with this system any inadvertent speed fluctuations of the leading motor would be followed by the controlled motor, it has the advantage of halving the cost and complication of the scheme compared with the independent control of each motor to a common reference.

The control system adopted is shown schematically in Fig. 2. The leading motor A and following motor B are fitted with voltage generators C and D. The leading motor is controlled by the field rheostat H. The potentiometer E provides for relative speed adjustment, and the electronic amplifier F and Metadyne generator G apply the control voltage to the shunt field of B. In the illustration the voltage generators are seen mounted on top of the vertical spindle main motors, while the control station and field regulators are on the extreme left.



A large calender fitted with the new Metrovick electric sectional drive

# In Parliament

## Bankside Scheme Debated—Minister's Assurance On Fumes

**Bankside Station Scheme.**—Considerable disagreement, some of it by Government supporters, was expressed in the House of Commons when Mr. Silkin, Minister of Town and Country Planning, announced at the end of the debate on the proposed power station at Bankside that: "Having reconsidered the whole matter in the light of the discussions that are taking place, the Government feel obliged to adhere to its decision, and I propose to give consent to the erection of this power station, subject to the conditions which I have laid down."

The motion had been put by Mr. Wilson Harris, who claimed, in the course of his speech, that the project, if allowed to continue, would deal a shattering blow to town planning. He did not suggest that a power station need be unsightly and there was nothing finer, in its situation, than the station at Battersea. But industry was the one thing which it was desirable to keep out of the Bankside site because part of the conception was that the area should be kept for residential, recreational, education and cultural purposes, and industry left to the area below London Bridge.

The House had been told by the Minister of Fuel and Power, Mr. Harris continued, that the effect of the change from coal to oil would increase the cost of production by between £400 000 and £500 000 a year. If that sum were capitalised at 2½ per cent. the cost of station would be increased by either £16 million or £20 million, which was substantially more than double what the cost of erection would have been in the first place.

After supporters both of the Government and Opposition had further spoken against the Scheme, Mr. Silkin rose to reply.

He had read every word of the evidence presented at the public inquiry, he said, and had come to the conclusion that, with the safeguards that had been incorporated in the decision, it was in the interests of London that a power station should be built at Bankside. It had not been seriously contended during the debate that the station would overshadow St. Paul's, or rival it in any way.

At this point, Sir Arthur Salter intervened to ask whether the Minister would promise, before he allowed the scheme to go forward, to publish authoritative expert evidence to show that sulphur fumes, in conjunction with the atmosphere, would not damage the fabric of the cathedral.

In reply, Mr. Silkin gave the assurance that he was proceeding on the basis that there would be a satisfactory solution to the sulphur problem and that, in fact, there would be no injurious effect. He asked the House to deal with the proposal on that assumption. If it were wrong, then he freely admitted that the case would go.

Continuing, the Minister said that it had been claimed that the Bankside area had been zoned as a cultural centre for colleges and educational institutions, but the fact remained that the County of London plan provided for offices and flats, with light industrial buildings behind. He failed to see how a building of the kind proposed could be incongruous or offensive.

Mr. Silkin then reviewed the need for an increase in generating capacity, by 1951, of 67 per cent. and stated, in conclusion, that unless the site could be used, the Greater London area would go short of electricity. Subject to the conditions he had laid down, he proposed to give his consent to the erection.

Among questions of electrical interest raised in Parliament during the week were the following:

**New Station Sites.**—Sir G. Jeffreys asked whether, in view of the successful experiences in New Zealand, the Minister of Fuel and Power had considered generating power close to the coal mines and carrying it to London and elsewhere by means of the grid. Replying, Mr. Shinwell stated that he understood the principal source of electricity in New Zealand was water power. The question of generation at coalfields in Great Britain had not been overlooked, but he was advised that it was more economical at present to transport coal to London and the South Coast by sea than it would be to transmit electricity from the coalfields supplying those areas.

**Generator Exports.**—Replying to Mr. York, the President of the Board of Trade said that the value of generators of more than 200 kW capacity exported during January, February, March and April, 1947, totalled respectively £402 212, £437 241, £166 524 and £692 239. It would not be practicable to divert current export orders to home use, but arrangements had been made to give preference to orders for home power plants. The particular articles exported were not suitable for the home market, and had been made for export orders.

# Electricity Bill in Committee

## Discussion Completed—Bill Ready For Report Stage

THE Standing Committee stage of the Electricity Bill was concluded on Thursday, May 22, and the Bill is now ready to be reported to the floor of the House. The examination of the Bill had been completed according to schedule in the ordinary manner of Parliamentary procedure, and without the aid of the guillotine.

At the end of the proceedings, Mr. R. S. Hudson thanked the Government for the "small concessions it had made to the overwhelming arguments of the Opposition." In reply, Mr. Shinwell, Minister of Fuel and Power, declared that although there was a fundamental difference of opinion on the Bill, there had been nothing in the nature of obstruction during the Standing Committee discussions.

### MORTGAGES AND DEBENTURES

The week's proceedings opened with a resumption of the Opposition attack on the Government's decision to include debentures in the securities to be taken over at Stock Exchange prices.

After Mr. Gaitskell had repeated the Government view that debentures were quoted securities and should be treated as such, while mortgages, being unquoted, were treated differently, the Committee divided on the amendment—to leave debentures out of the securities taken over at Stock Exchange values—which was defeated by 18 votes to 8.

Moving a new clause designed to bind the Central Electricity Authority to take over the loan capital of the Central Electricity Board and the joint electricity authorities and repay them and pay the interest charges in accordance with the terms of their issues, Mr. Nigel Birch said that the Government should see that the commitments of these concerns were fully honoured.

These statutory bodies, he complained, had been treated the same as the companies, with compensation based on share values, whereas they precisely resembled the local authorities. Under Clause 20, he pointed out, it was laid down that no contract made by a local authority should not be honoured, but in the case of the C.E.B. and the joint authorities their loan capital was being taken on a basis that completely disregarded the terms of issue.

To these criticisms, Mr. Gaitskell maintained it was not true that these stockholders were being defrauded, and he went on to quote a number of yields on the new stock to be issued—taking a 2½ per cent. rate as his basis—showing that

holders would be better off. He took redemption yields as the figures for the old stock. He also pointed out that not a single protest had been received from the holders of these stocks. He admitted that these statutory bodies were, perhaps, border-line cases, although he did not propose to do anything about it. The new clause was rejected.

To a new clause put forward by Mr. Foster to protect the non-statutory undertaking not nationalised against "economic pressure," Mr. Shinwell agreed to put forward a new clause on the Report stage, providing that after a certain date any such concerns that incurred capital expenditure, with the Minister's approval, within a specified period might serve notice on the Central Electricity Authority to be taken over. If compensation was not agreed on then it would go before an independent tribunal.

A new clause added by the Government gives power to the Minister of Fuel and the Secretary of State for Scotland to increase the sums payable to the North of Scotland Hydro-Electric Board in respect of bulk supplies outside its area. An investigation will be made in 1953 with a view to procuring alterations from time to time in the prices payable to the Scottish Board. When the clause was introduced, Mr. R. S. Hudson described the Government's methods as being "hole and corner." The effect of the new clause, it was pointed out, may be to increase the charges payable by consumers outside the North of Scotland area.

On the final day of the Standing Committee, the Government rejected a large number of Opposition amendments to the Third Schedule designed to continue protection afforded to the consumer under previous Acts, and now to be repealed.

### MINISTER'S COMMENTS

On an amendment to include the comments of the Minister in the annual report of the Central Authority when it came before Parliament, Mr. Gaitskell promised that consideration would be given to the point before the Report stage.

