

Vol. CXXXIX. No. 3589
SEPTEMBER 6, 1946

"NOW,
REGARDING OUR

## LIGHTING

 PLANS . . ."LIGHTING All concerned with ADVISORY the installation or SERVICE renewal of lighting are invited 10 com municate with our Lighting Advisory Service, Bridle Pash, Watford. Phone 7701.


THE importance of planned lighting cannot be exaggerated. Sufficient light is not enough. Modern practice takes heed of the psychological and cesthetic aspects as well as the "fitness-for-purpose" of a lighting installation. Appearance, quality, accessibility, economy are other vital considerations ranging far beyond the question of actual light. All are catered for by the famous Mazda range of lamps and fittings.

## LAMPS IN MARZDALUES FITTINGS

 A.P.L.E.CENTRAL HALL, WESTMINSTER SEPT. $10-12$ STAND No. 38

The British Thomson-Houston Co. Ltd.



GENERAL TYPES
semi-Enclosed Type-Constructed
to give adequate protection to
all vital parts, and for ventilation
from the machine room.
Duct Ventilated Type - Enclosed sator end covers arranged with air intake ducts for collfecrion to air ducts in the foundations.
Enclosed Ventilated Type with Self-contained Air Filters. Easily remorable air filcers embodied in the machine dispense with basement air ducts.
Totally Enclosed Air Circuit Type - Air coolers form an integral part of the machine: and eliminate excarations for basement air ducts.

Power house ot a large crude oil works. in Scotland showing 1800 K.W. (2250 K.Y.A.) 3-phase 50 cycle, 3,300 volt, 1,000 r.p.m. A.C. Generators fitted with selfcontained air filters, driven by geared steam turbines.

The growing demand for geared steam turbine-driven A.C. Generators for constantly increasing outputs has resulted in developments in design of dominant importance.

Four general types are now available to cover the increasing field of application, and a choice may be made of alternative methods of cooling to suit the conditions most favourable to a given situation, thus ensuring reliable units of good efficiency and economy of operation.

## GEARED STEAM TURBINE-DRIVEN CENERATORS

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

THE SMALLEST TRIPLE DOLE SWITCHFUSE EMINENTLY SUITABLE FOR MACHINE TOOLS (3ill RADETTE. 10 AMPERES. 500 VOLTS. CATALOCUE N ${ }^{\circ}$ Q1438

BILL SWITCHGEAR LTD
ASTON LANE. PERRY BARR
BIRMINGHAM-20

## IOCO varnished glass fabrics and tapes

VARNISHED GLASS FABRICS and TAPES ...
Build smaller and more efficient motors by using Ioco varnished glass fabrics and tapes. They are specially designed to resist high voltage at elevated temperatures.

We also manufacture INSULATING AND OILED FABRICS FOR CABLE WORK. SWITCHBOARD RUBBER MATS. AND ELECTRICIANS' RUBBER GLOVES IOCO LTD.

Anniesland
GLASGOW

## Sandmarks of Britain



THE WHITE CLIFFS OF DOVER
These ramparts of chalk rising to 375 feet are the first glimpses of England obtained by travellers from the Continent

## CRYSEVCO <br> FIFTY YEARS OF QUALITY \& SERVICE

Branches

| BIRMINGHAM | BURYST EDMUNDS |
| :--- | :--- |
| BRIGHTON | CARDIFF |
| BRISTOL | GLASGOW | BRISTOL

LEEDS
LEICESTER
LIVERPOOL


CRYSELCO LIMITED. KEMPSTON WORKS, BEDFORD




 Rhate. Restively neskes the 5 rimed he productions of pe petrornance uneces. 30,1 and tho
alone- and tosther recommendation unil iof wio ap 100 ins. This advertisement describes a problem solved by $\Phi$ in the Aero Ensine industry. You also will have production problems which can be wilved by
sol
$\Phi$

# THE POCKET TESTOSCOPE 

Size of a Fountain Pen
A convenient rapid
fault-finding instrument for use on $A C$ or DC Circults
for use on 100-750 volts

## for testing

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

Ohe Elechician' Goed Compravion. DRAKE \& GORHAM
WHOLESALE LTD. 7 LONG ACRE, LONDON,W.C. 2

Telephone : TEMple Bar 3993
MANCHESTER: 29 Piccadilly. BRIGHTON: $\mathbf{2 4}$ Marlborough Place GLASGOW: 182 Sc . Vincent Street. Bristol: 2-4 Church St., Temple. DUBLIN: 2 Chureh Lane, College

Midland Representative : Green
W. T. BOWER, I84 Jockey Road, Sutton Coldfield


## Don't keep his nose to the grindstone!

While your cutters are at the grindstone they are not producing and every time they require regrinding it slows up output.
If your tool regrinding were reduced, your output would be increased and costs reduced. MACROME treated tools do this, because they give a much bigger average putput per regrind than similar untreated tools.
This would give you the following economies :
(a) Higher outpue.
(b) Reduced outlay on tools.
(c) Reduced production cost per unit
These savings can be obtained quite simply in two ways:
(1) When new tools are required, we can supply your full requirements already MACROME treated.
(2) We can treat your own
tools.

Write to us for details.

## TVA S O O M 5 <br> The Toughes Toods in the lwirld <br> MACROME LTD. (DEPT. C.T) ALCESTER WARWICKSHIRE



## PRESSED STEEL TANKS



The ready adaptability of the Braithwaite Pressed Steel Tank for special uses, is well illustrated by this launching tank reinstated at the Ministry of Aircraft Production (Marine) Experimental Establishment at Felixstowe. It is used for research and testing purposes in connection with the design of seaplane floats, flying boat hulls and airplane fuselages.

# BRAITHWAITE \& CO <br> ENGINEERS LTD 

Temporary London Office:


KINGS HOUSE HAYMARKET LONDON S.W. 1


FERRANTI LTD., Holinwood, Lancs. London Office: Kern House, Kingsway, W.C.2.

#  FOR GAS FILLED LAMPS 

FOR EASY MAINTENANCE-THE BEST.


Thorlux Overlamp Maintenance Scheme.
Have one spare clean reflector. Remove dirty one (lift, turn, and it's off). Replace with clean one. Repeat over whole installation.
Thorlux Wiring Box.
Remove Lid, connect Mains and Earth,
Replace Lid-Job's done (The Wireman's Friend).
A SUCCESSFUL \& MOST POPULAR HIGH QUALITY REFLECTOR, IN LARGE DEMAND BY GOVERNMENT DEPTS., LARGE \& SMALL INDUSTRIAL PLANTS.
SAMPLES—With Pleasure.


It was good news for Londoners - and for many country cousins toowhen the General Steam Navigation Company announced that P.S. Royal Eagle had re-commenced her famous cruises from London to the sea. The Royal Eagle has a wonderful war record, as a flak
 ship guarding the approaches to the Metropolis; she also brought away some 3,000 survivors from the Dunkirk beaches. Like many other famous vessels, large and small, she is wired with

## HENLEY CABLES

```
W. T. HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON CARDEN.
LONDON.E.C.I
```


## an Innouncement

Priority demands from Service departments have been greatly reduced. Thus we are now able to place our widespread resources at the disposal of Industry.

Our organisation, which some seven years ago was immediately made available for the purposes of War, has just as quickly been changed to meet the requirements of Peace.

Our world-wide pre-war reputation, coupled with the added experience gained during the period of acute emergency is. in itself, a guarantee of reliability.

With a team of technical experts covering the entire country and with Offices, Works and Stores throughout Great Britain, we are ready now to respond speedily to enquiries and orders for

WIRE ROPE, WIRE, HEMP CORDAGE AND CANVAS

## BRITISH ROPES LIMITED

head office:

## EIRMINGHAM 6 ENGLAND



HIGGS large alternating current machines up to 600 H.P. are the successful outcome of extensive research and experiment in design, and are produced individually by a highly specialized plant. Maximum efficiency and reliability in performance is thus ensured.

Belfast, Birmingham, Bristol, Dundee, Glasgow, London, Manchester, Nottingham, Peterborough, Sheffield, Wolverhampton.


Eleco planned street lighting service is now again available. A consultation costs nothing. Eleco fittings are available for tungsten, sodium or mercury discharge lamps. Each type of fitting embodies the improvements suggested by Eleco's 40 years experience. Catalogues on request.

## ENGINEERING \& LIGHTING EQUIPMENT CO. LTD.

DEPT. W.S., SPHERE WORKS, ST. ALBANS, HERTS. PHONE: $2258 / 9$

Hurry, thurry, the Keel Irons is on the way -

postWar
ELECTRIC IRONS
ELEXCEL LTD • VICTOR WORKS • BROAD GREEN • LIVERPOOL • 1


## OVER 20 YEARS' MANUFACTURING EXPERIENCE

SUFLEX LTD, are speciaists in the manufacture of the following electrical products

| VARNISHED COTTON |
| :---: |
| SLEEVING |
| $\star$ |
| VARNISHED SILK |
| SLEEVING |
| $\star$ |
| TINNED COPPER |
| SCREENED VARNISHED |
| COTTON SLEEVING |


| PLAIN PLASTIC |
| :---: |
| SLEEVING \& TUBING |
| $\star$ |
| TINNED COPPER |
| SCREENED PLASTIC |
| SLEEVING |
| $\star$ |
| TINNED $^{\star}$ COPPER |
| SCREENIMG |


| PUSH BACK WIRE |
| :---: |
| DOUBLE BRAIDED |
| AND WAXED |
| $\star$ |




T U F N O L Bell and Barrel Insulators are made in two brands. One is for use in temperatures of up to $212^{\circ} \mathrm{F}$. and will withstand a tensile load of 2 tons. The other is for use in temperatures of up to $400^{\circ} \mathrm{F}$. and will withstand a tensile load of $1 \frac{1}{2}$ tons.
The metal inserts are moulded into the insulators and will remain firmly anchored there. They can be tapped for either $\frac{1^{\prime \prime}}{}$ or $\frac{5}{8}$ " whit bolts.