In the last few minutes of the proceedings, Mr. Glenvil Hall introduced a new Government clause dealing with the issue of British Electricity stock. This clause, he said, implemented undertakings given earlier, and would provide that share certificates of electricity companies should be treated as if they were the new British Electricity stock until the corresponding new document was issued.

# STARTING MARINE AUXILIARIES

## RECENT DEVELOPMENTS IN "PLURAL STARTER" SYSTEM

**M**ANY industrial processes call for continuous running of a number of motors over lengthy periods. In the case of ships' engine room auxiliaries, the starters, having once started up the motors, may not be used again during a whole voyage. These individual starters occupy valuable deck space and for the many motors above 20 H.P. are of substantial size.

For many years the G.E.C. plural starter system has dealt with this problem by enabling a single starter to operate a number of motors. Over forty such installations have already been made in vessels and a number of others are now in course of construction.

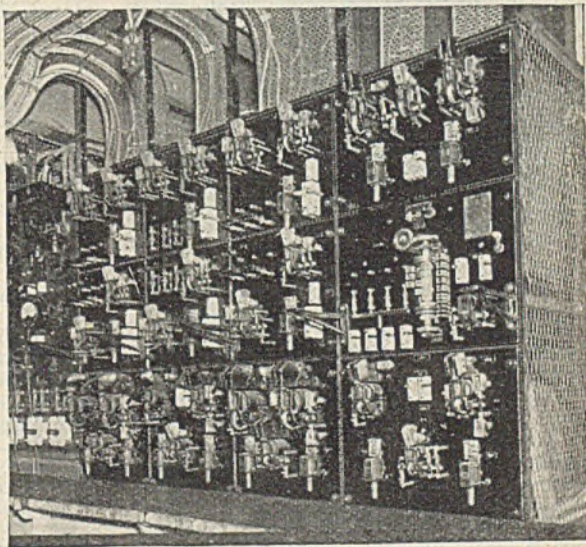
The number of motors controlled by the plural starter varies according to the requirements of each case. In the 10 000-ton m.v. "Somerset," of the Federal Steam Navigation Line, for instance, a single plural starter operates 11 motors varying from 8 H.P. to 40 H.P. Recent improvements have resulted in considerable simplification of the system and also in extending the range of motor sizes which can be controlled. Although primarily designed for starting d.c. motors, it can in many cases be employed with a.c. motors, other than those arranged for star-delta starting.

The component units of the system are, firstly, a motor control unit mounted directly on the motor and containing the "start" and "stop" push buttons, indicating lamp and isolating links. Each unit has its open-type contactor panel, all the panels being mounted on one framework, usually as an extension of the main switchboard.

The common or "plural" starter itself consists of the starting resistance and a motor-driven drum controlled by a pilot contactor. The drum has two driving motors with a selector clutch so that either motor may be used.

The drum motor has two field windings, one connected across the armature and the other across the main resistance. When a small motor, or a motor starting against light torque, is started up, the voltage drop across the resistance is very

small and of short duration. Thus the field of this separately excited winding is weak and the drum motor runs near its maximum speed. When, however, the motor being started is large or is to be started against a heavy torque, there is a considerable voltage drop across the resistance, resulting in a strengthening of the



*Plural starter switchboard on the 10 000-ton m.v. 'Somerset,' showing contactor panels and the motor-driven common starter drum*

separately excited field, so that the drum motor runs at reduced speed, and the machine is started up more slowly.

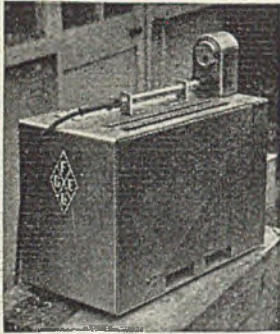
In operation, the "start" button is closed, the starting and negative line contactors close, and auxiliary contacts on these contactors start up the drum motor by means of the pilot contactor. As the drum revolves the resistance steps are cut out until the drum has made one revolution, by which time the motor driven auxiliary is up to speed. The positive line contactor closes and the starting contactor opens, so that the motor is connected direct to line and the common starter is disconnected and is ready to start up another motor.

Provided that the number of motors to be controlled is sufficient to warrant its use, this method of plural starting not only economises space, but reduces cost and many other applications will be apparent.

# Equipment and Appliances

## Three-Purpose Garden Unit

The "Alpha" electric garden unit, produced by Farm and Garden Electrification,



"Alpha" electric garden unit

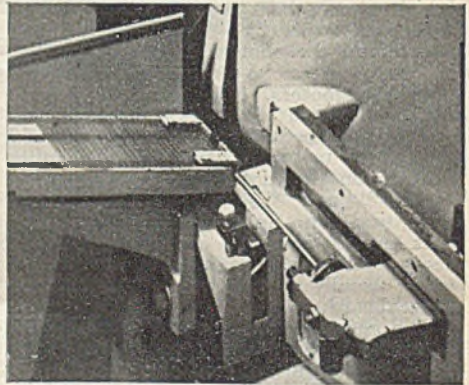
Works, Havelock Road, Middlesex, combines the functions of a greenhouse heater, soil steriliser and bulb and root pasteuriser. It consists of a strong, diagonally divided metal box, the upper half of which forms the cover and is so arranged that it cannot be removed until all electrical connections have been broken. Inside the box, mounted on Bakelite insulators, are two galvanised angle steel support rails, used as conductors, upon which one or more heating elements may be placed when the unit is employed for greenhouse heating. When either of the other operations is being carried out, the soil sterilisation box, or the pasteurisation tank, also rests on these rails. The heating elements are rated at 500 W each, and a maximum of four can be used. Provision is made for free circulation of the heated air. The metal sides of the soil box, which will hold half a cu. ft. (1 cwt.), constitute the electrodes, and a fitted ammeter permits easy observation of the sterilisation process. The water tank, also of half a cu. ft. capacity, has two elements—one designed to raise the temperature of the water to 110° in about twenty minutes, and the other to hold the temperature at this value during the pasteurisation period, when the initial heater has been switched off. An insulated aperture is provided in the cover to accommodate a special thermometer.

## Automatic Form Grinding

An example of the trend in automatic centreless form grinding is provided by Arthur Scrivener, Ltd., of Birmingham, in a machine working upon a patented controlled cycle, and employing a hydraulic slide. The whole grinding operation is performed automatically from the loading of the piece to its final ejection, provision being made for reducing or in-

creasing the cycle time. The work of the operator is confined to keeping the magazine charged with work. The magazine consists of a sloping chute on which the pieces are loaded. These descend by gravity to a position ready to be pushed on to the workplate between the wheels. As the controlled-cycle slide recedes and opens the wheels, the movement advances the pusher, which in turn actuates the override arm. This latter, through the intermediate counter-weighted shaft, advances the pusher rod, thus moving the bottom piece from the magazine on to the workplate between the wheels. The advancing piece ejects the previous finished piece during this movement, and is located by a stop which is interposed at this point. The controlled-cycle slide then advances the control wheel and work up to the grinding wheel, holds the piece there until the requisite amount of stock is removed and the piece formed, after which the slide (on its return stroke) opens the wheels, and the cycle is repeated. A Scrivener No. 1 controlled-cycle machine, it is claimed, automatically grinds form pieces .190 in. diameter by 3 in. long with a stock removal varying from .005 in. to .010 in. at the rate of 600 pieces an hour.

Pointing out that the present labour situation has increased the popularity of automatic machines, the makers state that there is an increasing appreciation in many industries of the important part which



View of the magazine for loading pieces to the controlled cycle centreless form grinding machine

centreless grinding can play in ensuring economical production of small parts to close tolerances and in a range of surface finishes.



# Electricity Supply

**Coal Statistics.**—As may be seen from the accompanying graph, consumption of coal at power stations declined appreciably during the first weeks of May and also showed for the first time a considerable decrease compared with the figures for the same weeks of last year. On May 5, during the week in which the fall in consumption was most pronounced, the statutory ban on space-heating was applied to Central and Southern England. In the following week, when the trend continued, the ban was extended to cover the whole of England, Scotland and Wales. Similarly, an improvement in power-station coal stocks is recorded in figures issued last week-end by the Ministry of Fuel and Power. Compared with 1 728 000 tons held at the end of March this year, and 1 170 000 tons in April, 1946, stocks at the end of April had risen to 2 006 000 tons. Stocks held by industrial consumers, however, were lower in all

Council is to build a new sub-station at a cost of £6 635, which will include £950 for the building work, £2 685 for underground



*The stand of Birmingham Electric Supply Department at the Castle Bromwich Section of the British Industries Fair demonstrated, by means of models, photographs and actual apparatus, the progress of the supply industry in general and the city undertaking in particular. Applications of electricity which were represented ranged from farming equipment to medical apparatus, and an illuminated wall map showed the growth of the undertaking's area of supply*

mains, and £3 000 for plant and other equipment.

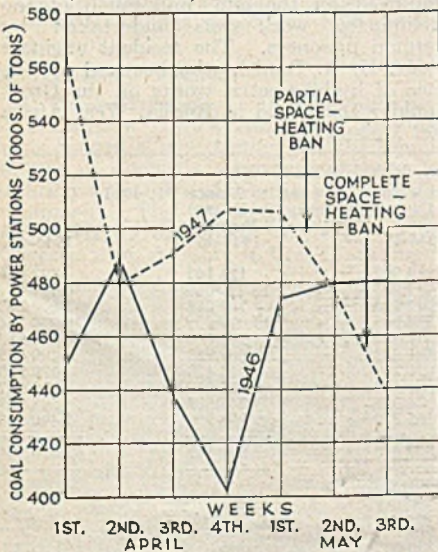
**Birkenhead.**—Three new street-lighting schemes, costing altogether £37 000, are under consideration.

**Basingstoke.**—Fluorescent street lighting is to be installed on a housing estate at South View.

**Maidenhead.**—In order to avoid a heavy bank overdraft on the electricity account, the Town Council has taken up a loan of £20 000 at 1 per cent. per annum.

**Shoreditch.**—To celebrate the jubilee of the undertaking, which was inaugurated on June 28, 1897, the Council have approved a civic dinner and a social evening for employees of the electricity department and their wives. An exhibition dealing with the activities of the undertaking during the last 50 years will also be held in connection with the jubilee, and there will be an inspection of suitable works of the department by conducted parties of senior schoolchildren. A commemorative brochure is being prepared for the occasion.

**Oldham.**—The Electricity Committee is asking for a loan of £44 630 for a scheme to provide additional inter-connecting capacity between the Chadderton and



*Power station coal consumption of recent weeks compared with the same period last year*

branches of industry than in April, 1946, although there was some improvement over the figures for March.

**West Hartlepool.**—A £25 000 rebate from the North-Eastern Electric Supply Co., Ltd., to the Town Council is being passed on to consumers in the form of a special 33½ per cent. discount during the six months ending October 31. The Town

Greenhill power stations. The scheme will involve the substitution of the existing 8 000 kVA transformer at Chadderton by one of 20 000 kVA, the removal of the displaced transformer to a sub-station at Greenhill, the provision of the necessary switchgear, erection of a sub-station building, cable connections and fire protection.

**York.**—Automatic reclosing circuit-breakers are to be installed on the 11 kV network at certain sub-stations in order to reduce interruptions to rural supplies, at an estimated cost of £1 567.

**Shetland Islands.**—The North of Scotland Hydro-Electric Board has taken over the electricity undertaking of Lerwick, capital of the islands, which was inaugurated 16 years ago and has cost £60 000. Speaking at the ceremony, Mr. Tom Johnston, chairman of the Board, said that the Town Council was making a wise move in handing over the undertaking to the Board, for although the power had been most efficiently conducted under it, the Council would not have been able to do what the Board intended to do—supply the whole of the rural population in Shetland with electricity.

**Eire.**—The Electricity Supply Board in Dublin has embarked upon a rural electrification scheme. The Board will determine the order in which areas will be developed, the rule being that no second area must be developed in any one county until one area has been developed in each

of the 26 counties of Eire and that the "best" area in each county must be developed first. The "best" area is defined as the area where the ratio of estimated annual revenue to the estimated capital cost is greatest. These areas will in most cases be those in which large potential consumers are situated or which are crossed by one of the E.S.B.'s existing 10 kV lines.

**Leyton.**—The jubilee of the electricity undertaking, which fell due in September, 1946, will be celebrated by a civic luncheon to be held at the Town Hall, Leyton, on June 14. Following this, Mr. Emanuel Shimwell, Minister of Fuel and Power, is to perform the official opening ceremony of the new electricity showrooms and service centre in High Road, Leyton.

**Scotland.**—Excavations for the North of Scotland Hydro-Electric Board's generating station at Loch Sloy have been largely completed. The scheme has involved a whole series of local developments, including the opening of a new sand pit at Balloch, from which barges tow up to Inveruglas, where a new service road from Loch Lomondside is now practically completed. Some 1 200 men are employed on the site, and much of the preliminary work was undertaken by German prisoners. The resident engineer is Mr. H. A. Daniel, who has had experience of hydro-electric works on the Great Boulder Dam, and in Russia, West Africa and Ireland.

#### ELECTRICITY COMMISSION LOAN SANCTIONS

AMOUNTS SANCTIONED FOR THE THREE YEARS FROM APRIL 1, 1944, TO MARCH 31, 1947

(A) PUBLIC AUTHORITIES (EXCLUDING CENTRAL ELECTRICITY BOARD)

ITEM	PERIOD		1946-47
	1944-45	1945-46	
Purchase of property ... ..	£ 13 907	£ 124 165	£ 322 556
Buildings (generation purposes) ... ..	6 711 285	10 710 085	6 799 906
Buildings (distribution purposes) ... ..	42 734	789 258	1 618 303
Plant (generation purposes) ... ..	20 323 383	19 077 935	19 239 336
Plant (distribution purposes) ... ..	593 327	2 381 948	4 854 982
Mains and services ... ..	491 422	3 667 759	8 299 475
Meters and instruments ... ..	31 249	246 418	679 128
Wiring installations ... ..	1 107	16 009	80 017
Apparatus ... ..	24 034	245 500	594 788
Other purposes ... ..	105 370	393 298	1 490 103
<b>Total</b> ... ..	<b>28 337 818</b>	<b>37 652 375</b>	<b>43 978 594</b>

(B) CENTRAL ELECTRICITY BOARD

	£	£	£
Purchase of property ... ..	—	—	—
Buildings (distribution purposes) ... ..	200 000	—	—
Plant (distribution) ... ..	230 000	—	—
Mains ... ..	400 000	—	—
Civil Defence ... ..	100 000	100 000	—
Generating stations ... ..	1 075 000	—	—
Other purposes ... ..	20 000	—	—
<b>Total</b> ... ..	<b>2 025 000</b>	<b>100 000</b>	<b>—</b>

(C) TOTAL AMOUNTS SANCTIONED DURING EACH QUARTER

	£	£	£
April 1-June 30 ... ..	1 067 578	16 792 980	8 816 821
July 1-Sept. 30 ... ..	5 801 894	4 035 003	18 414 206
Oct. 1-Dec. 31 ... ..	8 070 946	10 337 392	8 231 878
Jan. 1-Mar. 31 ... ..	15 422 400	6 587 000	8 515 689
<b>Grand total</b> ... ..	<b>30 362 818</b>	<b>37 752 375</b>	<b>43 978 594</b>

# Industrial Information

## Anglo-Belgian Exhibition

An exhibition will be held in the Salle de la Madeleine, Rue Duquesnoy, Brussels, from September 4 to 9, inclusive, this year, to show the products of British manufacturers to buyers for the European markets. It is being organised by H. and H. Trading (London), Ltd., of 5, Copthall Buildings, Copthall Avenue, London, E.C.2 (Telephone: Monarch 7876/7), and designed by Ian Jeffcott.