## An ElLISON Product TUFNOL LTD

DERRY 日ARA日IRMINGHAM22B

## Gentercel MINIATURE RECTIFIERS

## UNIPLATE RECTIFIERS

## FOR HIGH FREQUENCY

## EOR LQW Frequency

N signal or A.V.C. rectification, crash limiters, measuring and recording instruments, etc., there's a job for the SenTerCel miniature UNIPLATE RECTIFIER.

Assembled in light, compact units they can be supplied singly or in series, parallel, or series-parallel connection. Suitable for any voltages or currents normally met with in this class of work. They are small and light and thus can be suspended in wiring.

There are several sizes with working areas to suit the varied requirements encountered in practice.


Standard Telephones and Cables Limited
(rectifer division)
OAKLEIGH ROAD, NEW SOUTHGATE, LONDON, N.II



All Varnishes confarm to B.S. Specifications wherever applicable.

Please submit your jroblems to our Electrical INSULATING VARNISH TECHNICAL DEPARTMENT.

## MINERVA ELECTRICAL Insulating Varnishes

STOVING VARNISHES (Natural Resin Type) ... Black and Clear STOVING VARNISHES (Synthetic Resin Type) ... Black and Cle r THERMO-SETTING VARNISHES ... ... Black and Clear AIR-DRYING VARNISHES ... ... ... Black and Clear CLOTH VARNISHES ... ... ... ... Black and Clear SLEEVING VARNISHES ... Black, Clear and Colours CORE-PLATE VARNISHES (Slosing and $d i \gamma$-drying) Black and Clear COPPER-WIRE ENAMELS ... ... ... Black and Clear ACID AND HEAT-RESISTING ENAMELS ... AII Colours CABLE LACQUERS - MICA BONDING VARNISHES COMPOUNDS

# PINCHIN JOHNSON 

15 CLIFFORD STREET - LONDON • W. 1

Switchboards of all types for A.C. and D.C., open or enclosed.


Illustration shows typical Marine type.
William McGEOCH \& Co. Ltd. Warwick Works, BIRMINGHAM, IO also GLASGOW and LONDON


## WUVEN WIRE BRAIDING

FOR HOSE AND CABLE COVERING, FLAT CONDUCTIVITY STRIP, ETC. WRITE FOR BOOKLET TO.-
SPAIKLETS LIMITED WIRE WEAVING DIVISION, LONDON, N. 18


LONDON OFFICE: QUEEN'S MOUSE, KINGSWAY, LONDON, W.C. 2
WORKS: STAFFORD-PRESTON-RUGBY-BRADFORD-LIVERPOOL


## 7using Farilities

No. 1

SIMPLE RE-FUSING

CVEN if you happen to be a plumber, sans tools, sans mate, sans everything and miles from anywhere, you can re-fuse the new SLYDLOK FUSE from the coil of spare fuse-wire in the holder.
Fingers and thumbs are the only tools necessary, in fact you can't use any others. The same applies if you wish to fit an H.R.C. cartridge. No need to send and wait for another fuseholder. Providing you have a standard cartridge and two hands the rest is simplicity simplified to the nth degree.

Exclusive to the New


## Give full protection <br> 

Conforming in all respects to the latest requirements of B.S. 142/1942
"ALVVAYS UP-TO-DATE."


NALDERS RELAYS are supplied in a complete range of models. They are of outstanding quality, having high torque, low energy consumption and a wide range of adjustable settings. The Relays are vibration and surge proof, and are fitted with reliable contacts and operation indicators. They occupy small panel space. Nalders Relays are in service in leading Power Stations and in all ports of the Globe.

Telephone: Clissold 2365 (3 lines) DALSTON LANE WORKS, LONDON, E. 8 Telegranns: Occlude, Hack, London


## When Reliable control is essential

Opposed to the Drum Controller, the SolenoidOperated Contactor Gear was almost perfect . . . the best of the two without their defects is incorporated in the de Renzi Holmes CamOperated Contactor Controller - the perfect method of control essential when the efficiency of your Electric Cranes, Hoists, Haulage Gears, etc., coupled with the safety of your employees is at stake. Fullest details of these sturdy, long wearing, and easily maintained Controllers sent on request - your queries dealt with gladly by our Technical Dept.


## De Renil, HOLMES

## CAM-DPERATED GONTAGTOR GONTROLLERS

DE RENZI, HOLMES \& COMPANY LIMITED, FOX'S LANE, WOLVERHAMPTON, ENGLAND TELEPHONE: WOLVERHAMPTON 21714
London Office : R. B. Whittick, A.M.I.E.E., Abford House, Wilton Road, S.W.I. Phone: VICtoria 5957-8 Scottish Representative : John H. Scott,
88-90 York Street, Glasgow, C. 2. Phone : City 6677


FOR UNDERGROUND CABLES


EXTREMELY EASY TO LAY, NO PROJECTION AT JOINTS, LONG LENGTHS, FEW JOINTS, PERFECT ALIGNMENT.
Write for details and specification.

## ${ }^{\text {the }}$ KEY ENGinefrng coitid

 4 QUE N VICTORIA ST., and TRAFFORD PARK, LONDON, E.C.4. MANCHESTER.Tel. : City 2235
Tel.: Trafford Park 1903



If starters could reproduce themselves the present heavy demand for M.E.M. motor control gear would be met without delay. But as it is, labour, material and extensive planning are needed. Yet in spite of shortages, controls and restrictions, supplies
 from the M.E.M. Factory are being steadily increased and goods are going out as quickly as possible to the wholesalers. Their's is the job of distribution and they are doing it magnificently in allocating all available goods fairly and equitably. So keep in touch with your wholesaler and he will see that your needs are met as quickly as supplies permit.

## MED

## MIDLAND ELECTRIC MANUFACTURING CO. LTD., TYSELEY, BIRMINGHAM, 11

SWITCH, FUSE AND MOTOR CONTROL • GEAR, ELECTRIC FIRES AND LOCALISED LICHTING EQUIPMENT



The constant A.C.input voltage called for in so many modern industrial and labotatory applications is provided with maximurn accuracy and reliability by B.A.T. Automatic Voltage Regulators. Seven standard nominal ratings are carried in stock, $10-2,500$ Watts, giving $230 \mathrm{~V} \pm 5 \%$ with 190-255 input. Other tatings to special order.
Excellent deliveries can be arranged, mostly from stock. No priority or "M" Certificates needed. Please request Bulletin V.R. 10744 for complete data.

## ALSO SUPPLIERS OF

Static Mains Transformers of all types and "Variac" Infinitely variable voltage regulating transformers.


ELECTRICLL AND MADIO LABORATORY APPARATUS ETC.

180 Tottenham Court Road, London,W.I And 76 Oldhall Street, Liverpool 3, Lancs


WORKS : ENFIELD, MIDDLESEX SE.R. 19 "


ELECTRIC TRUCK
A Power-driven Truck, built for hard work ; no tugging-no straining.

YOU need this truck.
WINGROVE \& ROGERS LTD. (Dept E)
POLAR WORKS, OLD SWAN, LIVERPOOL I]

1. Vertical Draw-out Switchgear $6.6 \mathrm{kV}, 250 \mathrm{MVA}$ for Intake.

## SWITCHGEAR

 FOR FACTORY SUB-STATIONSWORKS Engineers facing the problem of Electrical Extensions or modernization of Switchgear should write for PUB. NO. B. 285.

2. 400 Volt A.C. Distributor board with 18 Fuse-Switch Circuits.
3. $440 / 220$ Volts D.C. Distribution hoard supplied from rectifier fitted with 15 Fuse-Switch Circuits.

## SPECIFY

## THE BRUSH ELECTRICAL ENGINEERING CO. LTD. LOUGHBOROUGH, ENGLAND

TURBO.GENERATORS, TRANSFORMERS, E.H.T. and M.T. SWITCHGEAR, A.C. and D.C. MOTORS and GENERATORS BATTERY ELECTRIC VEHICLES and TRUCKS. TRACTION EQUIPMENT, BUS and COACH BODIES

BRANCHES: London, Birminghom, Cardiff, Manchester, Both, Leeds, Newcastle, Glasgow. Belfost, Dublin.

## S.E.M.

## Traction Motors



This 2.1 B.H.P. motor is typical of the range of S.E.M. Traction Motors. 28 volts 75 amps., 1,500 r.p.m. It is capable of heavy overloads and weighs only 120 lbs .

ARANGE of high-efficiency, lightweight traction motors which will be of considerable use in the manufacture of light trucks and other small powered vehicles, has been designed and manufactured by S.E.M. Engineers.

These series-wound, reversible motors are very robustly built, have a high starting torque, and are extremely reliable. They are totally enclosed and have Class B insulation throughout. In common with all S.E.M. machines, these motors are manufactured to the highest standards of mechanical detail and have passed rigid inspection tests.

## SMALL ELECTRIC MOTORS Ltd.

have specialized for over 30 years in making electrical machinery and switchgear up to 10 kW capacity. They are experienced in the design and manufacture of ventilating fans and blowers, motors, generators, aircraft and motor generators, highfrequency alternators, switchgear, starters and regulators.
A SUBSIDIARY OF BROADCAST RELAY SERVICE LTD.
BECKENHAM • KENT

## A WIDE RANGE OF OKERIN WAX DI-ELECTRICS

-created in our own laboratories and manufactured in our own workssupplies almost every requirement of Electrical Industry. Grades have been designed for operation under the most severe and varied conditions, and many are resistant to mould and fungus growth.


Special types are evolved as new demands arise, and technical discussion on manufacturers' problems is welcomed.

Telephone: Temple Bar 5927.
Astor Boisselier \& Lawrence Ltd. Sales Dept.: Norfolk House, Norfolk Street, London, W.C. 2

## Modern Electrical Engineering Mathematics

by S. AUSTEN STIGANT
The most recent application of mathematical methods to electrical engineering problems are here fully treated.

Fully illustrated with diagrams, 30/-

## The Mid-Twentieth Century Atom by MARTIN DAVIDSON, D.Sc., F.R.A.S.

An outline of modern conceptions of the constitution of the atom, with some account of how these conceptions led to the atomic bomb and to the possibility of industrial atomic energy. With diagrams.

Now Ready, 8/6 HUTCHINSON
Scientific and Technical Publications 47 PRINCES GATE, S.W. 7


Leaflet No. I 55 sent on application
SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED 38-39 UPPER THAMES STREET, LƠNDON, E.C. 4
 guess output, when a TRUMETER is fitted. Production can be seen at a glance, to the last unit of accurate measurement. Mistakes in over-production or under-production are impossible. There's a TRUMETER model for every requirement-councing up to seven figures in revolutions and stroke and measuring in yards, feet or metres and fractions thereof and recording r.p.m. of shafts, etc. We shall beglad to send details of the TRUMETER that will help YOU.

Above is the TRUMETER Stroke Counter, for mochines with oscillating or stroke movements.

## TRUMETER CO. LTD. (Dept. ER/7) <br> Sunnyside Works, Leicester Road, SALFORD (Associated with Measure-Merers Co. Ltd.)


dm 1294


For instrument work, domestic and industrial apparatus and power control plant. Standard switches available or designed to any individual requirement. Write for catalogue or technical advice.

THE MERCURY SWITCH MANUPACTURING CO.LTD,

## - WHET DRAYTON , MDDLESEX



THE
FLUXITE QUINS AT WORE
This motor's a treal, you'll agree ;
Just "hark at it pur-
ring" cried E $E$
Thanks to good old
FLDXITE...
cried OI, "That's all right ; But loak 1 There's no holding it-SEE.

ForallS OLDERING work-you need FLUXITEthe paste flux-with which even dirty metals are soldered and "tinned." For the jointing of lead -without solder and the " running " of white metal bearings-without " tinning " the bearing It is suitable for ALL METALS-excepting ALUMINIUM-and can be used with safety on ELECTRICAL and other sensitive apparatus. With FLUXITE joints can be "wiped "successfully that are impossible by ony other method.
Used for over 30 years in Government works and by leading Engineers and Manufacturers. Of ALL IRONMONGERS in tins-8d., $1 / 4$ and $2 / 8$. The " FLUXITE GUN'" puts FLUXITE where you want it by a simple pressure. Price $1 / 6$ or filled $2 / 6$
FLUXITE SIMPLIFIES ALL SOLDERING
 with FLUX1TE, siss on "Wiped" jointh. Pries ld. soeh. FLUXITE LTD. (Dept, R.E.), Bermondsey St., S.E.I

We need not bore "efficient and economical," etc., etc. - suffice it to say that we know we make good motors will endorse is available from about $7 \frac{1}{2}$ to about The small A.C. range is available ring or squirrel cage, and the 50 h.p. (at 1.450 r.p.m.) enclosure, including drip-p enclosed. Our usual types of protected and and technical data we'revery ventilated, screen $p$ full details not standard, normal and not brochure $X, 92 B$ b if your needs are perform any norm brochure?

## HARLANTI moross remess

THE HARLAND ENGINEERING COMPANY LTD.
\& Branches at Manchester, Glasgow, Bristol, Aull, Leeds, Birmingham, New castle, Nottingham and Swansea.

WORKS: ALLOA, SCOTLAND London Office: Harland House, 20 Park Street, W. 1 Telephone: GROsvenor 1221
 time co-operation, enterprise and design: Less than 30 months after the drawing up of the war emergency power supply programme, Earley Power Station, a key factor in that programme, was planned, built and put into commercial operation.
The whole industry can take just pride in this achievement, won in the teeth of unprecedented material and labour scarcities. International Combustion are proud to have been associated with it, as manufacturers of the boilers and pulverized fuel firing equipment.

The Technical Staff of International Combustion Ltd. are always ready to bring their exceptional experience 10 any steam raising problem

## INTERNATIONAL (IC) COMBUSTION L" <br> MIMETEEN WOBURN PLACE <br> LONDOK, W.C. 1 Works: DERBY



Registered Trode Mark BRASS MOULDED AND RUBBER BUSHES


Moulded

## and now sHADS POL: MOTORs



A sturdy silant runnine motor for 200/240 A.C. consuming $0 \cdot 15$ amps and weighing liz lbs. Ideal for driving axial flow fans and light mechanisms. High efficiency, good starting torque. Avallable in variety of mountings. Write for fully descriptive folder S.P.M.


ENGINEERING COMPANY LIMITED COMMERCE WAY PURLEY WAY CROYDON Telephone. CROYOON 4I25-8 Telegrams SYNCROY CROYDON

## Where does life bear

 hardest on a D.C. motor?

## That's where

## CROMPTON STRENGTH

 is greatestIn the brushgear and commutator where sparkless performance and exceptional stamina are the result of 60 years' experience in D.C. machine construction. In the field coils, too, where the special impregnation process ensures complete protection - from dirt, oil or moisture. That's where Crompton leadership shows itself.

## CROMPTOn



## Trusted by those carrying great responsibility

The engineers responsible for equipping 500 of Britain's Power Stations pinned their faith to Tudor Accumulators. This confidence was justified by the Tudor record of unsurpassed efficiency and reliability. Many of the largest battery installations in the countryare Tudor, and some of these
have been functioning without pause or hitch for over 30 years. You should specify Tudor for important jobs.

SAPETYLYTE is the Tudor Emer. geney Lighting System, which is automatic and instantaneous in operation. It is installed in thousands of schools, hospitals, factories and other large buildings.


The Tudor Accumulator Co., Ltd., 50, Grosvenor Gardens, London, S.W.I. SLOane: or68/9


The plant illustrated is installed in the Chertsey Pumping Station of the Woking Water \& Gas Co., and typifies the outstanding qualities of Allen design of waterworks plant-compactness, accessibility and uniformity of design in respect of driving and driven units.
The 12 -hour rating of the 6 -cylinder Diesel engine is $426 \mathrm{~b} . \mathrm{h} . \mathrm{p}$. at 400 r.p.m., and the continuous day and night rating 385 b.h.p. at the same speed. The 3 -stage double-suction pump has an output of from $3 / 1 \frac{1}{2} \mathrm{~m} . \mathrm{g} . \mathrm{p} . \mathrm{d}$. over a head range of from $365 / 301$ feet and a speed range of from 350/1,040 r.p.m.
A power take-off from the pump shaft drives a 50 kW .230 -volt direct-current generator which provides power for auxiliary plant, including a vertical river water pump having an output of $3 \mathrm{~m} . \mathrm{g} . \mathrm{p} . \mathrm{d}$. against a total head of 50 feet.
The Engine, Pumps, Generator, Switchboard and Auxiliary motor-driven pumps are all of Allen construction.
The main pump is parsicularly interesting as it is a multi-stage pump of the double-suction type which sets up no hydraulic end thrust and consequently an automatic balancing valve or thrust bearing is not necessary. The accessibility which the horizontal split on the pump casing gives is readily observed.
Allen waterworks plant is efficient, reliable in operation, straightiorward in design and simple to operate. Above all, it secures uniformity in standards of design and performance down to the smallest detail.

## WHICH is WHICH ?

## You KNOW, (but do your customers



To follow the "Safety First " recommendation, make sure your electrical leads, whether to Domestic Appliances or to Machine Tools, etc., are clearly defined.
"Viskrings" simply slipped over the core-wires and/or the outer casing of the leads do the job and put an end to confusion or doubt.

- No Tools required
- No rubber used
- Impervious to oil and petrol
- Indelibly printed
- Supplied in all colours as well as white
- Self-fixing
- Do not increase diameter of lead


# PERMANENT IDENTIFICATION OF ELECTRIC LEADS 

## MORE POWER TO LOCHABER!



Despising all other weapons, the clansman trusted to his claymore and superb swordsmanship
-
Lochaber is that of highland clans, highland feuds and the 'forty-five'. But today the power of this wild and picturesque district no longer lies in the claymore ; it comes instead from one of the greatest industrial developments of recent times, which, promoted at a cost of millions of pounds, harnesses the waters of the countryside to generators that give an immense output of electrical power. A new page to highland history indeed ! . . . and one in which it is recorded that an Alton battery has been installed in the hydro-electric station for emergency and other important duties.

## ALTON BATTERIES OF MERIT

THE ALTON BATTERY COMPANY LTD., ALTON, HANTS
Sole Suppliers of Fuller Stationary Batteries
Telephone: Alton 2267 and 2268
Telegrams: 'Battery, Alton


(Photograph by courtesy of Messrs. Hoover Ltd.) THE

## "ZANDEROLL" PROCESS

 (PROVISIONAL PATENT NO. Il006/44)AN AMAZING NEW COST-SAVING PRODUCTION METHOD FOR FASTER AND BETTER APPLICATION AND TREATMENT OF INSULATING VARNISH

## TO ARMATURES AND STATORS

The "ZANDEROLL" PROCESS is a new and advanced production method for the application of insulating varnish to armatures and stators, which shows a reduction of $50-90 \%$ in total treatment time ; eliminates clean-up of shafts and other parts ; is easily adapted to production lines; requires less floor-space. It gives complete penetration of the varnish, perfect distribution and complete through-drying of the windings.