## B.S.S. for Magnesium Alloys

The British Standards Institution has published a specification, B.S. 1350—1357:1947 covering magnesium alloys in the following wrought forms: (i) Forgings, press forgings and stampings. (ii) Sheet and strip. (iii) Bars and sections. (iv) Tubes. Each of the four sections is complete, and contains clauses covering chemical composition, mechanical properties, and test requirements. This specification follows the publication in 1945 of B.S. 1272-1280 for magnesium alloy in the form of ingots and castings, and it is hoped to publish a further specification for a series of alloys based on high purity magnesium.

## New Factory Opened

At Calne, Wiltshire, C. H. Blackburn and Co., Ltd., of Gray's Inn Road, London, have opened a new factory for the manufacture of domestic electric appliances, in addition to immersion heaters and hospital equipment. The opening ceremony was performed by the Mayor of Calne, Coun. Thomas, who, in reply to Col. Blackburn's

inauguration speech, welcomed the new industry, in the hope that it would bring prosperity to his town. For his executive staff, Col. Blackburn has selected ex-

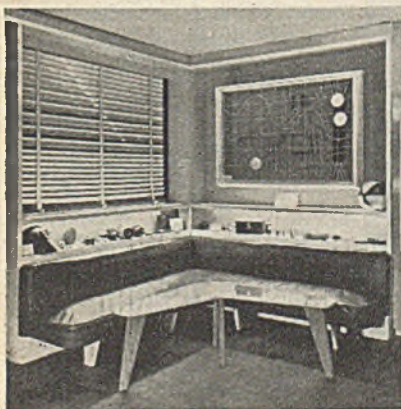


COL. BLACKBURN showing an immersion heater to the Mayor of Calne who opened a new factory for C. H. Blackburn and Co., Ltd.

Servicemen. The chief engineer, Mr. B. C. Elliot, was a technical Flight Lieutenant in the R.A.F., and the works manager, Mr. A. P. F. Rogers, was a Major in the Royal Engineers.

## Cable Trunking

A reader has asked to be supplied with the name of the manufacturers of "Zed-lock" cable trunking. Can any other reader assist?



On the left is shown the right-hand corner of the stand of Bakelite, Ltd., at the B.I.F. London. The wall design is a three-dimensional work carried out in Vybak covered wires and cables. The table and venetian blinds are constructed from Waverite laminated plastics. On the right is a view of the stand of the company in the electrical section of the B.I.F. at Birmingham. Waverite laminated plastics were used for the doors and shelving

### Lighting a Children's Library

Having secured from the Kensington Borough Council the contract for lighting the Children's Library, at North Kensington, Thorn Electrical Industries, Ltd., utilised their new Atlas FU/0080 enclosed ceiling fittings for the installation. These incorporate fluted Perspex diffusing covers, the units being self-contained with easy access to starter gear and tubes. Atlas 80 W "warm white" fluorescent tubes were used with the fittings.

### Change of Address

The supply department of the Donovan Electrical Co., Ltd., has moved from Flaxley Road, Stechford, Birmingham, 9, to 76-82, Granville Street, Birmingham, 1, which will in future be the address of the head office and warehouse. The works remain at Northcote Road, Stechford, Birmingham, 9.

### Dublin Branch of E.I.B.A.

At the annual meeting in Dublin of the branch of the Electrical Industries' Benevolent Association, it was stated that there were 614 members and associate members. Revenue at £716 5s. 6d. ex-

ceeded the 1945 figure by £175 12s. 4d. and was a record. Total expenditure of £857 9s. exceeded 1945 expenditure by £157 13s. 6d. There was a deficit of £144 3s. 6d. The chairman is Mr. J. A. McConnell (Roche and McConnell, Ltd.).



*Atlas fluorescent lighting fittings with fluted Perspex diffusing covers at the Children's Library, North Kensington*

The Electricity Supply Board had subscribed £300, the Electrical and Allied Trades' Golfing Society £33 10s., and the proceeds of an annual raffle and the Electricity Supply Board's staff dance amounted to £78 19s. 7d.

### New Coil-Winding Department

Bruce Peebles and Co., Ltd., Edinburgh, have made a large-scale extension to their transformer shop at East Pilton works by the addition of a new coil-winding department which is considered to be among the largest and best equipped in the country. It is a lofty, light, and airy building, with neat rows of pleasingly coloured, quiet-running machines, arranged according to their place in production with a most effective use of area, and clear gangways. The operators have the advantage of every modern convenience and facility in carrying out the work assigned to them. The lighting and heating arrangements are admirable, and there is ample individual working space. The new department is now in full operation.



*New coil-winding department at the East Pilton works of Bruce Peebles and Co., Ltd.*

ceeded the 1945 figure by £175 12s. 4d. and was a record. Total expenditure of £857 9s. exceeded 1945 expenditure by

### Lighting in Industry

"A Memorandum on Lighting in Industry," prepared by the E.L.M.A. Light-

ing Service Bureau, and just published, is based on a report submitted by the Lighting Service Bureau to the various Working Parties set up by the President of the Board of Trade. Owing to the paper shortage a limited number of the booklets has been produced, but free copies will be presented by the Lighting Service Bureau to industrialists and members of the electrical industry who can show that the memorandum will be of assistance to them. The first post-war illumination design course to be held in Glasgow has been arranged as a complete refresher course for the electrical industry to take place at the E.L.M.A. Lighting Service Bureau of Scotland, 29, St. Vincent Place, on June 3, 4 and 5. It will be opened by Mr. J. M. Anderson, chairman of the L.S.B.S. Committee, at 9.45 a.m., on June 3. The lecturers will be Messrs. A. D. S. Atkinson, C. J. King (the new area engineer in Scotland), E. B. Sawyer, W. Robinson and T. O. Freeth.

### **I.E.E. Members at Pitlochry**

Members of the Institution of Electrical Engineers on May 24, visited the area of North of Scotland Hydro-Electric Board, and inspected the Tummal-Garry Scheme at Pitlochry. A special souvenir booklet was prepared by the Board wherein are described and illustrated the various constructional schemes.

### **Presentation of Technical Information**

At the request of many people who were unable to gain admission to his lectures on "The Presentation of Technical Information," at University College, London, Prof. R. O. Kapp will repeat the course on Mondays, June 2, 9, 16 and 23, at 5.30 p.m., at the I.E.E., Victoria Embankment, W.C.2. Admission will be free.