## The Sterling Varnish Company Ltd.

 FRASER ROAD, TRAFFORD PARK, MANCHESTER 17
GEARED MOTORS


## Ingiv LANCASHIRE DYNAMO \& CRYPTO ITD <br> TRAFFORD PARK. MANCHESTER. 17

Associntad Gompanies :-Foster Transformers \& Switchgear Ltd. . Crypto Ltd. * Crypton Equipment Ltd.


BRITANNIC


AN INDEPENDENT COMPANY, MAKERS OF E.H.T. AND L.T.
PAPER MAINS CABLES, VARNISHED CAMBRIC C.T.S. MINING
TRAILING, "IVERITE" INSULATED CABLES AND THERMO-
PLASTIC CABLES (P.V.C.) FOR 250 VOLT LIGHTING CIRCUITS FOR BUILDINGS OF ALL TYPES.

BRITANNIC ELECTRIC CABLE AND CONSTRUCTION CO. LTD. IVER, BUCKS.

Telephone:
IVER 491

Telegrams:
" BRITANNIC, IVER."
The masing finger writess and, laving wnit, Mowes on: nor all your piety, nor wit Shall lure it herch to cancel half a linere, Nor all your taurs masbo out a word of it."

$$
\alpha_{a r} k_{m, n}
$$

EVER SHED \& YIGNOLES LTD CHISWICK LONDON W4



When writing please mention D. 5/68


## Electric

## SPACE HEATING

handles the vagaries of

## 'BETWEEN SEASONS' WEATHER

' ONE-DAY-HOT-ONE-DAY-COLD.' Between the seasons we get many days of up-and-down temperature; days when only a really efficient thermostotically-controlled 'central' heating system can compensate adequately for temperature changes.

THERMOVENT'S EFFICIENCY. Thermovent Electric Space Heating is such a system. It distributes warm air throughout the space to be heated and thermostatic control makes it completely responsive to temperature fluctuations. No other method is so economical of fuel or labour.

SIMPLIFIED 'CENTRAL-HEATING.' Thermovent is compact and is available either in portable form or can be built into walls or furniture. It causes no wall-blackening and is completely safe heating.

FLOOR-STANDING MODEL is in handsome plastic casing with luminous effect. Prices from 55/0:0 (I Kw). Inset and Industrial Models are also available.

## THERMOVENT

 ELECTRICA product of


S P A C E HEATING
E. K. Cole Ltd.

TECHNICAL ADVISORY SERVICE. Electrical and heating engineers, supply authorities, architects, builders, and planning authorities, are invited to write for full details to Thermovent Heating, (Dept. E.R.), Messrs. E. K. Cole Ltd., 5 Vigo Street, London, W.I.


A Resistance of exceptionally robust construction, wound on high quality vitreous enamelled tubes. Nickel-copper alloy wire is used for the resistance.

An ideal product for use in LABORATORIES, TEST EQUIPMENT, BATTERY CHARGING SPEED CONTROL, etc.

## OLIVER PELL COITHOL LD

CAMBRIDGE ROW WOOLWICH • S•E•18
TELEPHONE: WOOLWICM • $1 \uparrow 22$


## WAR

## PEACE



DURING the six years of War, the whole of our production capacity was utilised and directed towards the successful prosecution of the War.
This changeover was undertaken at the request of the Ministries responsible for war production and the design work and ultimate manufacture of Electrical Equipment, which we carried out during that period, is officially recorded as having contributed substantially towards Victory, both in Europe and in the Far East.
What we made in War was of course secret, but it is no secret that in Peace we can supply your requirements better than others.

N the days of Peace to come, this same organisation, with its skilled engineering development ability and modern equipment, is available to all for the manufacture of the finest Electrical Equipment, incorporating new and advanced designs to meet the needs of Peace.
We invite you to seek our aid in the development and production of specialised Electrical Apparatus allied to Battery Charging, Switchboards, Static Rectifiers, air or oil cooled Transformers, Chokes or Balancer Plant.
We are specialist manufacturers of Commercial Accumulator Charging Plant and hold many master patents which have made our products famous for Efficiency and Reliability.


FLEMING ROAD SPEKE, LIVERPOOLI9. Hunts Cross 1217/8 LONDON OFFICE-ABFORD HOUSE, WILTON RD., S.W.I Telephone : Victoria 5957/8

## IMMEDIATE DELIVERY

## 30 and 60 amp DOUBLE POLE TUMBLER SWITCHES

For Flush and Panel Mounting Cat. No. 80094 (30 amp) Cat. No. 80060 (60 amp)

# ARROW SWVITCMES 

Arrow Electric Switches
Ltd. HANGER LANE, LONDON, W. 5

Tel. : Perivale 4451

## Saxon COMPONENTS

Saxon Silent Chokes and Ballasts are now available for use with 80 -watt Fluorescent Lighting Tubes in all standard voltages.
They should be specified when absolutely noiseless functioning is desired.

Maximum Efficiency and-SILENCE
SAXON COMPONENTS LTD,
66 Victoria Street, London, S.W.I Telephone: Victoria 0804

## CLEAN, PERMANENT MARKING ON <br> BAKELITE, METAL, GLASS, WOOD COMPONENT PARTS, Etc.



LARGE OR SMALL ARTICLES OF ANY SHAPE PRINTED BY ONE SIMPLE MACHINE
Adopted in place of engraving by many leading manufacturers
REAENK LD. ${ }^{75}$ BAKER STREET
Tel. : Welbeck 1979 \& 5141
 elimination of re-wirable fuses. One switch in control ... Interchangeable components . . . Can be used with most meters Complies with E.D.A. Specification

Full particulars on application to
REVO ELECTRIC CO.LTD.,TIPTON,STAFFS

## Do you need "distilled" water?

 Permutit "Deminrolit" Process cuts cost as much as $95 \%$| ANALYSES OF WATER BEFORE AND AFTER TREATMENT BY PERMUTIT 'DEMINROLIT' PLANTS IN COMMERCIAL USE. <br>  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Plant | No. 1 |  | No. 2 |  | No. 3 |  |
| Water | Crude | Treated | Crude | Treated | Crude | Treated |
| Cations <br> Calcium Ca <br> Magnesium Mg <br> Sodium | $\begin{aligned} & 3.2 \\ & 0.8 \\ & 0.46 \end{aligned}$ | $0.23$ | $\begin{aligned} & 9.4 \\ & 0.36 \\ & 1.0 \end{aligned}$ | $\overline{-}$ | $\begin{gathered} 10.7 \\ 1.09 \\ 1.66 \end{gathered}$ | $\begin{gathered} - \\ - \\ 0.44 \end{gathered}$ |
| Total | 4.46 | 0.23 | 10.76 | 0.31 | 13.45 | 0.44 |
| Anions  <br> Carbonate $\mathrm{CO}_{3}$ <br> Chloride Cl <br> Sulphate $\mathrm{SO}_{8}$ <br> Nitrate $\mathrm{NO}_{3}$ | $\begin{aligned} & 4.2 \\ & 1.8 \\ & 1.35 \\ & - \end{aligned}$ | $\begin{aligned} & 0.24 \\ & 0.06 \end{aligned}$ | $\begin{gathered} 12.4 \\ 2.5 \\ 3.48 \\ - \\ \hline \end{gathered}$ | $\begin{aligned} & 0.29 \\ & 0.12 \\ & 0.03 \end{aligned}$ | $\begin{array}{r} 10.5 \\ 2.84 \\ 11.95 \\ 1.15 \\ \hline \end{array}$ | $\begin{aligned} & 0.57 \\ & 0.30 \end{aligned}$ |
| Total | 7.35 | 0.30 | 18.38 | 0.44 | 26.44 | 0.87 |
| Total ions in solution | 11.81 | 0.53 | 29.14 | 0.75 | 39.89 | 1.31 |
| COST per 1000 gallons | 5.22d |  | 9.83d |  | 16.5d |  |

The table shows the composition of some types of water before and after treatment by Permutit's "Deminrolit" Process. Water similar to a distillate is produced by this process at a fraction of the cost. Where distilled water was too expensive you can afford "Deminrolit" water. The process has been in practical use in Great Britain for over 7 years. Write for technical publication "Distilled Water without Distillation" to

## PERMUTIT Company Limited

Dept T.W., Gunnersbury Avenue, London, W.4. Chiswick 6431.


The use of G.E.C. steel cable trunking in connection with heavy cable has many advantages and enables a considerable economy to be made when substituted for multiple conduit runs.
Another big advantage of cable trunking is


C8355 Tee piece
$\mathrm{C}_{3} 35$
Right angle Type A


C8352
Right Angle Type B


Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London W.C. ${ }^{2}$


For all problems in protection-consult METropouta TRAFFORD N縭俎… MANCHESTER I7.


We can offer delivery of a wide range of sizes within a


Telephone : LEYTONSTONE 3636 few weeks from receipt of orders. Please let us know your requirements.

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED CHURCH ROAD . LEYTON . LONDON, E.IO


The illustration shows the Rotor of a $30,000 \mathrm{~kW}$ Waterwheel Generator. The complete Rotor weighs 180 tons and is designed for an overspeed of 410 r.p.m. One of three for New Zealand.

## INCREASE PRODUGTIDN BY CONSulting METROVICKS ILLUMINATING ENGINEERS

Managing Editor:

## September 6, 1946

## Contents:-



EDITORIAL, ADVERTISING \& PUBLISHING OFFICES: Dorset House, Stamford St., London, S.E.I Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No. : Waterloo 3333 (50 lines) Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter Annual Subscription, post free : Great Britain and elsewhere (except Canada), $£ 27 \mathrm{~s} .8 \mathrm{~d} . ;$ Canada, $£ 2$ 3s. 4 d. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW LTD., and crossed "Lloyds Bank."


## SYNCLOCK PROCESS TIMERS and CONTACTORS

for accurate timing of industrial and scientific processes.


- 

The Synclock Synchronous Self-Starting motor ensures accurate timing and repetition when connected to a time controlled alternating current supply.
Wide range of full scale settings are available in Seconds, Minutes or Hours.
Unelapsed time is always visible.
External time adjustments can be provided when required.
Contacts (normally open or closed) reset automatically for next operation.

Write for Catalogue Sheet 611

## EVERETT EDGCUMBE COLINDALE WORKS LONDON, N.W. 9 <br> Telephone: COLINDALE 6045

# Electrical Review 

THE OLDEST ELECTRICAL PAPER - ESTABLISHED 1872

## Traditions

## Characteristics That Must Not be Sacrificed

IN the ferment of to-day, which owes much to an influx of new scientific conceptions and a speeding up of their technical applications against a background of changing political theory, there is a not unnatural tendency to question the validity of many traditional ways of thought and practice. Even the weight that is now (at long last) attached to research as an essential means of providing for the future may appear superficially to be antagonistic to methods that embody the results of past experience which have proved their fitness for survival.

## Proper Use of Knowledge

Changes in machinery, whether material or administrative, react on the human element responsible for ensuring that such changes do mean progress. Certain characteristics cannot be sacrificed without jeopardizing the attainment of even a short-term purpose. Implicit in the proposals worked out by engineering institutions for education and training is the need to foster the capacity to use academic knowledge intelligently (rather than to be satisfied with its mere acquisition), to take the initiative and to be willing to shoulder responsibility. British manufacturers rely on the ability of their representatives in the remotest spots of the earth to " make the machine work," without waiting for further instructions should blueprints not allow fully for local contingencies. That is a distinctive national asset.
Similar qualities were shown by the engineering staffs of electricity supply undertakings in the epic of the "blitz," when
the tradition of keeping the supply going was so nobly maintained. Their success was the logical result of their having been accustomed, in flexible organizations, to adapt pre-arranged plans to suit the varying requirements of day-to-day working. It is second nature to them to add to the value of their nominal duties (without being told to do so) by devising improvements out of their own intimate knowledge of detail and, if necessary, submitting them for acceptance, modification or reasoned rejection by higher authority. Part of their success in developing the electricity supply service on bold lines is the ingrained belief that a man who never made a mistake never made anything-a view that is incompatible with over-centralized administration.

## Personal Service

Engineers are not unduly concerned that the lay public, especially those members of it who are engaged in tasks of a non-progressive nature, should fail to understand the intricacy of their work and the amount of overtime thought given to the solution of its problems. Nor are they disturbed because of lack of appreciation of the magnitude of their contribution to society in providing not only the material basis of modern civilization but also a leaven that is derived from a training which entails a scientific approach to matters in general. What electricity supply engineers most prize in their work is the unhampered privilege of giving spontaneous personal service that engages all their faculties in bringing the benefits
of electricity to the public. If that is denied to them, no promise that they will be allowed to retain their present salaries can remove the sense of frustration that spoils the best work, especially if further discouragement is to come from a realization that their efforts may be frittered away in bolstering up less desirable and less technically advanced competitors.

Four power stations are
> C.E.B. Programme named for the first time in the list of new generating plant (given on another page) for which arrangements have so far this year been made between the Central Electricity Board and supply undertakings. They are widely dispersed, as is the remainder of the $1,029,000 \mathrm{~kW}$, all of which is to be installed within the next three years or so at an estimated capital cost of nearly $£ 40$ million. A good proportion of this figure would be accounted for by site works and civil engineering structures suitable for more than the plant initially installed. A net capacity of $339,000 \mathrm{~kW}$ as scheduled is needed to meet the winter load of 1948 and $690,000 \mathrm{~kW}$ is due to be installed by the end of the following year.

The four stations re-

> New Power Stations ferred to are included among the eighteen, which the Board's Annual Report for 1945 mentioned as required for the four years 1946 to 1949. Their capacities as now stated relate to the first sections only. For 1950 further generating capacity amounting to $1,470,000$ kW will be necessary. Most of this plant will presumably be in new stations, as room for extensions on existing sites is becoming increasingly limited. The substitution of larger and more efficient units for obsolescent plant, however, presents possibilities. This is exemplified at Portobello (Electrical Review, August 9th) where the opportunity is to be taken of adopting higher steam conditions as well.

Again the subject of

## University Training

 specialist and general university training has been raised in the correspondence columns of The Times. Principal John Murray opened the matter in a letter which referred to reports on scientific training which " with tolerance rather than conviction admit as an afterthought theclaims of the arts subjects." This was followed by a letter from Lord Cherwell who deprecated the grafting of " a fuilblown school of engineering " on to any existing university and favoured the establishment of independent institutions of university status, instancing the Zürich and Delft Polytechnica, the Massachusetts Institute of Technology and some German institutions, to ensure an adequate supply of highly-trained engineers. In a later letter Lady Snowden and Sir Patrick Hannon championed the teaching of the "humanities" to the science student to inculcate " the cultural quality of relating his work to the march of human progress and the exaltation of human character."

On another page we

> Australian Voltages reproduce some comments from a Melbourne contemporary on the subject of voltage standardization. It is shown that in different States 230, 240 and 250 V are all employed. The commonest voltage is 240 and the least used (in Western Australia) is 250. Conditions therefore favour the standardization of 240 V , which is in use in four States, from the economic point of view, and if the reasons for the British decision to adopt this as a standard are accepted, where they are applicable to Australian conditions, it is considered that the choice is also technically substantiated. Such a decision would be gratifying to British manufacturers supplying equipment to the Australian market.

As a means of warming

## Heat Pumps

 houses in this country the heat pump is generally regarded as having few prospects. In sunnier climes it holds out more promise of successful application when combined with summer air conditioning. Mr. J. M. Barry, of the Alabama Power Co., addressing the Edison Electric Institute recently, urged that the economic possibilities of pumps that would serve both purposes should be actively investigated. At an annual load factor of 25 per cent, after allowing for diversity, he considers that, at rates of between 1 and 2 cents per kWh , over 30 per cent of the million new houses to be built in the southern United States within the next decade might be warmed and cooled in this way.
## Netals Testins

## Specialized Electrical Equipment Applied to Production

IVN the articles " Making Bolts \& Studs" and "Temperature Treatment" in the Electrical Review of November 30th and December 21st, 1945, we described the essential electrical applications to the processes involved in the production of bolts, etc., at the factory of A. P. Newall \& Co., Ltd., Glasgow. It is now our intention to complete this story by an outline of the main specialized electrical equipment which we saw devoted to inspection and testing of the works raw materials and productions.

It was explained that bar for the manu-
facture of bolts is received from various sources in large quantities, and under these
 point. The instrument, which was supplied by Salford Instruments, Ltd., consists essentially of a cathode-ray tube linked as an electrical
 samples of incoming materials are carried out on a 50 -ton tensile testing machine
balancing bridge between two coils. When two samples of like properties are placed in the coils, i.e., one sample in each coil, a balanced field is obtained, but when unlike samples are introduced the balance is disturbed, so that the loop or line on the cathode-ray tube screen is distorted from its previous form. In this way all unlike material can be readily recognized, and it is a simple matter to test a sample of unknown specification against one the specification of which has already been verified.

Samples from all batches of incoming materials are fully heat-treated before being tested on a 50 ton Denison tensile testing machine to ensure that their physical properties satisfactorily
meet the rigid specifications laid down. Further, while the bolts, etc., are passed through the various processes during production samples are taken from the heattreated batches and similarly proved. Samples of finished parts are also tested on this machine for the Admiralty, A.I.D., M.O.S., and other inspecting authorities. The machine incorporates a hydraulically operated ram, served by a motor driven oil pump, and the load is weighed on a compound-lever system which records on a self-indicating dial. The scale on this dial can be changed to read $5,10,25$ and 50 tons for the full scale, i.e., the full scale can be utilized in each case. Transverse bending and compression tests can also be carried out on the bottom beam of the machine. The radial oil pump is directly coupled to the driving motor which is of 3 H.P. and runs at 960 r.p.m. The motor is direct-on started with pushbutton and contactor control.

Bolts in the process of manufacture have their threads checked at prescribed periods on a Zeiss projector. This applies particularly to those bolts produced by the automatic bolt makers, because in this case the method of manufacture is very fast and a close watch is necessary, not only to check the thread form, but also to ensure that the inspector will readily detect any sign of wear


The electro-limit gauge is used for checking parts ground to a very close limit
or loss of form in the dies. Further, before the manufacture of circular dies for the Steinle thread-generating machines is undertaken a test piece is submitted for check on the projector.

The image is magnified on this machine to thirty diameters. The beam is projected from underneath the work piece under test and through a prism, giving a right-angle turn on to a vertical screen. At the same time the outline of a master thread etched on the graticule, that is, a glass member arranged under the prism, is also projected. The top part of the instrument is moved to bring the beam into line with the helix of the thread, and the image of the thread on one side of the bolt is then superimposed on to the image of the master thread on the screen by means of a 0.0001 micrometer adjustment, and the micrometer


The hardness of finished parts is determined on motorized hardness testers
reading is noted. By taking a similar reading for a projection of the thread on the other side of the bolt the pitch diameter of the thread can be computed.