### **Breaking Records**

Celebrating the success of their production drive to catch up on losses sustained during the fuel crisis, Hoover, Ltd., held a fête for their employees at their Perivale factory on Saturday, May 24. All records of the company were broken during the six weeks' "Forward to Prosperity" campaign and production was 30 per cent. higher than what had hitherto been considered a good normal output. The number of cleaners manufactured was double the pre-war production.

### **Diesel Electric Sets**

In connection with the scheme for the production of Diesel-electric sets, referred to in our issue of May 16, we are asked to state that firms wishing to purchase sets should communicate direct with the makers concerned in this programme, *i.e.*, Davey, Paxman and Co., Ltd., Colchester, for 65 to 330 kVA sets, and Associated

British Oil Engines, Ltd., for sets of 65 kVA. Firms who wish to claim preference for delivery of these sets should give full details of the work they are doing to the Regional Controller of the Ministry dealing with their products, when placing an order with the suppliers.

### **E.D.A. Sales Conference at Edinburgh**

The first post-war sales conference organised by the E.D.A. in Scotland, which opened in the Edinburgh electricity showrooms yesterday, May 29, and will conclude to-morrow, attracted some 50 delegates to each session. Four new films, for use in schools, are being shown. These are "Generation of Electricity," "Distribution of Electricity," "Simple Home Repairs," and "The Electric Iron." To-morrow morning the party will visit the Portobello power station and the Lothian Electric Power Co.'s distribution system. Yesterday, with Mr. J. F. Field, city electrical engineer of Edinburgh, in the chair, Mr. R. Lonsdale, deputy burgh electrical engineer, Paisley, was to speak on "Electric Water Heating," and Mr. J. G. Curtis, deputy burgh electrical engineer of Kirkcaldy, on "Operation of a Service Department of an Electricity Undertaking." Mr. C. H. A. Collyns, general manager of the Lothians Power Co., was to preside for a lecture to be given by Mr. W. Duncan, consumers' engineer, Edinburgh Corporation, on "Electrical Installations, Particularly in Housing Schemes," and another by Mr. A. B. Mavor, consumers' engineer, Lothians Electric Power Co., on "Problems of the Sales Engineer in Rural Areas." Two members of Dundee electricity department, Messrs. R. S. Goddard and G. Fowler, contribute "Problems of the Sales Engineer in the Town."

### **Trade Publications Received**

The first comprehensive post-war catalogue to be published by the British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, lists all lamps on the company's present manufacturing programme. Leaflet 813 gives details of all Mazda lamps for domestic lighting purposes.

The latest publications of the Sun Electrical Co., Ltd., 118-120, Charing Cross Road, London, giving details of their switch and fuse gear, Sunco flexibles and wires, and decorative lighting fittings, and a schedule of price advances and alterations for the company's installation supplies catalogue.

A new catalogue from the Bowthorpe Electric Co., Ltd., Goodtric Works, Brewer Street, Oxford, giving full details of their overhead line fittings, including new insulated line taps and Bowthorpe-Hartley neutral links; and a leaflet giving full particulars of their cable ferrules.

# Contracts Open

**WE** give below the latest information regarding contracts for which tenders are invited. In the case of overseas contracts, particulars are to be had from the Board of Trade, Millbank, London, S.W.1 (corner Horseferry Road), unless otherwise stated:—

**Brighton, June 2.**—Supply and delivery of low voltage p.i. mains cable for one year from July 1, 1947. Particulars from Engineer and Manager, Corporation Electricity Department, Electric House, Castle Square, Brighton, 1; deposit, £1 ls.

**Bromley, June 3.**—Supply and delivery of l.t. cable, p.i.l.c. and s.t.a., 660 V; e.h.t. cable, p.i.l.c. and s.s.w.a., 3 300 V, 11 00 V; l.t. pilot cable, p.i.l.c. and s.t.a., 660 V; three 750 kVA, 10 000/415/240 V three-phase static transformers. Specification from Borough Electrical Engineer, 1, West Street, Bromley, Kent; deposit, £1 each.

**Melbourne, June 4.**—Supply of porcelain disc insulators for 220 kV transmission lines, for State Electricity Commission of Victoria. Particulars from Agent-General for Victoria, Victoria House, Melbourne Place, Strand, London, W.C.2; deposit with tenders, £25.

**Southport, June 7.**—Supply to Gas Department of one new or second-hand five-ton electrically-driven lifting unit to be attached to an existing hand-operated travelling beam (220 V d.c.). Particulars from General Manager, Gas Offices, 91, Eastbank Street, Southport.

**Plymouth, June 7.**—Supply and delivery of alkaline batteries for switchgear closing and tripping, and interlocking warning tiles for underground cable protection. Specifications from City Electrical Engineer, Armada Street, Plymouth.

**Brighouse, June 9.**—Supply and delivery of two 11 000 V switchboards. Specification from Borough Electrical Engineer, Huddersfield Road, Brighouse.

**West Hartlepool, June 10.**—Supply and delivery of eight 500 kVA, single-phase, 50 cycles, 5 760/490/245 V transformers. Specification from Borough Electrical Engineer, Electra House, Church Street, West Hartlepool.

**Littleborough, June 11.**—Supply and delivery of two 1 000 kVA transformers and e.h.t. underground cables. Specifications from Electrical Engineer and Manager, Council Offices, Littleborough.

**Middlesbrough, June 11.**—Supply and installation of public address system in the Town Hall. Specification from Town Clerk, Middlesbrough.

**Plympton St. Mary, June 14.**—Supply, testing and delivery of one 500 kVA, 6 600/415/240 V outdoor transformer, with on-load tap changing equipment. Specification from Clerk to the Council, Council Offices, Plympton.

**Madras, June 19.**—Supply, delivery, erection and commissioning of switchgear, reactors and auxiliary equipment for the Basin Bridge "B" power station. Specifications from Messrs. Merz and McLellan, Milburn, Esher, Surrey; deposit £5 5s. for first copy and £2 2s. for subsequent copies.

**Middlesbrough, June 21.**—Supply and delivery of street-lighting equipment. Specification from Borough Electrical Engineer, Corporation Electricity Works, Snowdon Road, Middlesbrough; deposit, £1 ls.

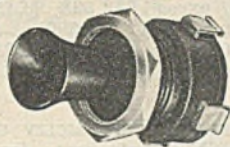
**Manchester, June 27.**—Supply, delivery and supervision of erection at the waterworks hydraulic power station of one electrically-driven submersible borehole pump with starting and control gear, etc. Specification from the Secretary, Waterworks Offices, Town Hall, Manchester, 2; deposit, £1 ls.

**Warrington, June 30.**—Supply of transformers. Specifications from Borough Electrical Engineer, Electricity Works, Warrington; deposit, £1 ls.

**Pretoria, July 1.**—Supply, delivery and erection of one 180 000-lb. and one 27 000-lb. overhead electric travelling crane. Specifications from City Electrical Engineer in Pretoria or from Messrs. Merz and McLellan, Carlol House, Newcastle-on-Tyne, 1; deposit, £2 2s.

**Birmingham, July 1.**—Supply, delivery, erection, testing and putting to work of cast iron water pipework (up to 8 in. diameter) and associated valves, hydrants, fittings, etc., required at Hams Hall "B" station. Specification from Chief Engineer and Manager, Electric Supply Department, 14, Dale End, Birmingham; deposit, £2

**Burnley, July 1.**—Work and equipment in connection with new electrical laboratory at the Municipal College: (a) Supply and installation of bus-bar assemblies in suitable trunking system; (b) supply and installation of wiring, conduit, switchgear, panels, etc., between machine sets, bus-bars and test benches; (c) supply of transformer equipment; (d) supply of various measuring instruments. Specifications from Director of Education, Education Offices, Burnley.