The detection of cracks in the various products plays quite a big part in the works inspection programme, and this applies particularly to such highly stressed parts as connecting-rod bolts and cylinder studs. During the war about a million aircraft parts per week were crack detected in this factory. The machine used for this work is a development of the well-known Johnson Fel model. The operation is in two parts. In the first the component is loaded between two contact points at about 150 A at very low voltage; secondly, the "charged" component is then immersed in crackdetecting fluid in a tank at the back of the machine for a few minutes, with the result that there is a concentration of the detecting
medium at any defect on the surface of the component under test. There are eight heads at the front of the machine, each with a pair of adjustable contacts, one of which in each case is spring loaded, and
the electric head a steel lever armature is spring mounted between two coils, and is actuated by a contact spindle, the slightest movement of which deflects the armature and thereby unbalances the bridge circuit. A power unit contains two other coils which complete the bridge circuit, together with a voltage regulator, a 10 -to-1


Thef crack-detection equipment has eight heads, each with a pair of adjustable contacts on which the components are "charged""
these contacts are served by a transformer unit incorporated in the machine at one end. On the other side of the machine there is inset in a bench opposite each contact head the fluid tank, so that the head and the tank together comprise one testing unit.

For checking the thicknesses, etc., of parts ground to very close limits, the TaylorHobson electro-limit gauge is used. This instrument is in the form of a column carrying a gauge head which is connected to a meter which records to an accuracy of either 00001 or 0.000005 inch. The range is changed by means of a switch which has a pointer engraved on it to indicate which range is in use. The basic principle of the machine lies in a combination of mechanical gauging contact and electrical magnification. The gauge is set by known standards, and the displacement of the gauging point resulting from a variation in the size of the work being inspected controls the electrical circuit on the electrical balance bridge principle in such a way that errors are shown in a greatly magnified and visible form on the dial of a micro-ammeter. In


The micro-structures of specimens of incoming materials are projected or photographed on this projection microscope
ratio transformer, and a rectifier unit by which a micro-ammeter is operated by direct current.

Hardness checking is effected on most work on a percentage basis, while all special parts and all zase-hardened components are similarly tested. The equipment used for this is a motorized type of Rockwell hardness tester. For soft materials a $\frac{1}{16}-\mathrm{in}$. diameter ball is used with a $100-\mathrm{kg}$ load, direct readings being taken on the "B" scale, while for hardened parts the diamond "Brale" is used with a $150-\mathrm{kg}$ load, and direct readings are taken on the " $C$ " scale. The motor is housed in the base of the machine. The minor load is applied by hand and the major load is applied by a depressor bar which brings a cam on the driven shaft to bear on the loading mechanism. Testing on a production
basis is carried out by a battery of these machines.

Equipment of particular interest in the physical laboratory is a Vickers projection microscope


Electro-chemical analysis apparatus is used for the electrolytic determination of copper, nickel, cobalt, etc. which is fitted with a dual illumination carriage consisting of a " Pointolite" of 150 c.p. and a carbon-are lamp of 500 c.p. Specimens of incoming materials are cut, polished and etched, and then examined for micro-structure. Similarly, specimens are taken periodically from heattreated batches of bolts, etc., in production, and are examined to ensure that the best possible microstructure is obtained for the given heat treatment. The work can be either projected on to the screen or actually photographed.

One of the two items we have selected
which the solution under test is agitated. The cathode is weighed before and after test, and the percentage of the required metal is thereby determined.

The other equipment in this laboratory is a high-temperature furnace which is used for the rapid determination of the carbon and steel contents. The furnace has a platinum-wound tube which affords a maximum working temperature of $1,350 \mathrm{deg} \mathrm{C}$. It is served by a "Sunvic" temperature controller. Essentially the determination is effected by burning off the carbon and steel in a stream of oxygen. The gases are collected in a volumetric gas burette, measured, then passed through an absorption bulb in which the $\mathrm{CO}_{2}$ is dissolved, after which the remaining gas is again measured in the gas burette.

The difference between the measurements is noted, and by correction for normal temperature and pressure, the percentage of carbon in a steel sample is readily computed. The total time taken to effect such a determination is about one minute. Other electrical equipments included in the comprehensive laboratory apparatus are resistance muffle furnaces, drying ovens, water baths and water stills.

We are indebted to Mr. A. P. Newall, managing director, for permission to visit the works and to publish this article, and to Mr. A. P. Newall, jun., director, Mr. C. Reid, works manager, Mr. W. Horn, chief for reference from a comprehensive range of electrical equipment in the chemical laboratory is an electrochemical analysis apparatus which is used for the electrolytic determination of copper, nickel, cobalt, etc., in ferrous and non-ferrous metals. The equipment includes a hot-plate by which the solution to be analysed is warmed, and metal to be determined is plated out of a solution by a platinum anode on to


Rapid determination of carbon and steel content is made by this high-
remperature furnace and its associated equipment
a platinum cathode. A rectifier unit supplies the plating equipment with d.c. at up to 12 V . The motorized head in the apparatus serves a stirrer by
inspector, and Mr. W. Johnstone, chief chemist and metallurgist, for their help in preparing this article.

# I.E.E. Centre Chairmen-I 

## Biographies of Officers

THE new chairman of the Mersey and North Wales Centre of the Institution of Electrical Engineers is Mr. R. Varley, general manager and


Mr. R. Varley engineer of the Mersey Railway Co., Birkenhead. Mr. Varley receiwed his technical education at Sheffield University, and served his apprenticeship with the Sheffield Corporation Electricity Department, with whom, in March, 1922, he became junior engineer. In August of the same year, however, he left Sheffield to join the Mersey Railway Co. with which company he held various posts before being appointed to his present position of general manager and engineer in 1938. He has served on the Committee of the Mersey and North Wales Centre from 1938-39 and from 1942 to date.

Mr. E. T. Norris, chairman of the North Western Centre, won a scholarship at the City and Guilds Engineering College, Finsbury, and received his technical training with the British Westinghouse Co. He joined the Metro-politan-Vickers Electrical Co., in 1919 as transformer designer, and in the following year went to Ferranti's as chief assistant transformer designer, be-


Mr. E. T. Norris coming chief engineer of the Transformer Department in 1922. Mr. Norris is a member of the Institution of Mechanical Engineers, a Fellow of the American Institute of Electrical Engineers, and an Associate of the Manchester College of Technology. He is the author of numerous papers and articles which have appeared in the British and Foreign technical press, and he acted as British delegate to the International Electrochemical Conferences at Paris, Prague, The Hague and Torquay. He is a
member of a number of committees of the B.S.I., E.R.A. and B.E.A.M.A. He is the inventor of the moving-coil voltage regulator and many other devices and he designed the apparatus for producing one million volts for the first time in this country in 1925

Mr. P. Philip, chairman of the Scottish Centre, was educated at Brechin High School and Dundee Technical College. From 1904 to 1908 he served an apprenticeship to marine and general engineer-


Mr. P. Philip ing, and in the latter year commenced his association with the Dundee Corporation Electricity Department with whom he has served in the constructional, distribution, substation and generating departments. From 1922 until his appointment as city electrical engineer in 1941, he was generating engineer and power station superintendent. Mr. Philip is a member of the Institution of Mechanical Engineers and a member of the Institute of Fuel. He has been hon. secretary of the Dundee Sub-Centre of the 1.E.E. for the past twenty years and is immediate past president of the Dundee Institute of Engineers. He is a member of the Consultative Technical Committee of the Central Electricity Board, Central Scotland Area.
The chairman of the North Eastern Centre is Mr. T. M. Ayres, Chief Engineer of the Operation (Transmission and Distribution) Department of the North-Eastern Electric Supply Co., Ltd. Mr. Ayres was educated at Hammond`s Grammar School, Swaffham, Norfolk, and entered the electricity supply industry as an articled pupil with the Urban Electric Supply Co., Ltd. (a subsidiary of Edmundsons), at their


Mr. T. M. Ayres Stamford and Grantham electricity undertakings. From 1914
to 1918 Mr . Ayres was on the generation and distribution staffs of the Cleveland \& Durham Electric Power Co., and after a short period as a cadet in the R.A.F. he joined the staff of the NorthEastern Electric Supply Co., Ltd., in 1919 as an assistant electrical construction engineer in the company's South Durham and North Yorkshire areas. In 1924 he was appointed assistant engineer in charge of electrical construction work in those areas, and held this position until he was transferred in 1935 to the company's headquarters at Cartiol House, Newcastle-on-Tyne, as chief assistant to the electrical construction engineer. In May, 1937, he became deputy engineer, and about six years later he took up his present position.

Mr. Ayres is a member of the North-East Coast Institution of Engineers and Shipbuilders.

## Fluorescent Lamps in France

A CCORDING to information furnished by a correspondent in Paris the Philips TL. 100 fluorescent lamp is at present available in three shades of colour, "white," "warm white," which is rose tinted, and the "daylight" variety, for operation on a.c. circuits at from 115 to 220 V .
The lamp is said to be started instantly by means of a simple switch. It is one metre long and 35 mm in diameter, the tube alone absorbing 22.5 W while the total loading including the rare gas relay (starter) and stabilizing device is from 28 to 30 W . The effective output of light is claimed to be from 35 to 40 lumens per watt input. The useful life of the
tube is claimed to be twice as long as that of a tube is claimed to be twice as long as that of a
good quality incandescent filament lamp. The provision of a diffuser, or screen, is not considered necessary and there is no appreciable temperature rise. These tubes are expected to appeal strongly for interior decorative illumination. The accompanying illustration shows a combination of three of the tubes to form a standard lamp. They are also used in pendant fittings and behind laylights.

## Generating Plant Extensions

INCE the beginning of this year, the Central Electricity Board has made arrangements with authorized electricity undertakings for the installation of the generating plant and boiler equipment, details of which are given below :-

| Area and Station | Owners | Generating <br> Plant (kW) | Boilers (lb. per hr.) |
| :---: | :---: | :---: | :---: |
| Scotland Braehead Portobello Clyde's Mill | Glasgow Edinburgh Clyde Valley Co. | $\begin{aligned} & 1 \times 50,000 \\ & 1 \times 60,000 \\ & 2 \times 30,000 \end{aligned}$ | $\begin{aligned} & 2 \times 300,000 \\ & 1 \times 540,000 \\ & 2 \times 300,000 \end{aligned}$ |
| N.W. England <br> Brom- <br> borough <br> Agecroft | and N. Wales- <br> Birkenhead Salford | $\begin{aligned} & 1 \times 50,000 \\ & 2 \times 52,500 \end{aligned}$ | $\begin{aligned} & 2 \times 300,000 \\ & 4 \times 315,000 \end{aligned}$ |
| M.E. England Skelton Grange Prince of Wales | Leeds <br> Rotherham | $\begin{aligned} & 2 \times 60,000 \\ & 1 \times 50,000^{*} \end{aligned}$ | $\begin{aligned} & 4 \times 360,000 \\ & 2 \times 200,000 \end{aligned}$ |
| $\begin{aligned} & \text { Central Englo } \\ & \text { Staythorpe } \\ & \text { Walsall } \end{aligned}$ | nd - <br> Derby \& Notts Co. Midlands J.E.A. | $\begin{aligned} & 2 \times 60,000 \\ & 2 \times 30,000 \end{aligned}$ | $\begin{aligned} & 6 \times 240,000 \\ & 4 \times 150,000 \end{aligned}$ |
| S.E. England Barking <br> Cliff Quay Southwick Rye House | County of London Co Ipswich Brighton Northmet Co. | $\begin{aligned} & 3 \times 75,000 \\ & 1 \times 44,000 \\ & 1 \times 50,000 \\ & 2 \times 32,000 \end{aligned}$ | $\begin{aligned} & 6 \times 405,000 \\ & 2 \times 365,000 \\ & 2 \times 300,000 \\ & 2 \times 350,000 \end{aligned}$ |
| S. W. England Poole | \& S. Wales-Bournemouth \& Pcole E.S. Co. | $2 \times 50,000$ | $4 \times 300,000$ |
| Total <br> - Less amendment of previous directions for $2 \times 50,000$ and $1 \times 30,000$ |  | $\begin{array}{r} 1,159,000 \\ 130,000 \end{array}$ | 13,000,000 |
|  |  | 1,029,000 | 13,000,000 |

The $339,000 \mathrm{~kW}$ due for commissioning by the winter of 1948 includes $150,000 \mathrm{~kW}$ at Barking, $64,000 \mathrm{~kW}$ at Rye House, $100,000 \mathrm{~kW}$ at Poole and $25,000 \mathrm{~kW}$ due to amendments which have been made in previous directions as stated above.

The remaining $690,000 \mathrm{~kW}$ is required by the winter of 1949. Skelton Grange, Staythorpe, Rye House and Poole, are new stations not included in previous lists. A cooling tower of 3 million gal. per hr. capacity is to be installed at Clyde's Mill and two of 1.6 million gal. at Walsall.

## Czechoslovakian Cable for Russia

The Prague correspondent of the Financial Times reports that the Kablo concern at Kladno has received a Soviet order for cables amounting to $£ 1,000,000$. It is stated that Russia is to furnish 500 truckloads of copper, lead, jute and rubber.

# Views an the News 

## Reflections on Current Topics

IN many matters Government control means a sharing (or maybe avoidance) of responsibility among several departments and unlucky applicants are passed from one to another. It is therefore with pleasure that I note that the Minister of Transport, in his statement on street lighting, said that as regarded procedure in this matter he had arranged with other Departments concerned that even when a number of Departments had to take action in a specific case, one application on the part of the lighting authority would be sufficient.

The New Statesman and Nation is not at all pleased with the way the Government is handling the iron and steel industry which has been such that "the big steel men "have greeted it with "unconcealed satisfaction," suggesting that they have been assured that they need fear no nationalization Bill within the lifetime of this Parliament. The New Statesman asks if this is a turning point in the history of the Labour Government. "If the steelmakers can get away with it, cannot the vested interests in gas, electricity and transport be equally successful?" It is an interesting suggestion, but the cases of steel and electricity are so different. The electricity supply industry is too compact and well organized to escape the net; it will be needed to act as an example of how well a nationalized industry can run to offset some other not-sogood examples.

A London evening paper reports that the Indian cricketers have a "remarkable collection of British goods to take home with them," and specifically mentions electric kettles, electric irons and electric stoves. No indication is given of the composition of the remainder of the collection, but it does not seem to me that the desire of our cricketing guests to take home electrical appliances, which they have apparently come to appreciate during their stay in this country, is in any way remarkable. These same appliances may serve as useful samples for the Indian market.

I have found that some confusion exists with regard to the registration of electrical contractors. In the first place there is the National Register of Electrical Installation Contractors-with which Electrical Review readers should be well acquainted as a good deal of matter has been published on the subject lately. Then there is the registration scheme of the Ministry of Works. Under

Defence Registration 56 AB all persons undertaking building and certain civil engineering contracts are required to be registered by the Ministry. Unlike the N.R.E.I.C. this takes no account of ability to carry out the work. Anybody will be granted a certificate of registration unless a previous certificate has been withdrawn or the applicant has been convicted of offences under the building control regulations. It is therefore quite legitimate for incompetent operators to describe themselves as "registered contractors," but if they use the term "registered electrical contractors," not being on the National Register, they are on rather uncertain ground and anyway they are deceiving the public.

In commenting on the proposed emergency conversion of 1,200 main-line locomotives to oil firing, The Times suggests that the advantages of railway electrification may be correspondingly increased as coal becomes more costly. This is certainly correct in regard to fuel saving, since the 14 million tons of coal per annum could be replaced by not more than 5 million tons burned in power stations. Moreover, the first figure relates to coal classed as "large" and therefore suitable for other purposes. In regard to comparative costs, however, in spite of progress in power station efficiencies, the Central Electricity Board could hardly offer terms so favourable to electrification as it could before recent advances in the price of coal, which have borne no relation to its commercial value, upset the economic balance.

There was a sports discussion in a television programme one evening last week and in the course of it a speaker referred to the possibility of carrying on football, tennis, etc., by artificial light to give working people more opportunities of participating in these sports. He referred to what was being done in Sweden in this way. Such arrangements would not be new to this country; there were quite a number of schemes of this kind before the war and even to-day illuminated dog-racing tracks are common. At the moment, I suppose, Mr. Shinwell would look askance at anything which added to the consumption of fuel, but I will risk the displeasure of dog-racing enthusiasts by suggesting that lighting used for football or tennis would be less of a waste than that employed at the country's numerous greyhound "stadiums" (or stadia).-

REFLECTOR.

# Swedish Water IPower Resources 

## One-Third of Total Developed

ABOUT one-third of Sweden's total potential water-power resources estimated at 40,000 million kWh a year are at present utilized, according to Swedish toreisn Commerce, published by the General Export Association of Sweden. The aggregate capacity of the hydro-electric stations is to-day approximately 2.5 million kW , and the total power output in 1945 amounted to 13,500 million kWh . This figure corresponds to a production per inhabitant of $2,050 \mathrm{kWh}$ per year, which is surpassed only by Norway, Canada and Switzerland. Owing to the shortage of imported fuel the Swedes had to expedite the development of their water-power resources during the war. While in the years 1936 to 1940 the water-power production only grew by about 1,200 million kWh , the increase during the following period up to 1945 totalled about 5,000 million kWh .

As the falls in central and south Sweden, which are the most industrialized and densely populated areas of the country, are almost fully utilized, further demands for power must mainly be supplied from the northern parts of the country, where already a large number of power plants are in operation. Among existing stations, Trollhattan, 50 km north of Gothenburg, and Krangede, on the Indal River, in the north, are two of the largest with a capacity of over $200,000 \mathrm{~kW}$ each. They will, however, be surpassed by the plant now in the course of erection at the Harsprånget falls in Lapland, which will have a capacity of approximately $260,000 \mathrm{~kW}$. In addition several plants of between 20,000 and $100,000 \mathrm{~kW}$ are being built. The number of steam-power stations in Sweden is relatively small, and many of these, especially
the big ones in Visteris, Stockholm and Malmo, are chiefly used as stand-by stations.
The transmission of electric power from distant parts of the country has required the building of an extensive power line system. There are at present four long-distance trunk lines, a fifth line will be ready in 1947, and a sixth and seventh in 1949 and 1950 respectively. One of them has a length of over 700 km and will later on be increased to 1.000 km or more.

All power stations of any importance in the country are now interconnected, and a joint central distribution organisation in which the private owners and Government-owned plants are collaborating on a voluntary basis, has been set up. to control this network.

In terms of capacity, the Swedish Government owns 36 per cent of the water-power plants, industrial companies 24 per cent, municipalities 6 per cent and private hydro-electric power companies 34 per cent. About 70 per cent of the energy produced is absorbed by the industries. The railways consumc 10 per cent and the balance of the energy produced, 20 per cent, is consumed by small industries, farms and households. All towns and villages are completely electrified, and in the countryside 85 per cent of the houses have electricity supply.

The exploitation of Sweden's " white coal " is, however, growing ever more expensive as most of the falls within convenient reach and comparatively easy to harness, have now been developed. Many of the new plants, like Harspranget, are being built in desolate parts of Norrland or require the blasting of enormous discharge tunnels in order to create sufficient height of fall for the turbines.