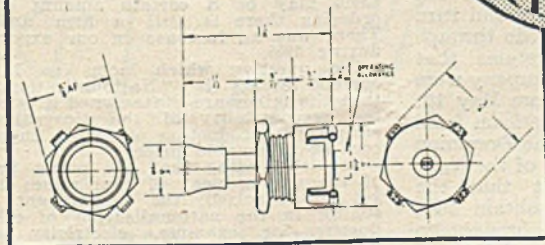
## Miniature Push-Button Switch

Specially developed for use in miniature equipments, but providing electrical characteristics enabling it to be used for a wider field of circuit requirements. The switch embodies one pair of normally made and one pair of normally open contacts completely isolated from one another in all positions. By cross connection of the contacts single pole change-over can be obtained. Locking or non-locking facilities can be provided as required. **FEATURES.**

Voltage rating, 250 A.C. R.M.S. Current carrying capacity, 1 amperes. Average measured contact resistance, 0.01 ohms approx. Insulation resistance 10,000 megohms.



DIMENSIONS



PAINTON & CO. LTD.  
KINGSTHORPE... NORTHAMPTON.

# Company News

**MERTHYR ELECTRIC TRACTION AND LIGHTING CO., LTD.**—Net rev. 1946 £49 020 (£45 305). To exes. £12 538 (£12 323), employees' funds £512 (£390); depen. £5 500 (£5 200), tax £17 231 (£23 639), ord. div. 8%, less tax (same), fwd. £14 840 (£5 286).

**LONDON ASSOCIATED ELECTRICITY UNDERTAKINGS, LTD.**—Net rev. acct. for 1946 shows prft. £401 898 (£401 121). To tax £20 789 (£22 995), pref. div. £75 400 (same), ord. div. 6% (same) £279 807 (£279 553), stockholders' res. acct. nil (£24 000); fwd., £26 135 (£232).

**ROTHERMEL CORPN., LTD.**—Trading prft. 1946 £7 751 (£6 343), plus int., subsid. co., etc., £21 765 (£14 323), mkg. £29 516 (£20 666); less dirs.' fees £1 300 (£912), tax £3 354 (£2 310), lvg. £24 862 (£17 444). To fin. div. 22½% (12½%), mkg. 35% (22½%), £24 052 (£10 340), fwd. £6 637 (£5 827).

**NEWMAN INDUSTRIES, LTD.**—Full accts. to Jan. 4 show blce. from trdg. acc. £103 035 (£100 862), plus transfer fees, etc., £278 (£211); deduct dirs.' fees £500 (same), pensions £847 (£804), depen. £19 136 (£17 161), lvg. £82 830 (£82 608). To tax £34 000 (£49 655), div. on 6% red. conv. cum. pref. £4 760, on 6% cum. ptgp. pref. £1 980, fin. div. of 12½% plus bonus 2½% on £241 863 ord., mkg. 22½% (7½% intn. was on £209 805 cap.; total paymts. for 1945 22½%); fwd. £36 101 (£22 620). Cons. net prfts., before tax, £109 122.

**MONTREAL LIGHT, HEAT AND POWER.**—Shareholders who had not accepted the offer of the Quebec Hydro-Electric Commission to buy their stock at \$25 a share have now been informed, in a letter from the late president of the company, that shareholders have now no alternative but to accept the Commission's offer and turn in their shares, which they may do through their own bank. The letter states that the duties of directors of the company were terminated by legislation as from May 10. Failing the presentation of a petition from any individual shareholder to the Dominion Government for a disallowance of the legislation, it concludes, the fight that the directors had carried on to obtain adequate compensation had been brought to a conclusion by the Government's use of its power to legislate.

**LAURENCE, SCOTT AND ELECTROMOTORS, LTD.**—Speaking at the annual general meeting, Mr. G. H. Wilson (chairman) said that the year under review was a particularly

important one, as it was the first time for over ten years in which the company had been engaged almost exclusively on orders other than those from Government departments. Orders on hand were at the highest level ever known in the history of the company, not excluding the war period, and covered a very wide range of industries and applications, notably electric equipment for many of the new power stations, for mines, steelworks, and for almost every application which depended on electric power. Their contribution to the rebuilding of the Merchant Navy by the supply of motors, switchgear and winches was second to none. They had suffered considerably during 1946 from shortage of supplies, and this position was not improving. A real confidence in stable trading conditions to enable them to get on with the job without interference or interruption was lacking, and the power cuts had been a major disaster of which they were still feeling the effects.

## Company Meeting

### London Electric Wire Company

#### Record Order Book

The 38th annual general meeting of the London Electric Wire Company and Smiths, Ltd., was held yesterday in London.

Mr. W. J. Terry (chairman and managing director), in the course of his speech, said: The profit for the year of £158 752 is £70 692 more than in the previous year, due to a marked improvement in output and return from investments.

Home sales were increased in value and volume during 1946 over the previous year, but the output was far below the demands and could have been greatly increased by the relaxation of controls and adequate supplies of material and labour. Our Order Book is the largest on record, and although there may be a certain amount of over-ordering there is still a firm undertone. There was an increase in our export sales during 1946.

The question which looms so large in current events is "Nationalisation." Now that the mines are State-owned it is entirely the responsibility of the Government to ensure the production of ample supplies of coal at reasonable prices.

Notwithstanding that the many problems of the management of coal mines have as yet to be solved, the Government is persisting in the nationalisation of other industries—for example, electricity supply, transport and many others to come. Surely it would have been wise first of all to prove the policy of nationalisation by making a success of the coal industry, which affects the whole population, before embarking upon further adventures. It is the opinion of your board that private enterprise is still the best policy for this country.

The report was unanimously adopted.





**I**t was the immortal bard who, through the eyes of King Harry V., saw his men thus — "Straining upon the start."

In this year of grace, we of Sanders, are equally impatient to "Follow our Spirit," and proclaim the interesting and far reaching developments which have been taking shape in our organisation — *but* — it would be manifestly unfair to make such announcements, whilst conditions confine availability to the few when the need is that of so many.

We ask for the forbearance of our many friends until the time when we can truthfully say once more and even more emphatically —

*Sanders for Service in all Senses.*

## SANDERS WEDNESBURY

MAKERS OF GOOD SWITCHGEAR FOR OVER FIFTY YEARS

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.

# Commercial Information

## Mortgages and Charges

NOTE.—The Companies Act of 1908 provides that every mortgage or charge shall be registered within 21 days after its creation, and that every company shall, in its annual summary, specify the total amount of debt due from it in respect of mortgages or charges. The following mortgages and charges have been registered. The total debt prior to the present creation, as shown in the annual summary, is given—marked with an \*—followed by the date of the summary, but such total may have been reduced.

ELECTRICAL POWER MAINTENANCE SERVICE, LTD., Birmingham.—April 15, mort. and charge, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on land with workshops and six cottages thereon at Horseley Heath, Tipton, 70, Lower Essex Street, Birmingham, with machinery, fixtures, etc., and general charge. \*Nil. September 19, 1945.

A. FOCKOCK (BATH), LTD., electrical and radio engineers.—February 18, £350 debenture, to C. A. Ratcliffe, London; general charge.

## Receiving Orders

RAYHAM NEON SIGNS (a firm), 4, Alexandra Crescent, Derker, Oldham, electrical dealers. Court: Oldham. Date of Receiving Order, May 12, 1947. Act of

Bankruptcy proved in Creditor's Petition, Section 1-1 (G.), Bankruptcy Act, 1914.

RODGERS, Charles, 16, Howard Road, Pomphlett, Devon, electrical engineer. Court: Plymouth. Date of Receiving Order, May 8, 1947. Act of Bankruptcy proved in Creditor's Petition, Section 1-1 (G.), Bankruptcy Act, 1914.

## Adjudication

TARBOX, Frederick Alfred, 14, Hale Drive, Mill Hill, London, N.W.7, company director, trading and described in the Receiving Order as Tudor Electrical Services (a firm), Station Yard, Mill Hill, Middlesex, electrical engineers. Court: High Court of Justice. Date of Order, May 7, 1947. Date of Filing Petition, March 11, 1947.

## Dividend

PEOVER, Harry, residing at 94, Wharrier Street, Newcastle-upon-Tyne, and carrying on business at Market Lane, Newcastle-upon-Tyne, electrical apparatus and tool merchant. Court: Newcastle-upon-Tyne. Amount per £—5<sup>3</sup>/<sub>4</sub>d. Supplemental. Payable, June 3, 1947, at The Official Receiver's Office, Gibb Chambers, Westgate Road, Newcastle-upon-Tyne.

## Metal Prices

	Monday, Price	Inc.	May 26 Dec.
<b>Copper—</b>			
Best Selected (nom.)...per ton	£135 10 0	—	—
Electro Wire bars ... ..	£137 0 0	—	—
E.C. Wires, basis ... ..	£155 0 0	—	—
Sheet ... ..	£178 10 0	—	—
<b>Bronze Electrical quality</b>			
1% Tin—			
Wire (Telephone) basis per ton	£177 15 0	—	—
<b>Brass (60/40)—</b>			
Rod basis ... ..	1s. 2 <sup>1</sup> / <sub>4</sub> d.	—	—
Wire ... ..	1s. 6 <sup>1</sup> / <sub>2</sub> d.	—	—
<b>Iron and Steel—</b>			
Pig Iron (E. Coast Hematite No. 1) ...per ton	£8 19 0	—	—
Galvanised Steel Wire (Cable Armouring) basis 0.104 in. ... ..	£34 5 0	—	—
Mild Steel Tape (Cable Armouring) basis 0.04 in. ... ..	£21 15 0	—	—
<b>Lead Pig—</b>			
English ... ..	£91 10 0	—	—
Foreign and Colonial... ..	£90 0 0	—	—
<b>Tin—</b>			
Ingot (minimum of 99.9% purity) ... ..	£440 10 0	—	—
Wire, basis ... ..	per lb. 6s. 6 <sup>1</sup> / <sub>2</sub> d.	—	—
Aluminium Ingots ...per ton	£80 0 0	—	—
Spelter ... ..	£70 0 0	—	—
Mercury (spot) ... ..	per bott. £17 3 6	—	—

Prices of galvanised steel wire and steel tape supplied by O.M.A. Other metal prices supplied by B.L. Callender's Cables, Ltd. The latter prices are nominal only, and do not include any allowances for tariff charges.

## Coming Events

### Friday, May 30 (To-day)

I.E.E., N. IRELAND CENTRE.—Belfast. Conversation and Presidential visit. 6.45 p.m.  
I.E.E., LONDON STUDENTS' SECTION.—Bishopsgate. Table Tennis Contest. 7 p.m.

### Saturday, May 31

I.E.E., S. WESTERN SUB-CENTRE.—Totnes, S. Devon. Summer Meeting.

### Monday, June 2

UNIVERSITY COLLEGE.—London. At the I.E.E. First lecture in the series, "The Presentation of Technical Information," by Prof. R. O. Kapp. 5.30 p.m.

### Tuesday, June 3

THE INSTITUTE OF WELDING.—Newcastle-upon-Tyne.—N. East Coast Meeting, until June 6.

### Wednesday, June 4

I.E.E., SOUTHERN CENTRE.—Portsmouth. "General Planning and Organisation of Colonial Telecommunication Systems," by C. Lawton and V. H. Winson. 7 p.m.

ELECTRIC VEHICLE ASSOCIATION OF GREAT BRITAIN.—London. At the Connaught Rooms: Luncheon. 12.30 p.m.

### Friday, June 6

I.E.E., TRANSMISSION SECTION.—At the Connaught Rooms. Section Dinner. 6 p.m.  
I.E.E., WESTERN CENTRE.—St. Austell. Commencement of Summer Meeting.

## A NEW IDEA IN FILING

A System which gives At-Sight Identification and Error - Proof Certainty

## SHANNOGRAPH FOR SPLIT-SECOND FILING—AND FINDING

If your filing system were just a place to keep letters, you might as well use a waste paper basket.

It's the FINDING that matters. Plus, of course, speed in operation. Here are the facts about Shannograph: First it is flat-topped. That is, the top of each file is flat right across. That gives you a lot of space to use—name, address, telephone (and many other things, as you will see). And there are no tabs and the like to catch in the cabinet, wear out or THUMB-FUMBLE through. Your EYE spots any file at one glance.

Then there's charting. Briefly, each letter of the alphabet is charted so that a "B" in an "A" section stands out like a sore thumb. For that matter, so does an "Ab" in an "Aa" section.

Then there's "suspension." Shannograph is not the ordinary suspension system. Every single folder is separately hung by steel hangers on a steel frame. The folders don't touch the cabinet. That means less wear and tear. More speed. Longer life. Less cost.

Last... you can signal Shannograph—like you would a Shannon Visible System. Why not? Shannograph is a VISIBLE system of filing-finding. So signal it—to show when a reply ought to be expected. Or what degree of importance each firm has. Or any other item(s) of information you may want.

Let's sum up Shannograph. It's fool-proof. You can't make an error and hide it. It's faster—the eye's quicker than the thumb. It's stronger. The folders last and last—and can be used and re-used for any purpose or firm.

Shannograph will go in your existing cabinet—or desk drawer—or on your desk-top, or on a side table, counter or shelf. And it's moderate in first-cost and next-door-to-nothing in upkeep cost.

... Having said all this, there's still a great deal more to be told. And you really should know about Shannograph—because there just isn't anything else like it made.

Incidentally have you asked for free specimens of Shannon Visible Records? They cover sales, stocks and purchases, control plant maintenance, personnel, ledger accounts, etc., etc. It can be supplied from standardised stocks or to your own specification.

**Shannon Systems**

The Shannon Limited, 553, Shannon Corner,  
New Malden, Surrey.

I am interested in the above system for correspondence and for

(Attach to your letterheading.)

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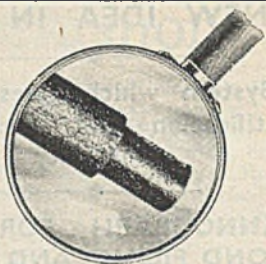
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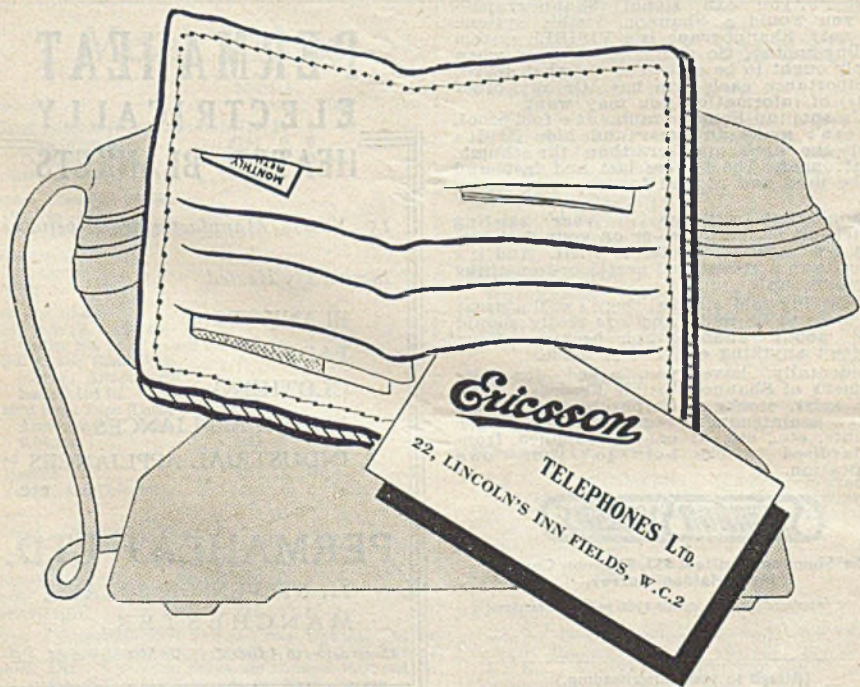


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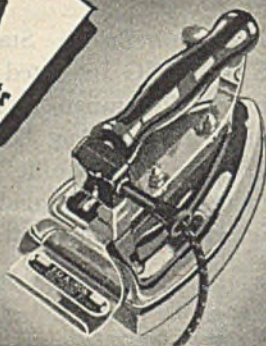
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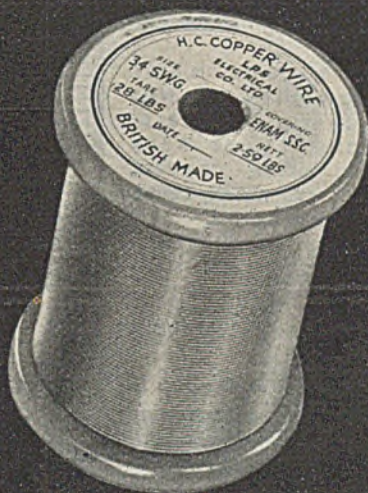
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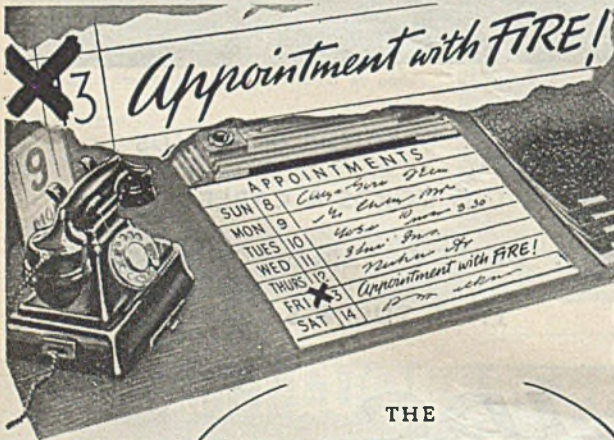
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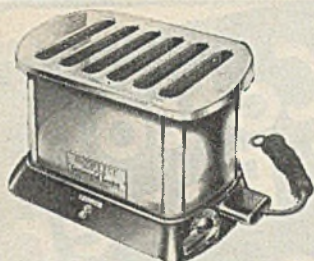
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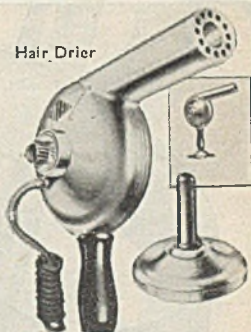




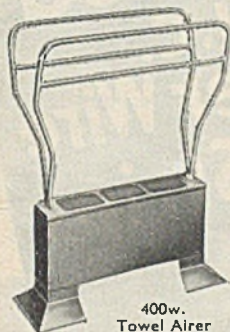
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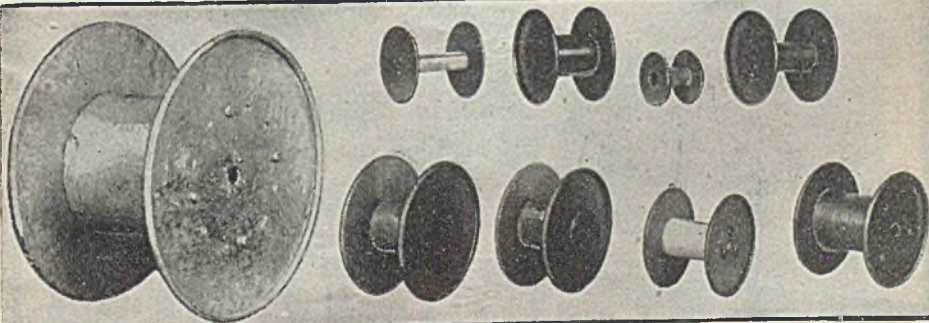
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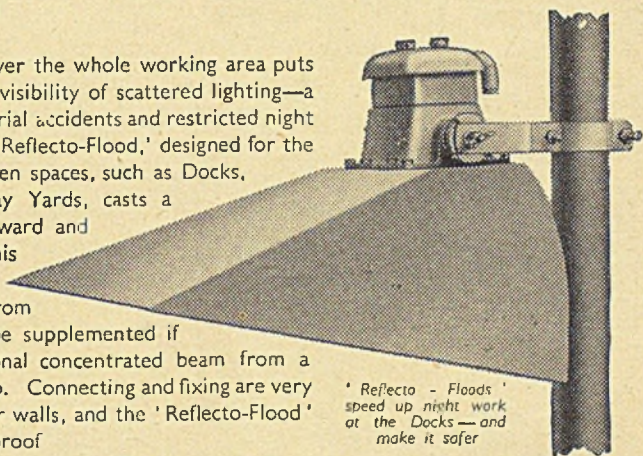


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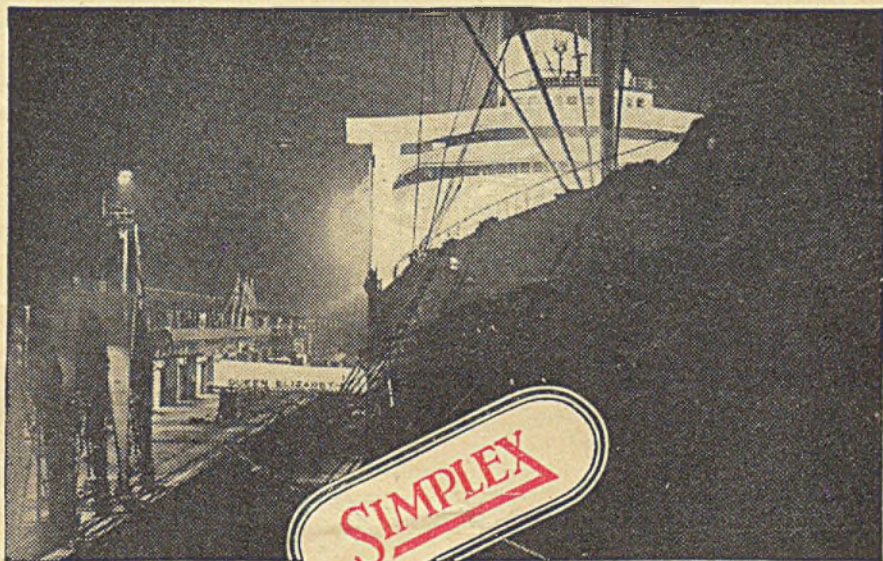
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