## Electricity Supply in Russia

THE August issue of the Engineers' Digest contains a translation of an article on the Russian electricity supply industry published in Electrotechnicky Ohzor. According to this, "* the Soviet Government attaches no particular importance as to whether the individual power stations are under the control of the State, of municipal corporations or of industrial works. The main concern of the experts in charge is reliability and economy."

Electricity supply undertakings are in four groups. The large district power stations, which account for about three-quarters of the total installed capacity, are under the jurisdiction of the Ministry of Electricity Supply. There are four regional grid systems comprising the most important industrial and mining areas.
The other three groups, which cover smallcapacity stations of merely local importance, are the municipal stations (under the Ministry
of Municipal Affairs), the rural stations under the Ministry for Agriculture and the industrial stations. The groups are supervised by a central planning commission. Each of the four regional grid systems has a managing office and each individual undertaking has a manager appointed by the Ministry of Electricity Supply. The senior officers are nominated by the regional managing office and the rest of the staff by the manager, who is responsible for the technical and administrative sides of the undertaking. He is assisted by a works council which assists in maintaining discipline.

It is stated that each undertaking is given ? definite " target" and if this is bettered any additional profit is shared by the managemen and staff. Employees' wages are determined by their qualifications and the amount of work done individually, a certain minimum being required of every employee.

## COIRRESP(DNDENCE

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

## Domestic Water Heating

:ITH reference to the article which appeared on page 135 of your issue of July 26 th, some years ago I carried out detailed tests on various arrangements of immersion heaters and on circulators, using a cylinder suitably designed to observe temperatures at various levels, and I reached the conclusion that the best arrangement is a vertical immersion heater.
As soon as this is switched on, hot water begins to rise in contact with the element. 1 found that the production of hot water at the top of the cylinder is nearly as rapid as with a circulator and without the disadvantages of the circulator under thermostatic control, which are the low average temperature of the water in the cylinder and the high temperature of the water inside the top of the tube, which causes rapid scaling. I have known circulators in North London to

- become completely choked with scale in less than a year.

With a long vertical immersion heater, the installation can be run with a higher average water temperature than with a circulator, and yet with a lower maximum temperature. This ensures better service from a given cylinder and freedom from excessive scale. It might be noted that the vertical immersion heater has been adopted as standard in practically every make of lagged storage water heater.

Abergavenny, Mon. W. C. McCallum.

## Immersion Heater Terminals

WE should like to draw the attention of manufacturers to the inconvenience caused by not having the connection terminals marked and printed instructions given for three-heat control or thermostat connections. The general practice appears to be four unmarked terminals forming the connections for two circuits, two of which have to be bridged when connected to a thermostat.

In these days, particularly, when purchasers have to get a plumber or fit the heaters themselves due to shortage of skilled electricians, they often complain that the heater does not work or else it takes hours to get any hot water (due entirely to wrong connections). Once the heater has been fitted
to the tank, it is very difficult to explain to clients how the circuit can be traced out. This applies even to the skilled man; if he has fitted the heater before noting the tube or blade formation, time has to be wasted in testing out the circuits. Surely it is a simple matter for manufacturers to remedy this obvious omission.

Mortimer, Gall \& Co., Ltd.
London, E.C. 4.
G. S. Gorringe,

Sales Department.

## "A Universal Plug-Now"

$\boldsymbol{T}^{1}$ is becoming increasingly plain that "Plain Engineer" is one of the type of people who will agree to any plug and socket so long as it is his particular fad. It is difficult to get some of our colleagues to agree to anything. However, there is one fact which we must all acknowledge and that is for so many years the engineers in our industry have not had the moral courage to grasp the plug and socket situation and settle it once and for all.

It is surprising that our consumers have tolerated the situation for so long and it is now apparent to me that my friend " Plain Engineer" has identified himself with a particular plug and socket and is most reluctant to contemplate any change at all. I would like to reassure him that he is not alone in this. We are all facing this, and while the building programme is in its present state, it is a sobering thought that we have no universal standard ready at the present moment.

The " small body " purporting to represent the views of the industry to which your correspondent has referred covered as wide a field as possible and I give the constitution of that body at one stage of the proceedings. In addition to this, a number of deputations were received and their proposals were considered at great length and patiently. With a little thought on the matter it will be appreciated that the Technical Committee of the B.S.I. is charged with the task of producing a specification, which is a most difficult job and should have all help from the rest of the industry.

Whether this question is settled this week or next year, the fact remains that we are at
last putting our house in order, and that in itself should be some compensation for the inconvenience which is bound to occur at some stage or other.

I maintain that this is the time to carry out the change and I think it can be done intelligently and with tolerance.
A. G. Connell,

## Halifax.

 Engineer and Manager.[The list appended by Mr. Connell to his letter includes the names of representatives of the following bodies on the B.S.I. Electrical Industry Committee under the chairmanship of Dr. C. C. Paterson, O.B.E. (now Sir Clifford Paterson):-Admiralty, General Post Office, M.O.L. Factory Department, National Physical Laboratory, Ministry of Works, Ministry of Supply, Central Electricity Board, railway companies, Electricity Commission. Association of Consulting Engineers, B.E.A.M.A., E.R.A., Cable Makers' Association, Electrical Contractors' Association, Electric Lamp Manufacturers' Association, Incorporated Association of Electric Power Companies, London Electricity Supply Association, Provincial Electric Supply Association, Incorporated Municipal Electrical Association, Public Service Transport Association, Institution of Electrical Engineers, Electric Light Fittings Association, Air Ministry, British Electrical Development Association and Ministry of Fuel and Power-Editors, Electrical Review.]

## Fluorescent Lighting Effects

IN his article in your August 16th issue Mr. R. O. Ackerley quotes the British Medical Journal as referring to " speculations as to possible ill-effects of fuorescent lighting," but surely when considerable numbers of users, both here and in America, experience eye trouble, headaches, etc., when working with this type of lighting it is reasonable to attribute the trouble to some harmful effect of the light.
If only one or two instances were known one might admit the possibility that the trouble was due to some other factor than the light and that it just happened to coincide with the period when this light was being used, but such instances are far too numerous to be dismissed as "coincidences" and incidentally when the British Medical Journal says that "no valid evidence of harmful effects is known" one would like to know what is meant by "valid evidence" and what more valid evidence is required than the fact that so many people appear to suffer from various eye and head troubles after using fluorescent lighting.

Surely it is not so much evidence of
harmful effects that is lacking as knowledge of how and why such effects are produced. "H.H.'s" suggestion in your issue of August 30th that the practically undamped frequency oscillations are the real or chief cause of the trouble seems very cogent, as such oscillations must have a more marked effect upon the retina and iris muscles than the same oscillations applied to a hot filament which largely damps them.

I am a little surprised that Mr. Ackerley, and apparently Mr. Weston and others, should attribute all these troubles to faulty design and layout, for surely manufacturers of the equipment should be able either to install it correctly themselves or to instruct their salesmen and agents as to how it should be installed. If they are not competent to ensure its correct installation may we not equally doubt these manufacturers' competence to produce an article which is harmless in itself?

There have been quite a number of articles and letters in the technical press recently professing to "refute" the rising tide of complaints by users of fluorescent lightung and this fact alone seems to indicate that at all events there is something quite serious to refute.

Incidentally, this form of lighting is claimed to be economical in power, yet I find that 7 or 8 watts per sq ft is quite commonly being used, while in the old days of ordinary filament lamps $\frac{1}{4}$ to $1 \frac{1}{2}$ watts was about the usual range: in fact the latter figure was colossally high for direct lighting, yet the fluorescent type of lighting is direct and now we are being told that the cause of the trouble is that the intensity of the light is not high enough.

London, W.C.I.

## G. V. Downer.

## Is There a Shortage?

IOBSERVE in the "Electricity Supply" notes in the Electrical Review of August 23 rd the report of the borough engineer of Sunderland on the shortage of electrical equipment for houses.
If he will take the trouble to go to one of the chain stores, he will find enough switches, holders, etc., to carry out this work. I noted in Sheffield this week huge quantities of all types of accessories, by a maker of good repute, on sale and this, I think, is general in most towns.

Nottingham.
Walsall Conduits, Ltd.
> E. P. Prior, District Manager.

# PERSONAL and SOCLAL 

## News of Men and Women of the Industry

THE September meeting of Blackburn Town Council will be asked to agree to a new salary for the borough electrical engineer (Mr. R. H. Harral), which will not carry war bonus or fees paid for pupils, both systems being abolished. The salary for the position will be increased from $£ 1,534$ to $£ 1,650$ rising to $£ 2,052$, in accordance with the "Walker " scale.

Mr. H. E. Annett, M.I.E.E., who, as we reported in our last issue, is retiring from the position of borough


Mr. H. E. Annett electrical engincer at Bolton in January next, received his technical training at Faraday House from 1899 to 1903, and the whole of his career has been spent with the Bolton electricity undertaking, where he commenced in 1902 as a junior engineer. He occupied the successive appointments of engineer in charge, station engineer and resident engineer, before becoming borough electrical engineer and manager in 1927.

A presentation was made recently to Mr. G. H. Lake, who has retired from the position of city electrical engineer at Nottingham, by the staff of the Electricity Department. The presentation took the form of a cheque and facsimile of an inscribed silver plate which will adorn a television set which Mr. Lake proposes to obtain with the cheque. The presentation was made by Mr. M. Wadeson, deputy electrical engineer, and Mr. Lake in accepting the gift referred to the happy relations which had always existed between himself and the staff.

Mr. W. J. Forster informs us that he has now taken up his appointment as borough electrical engineer at Wallasey.

Mr. H. C. Johnson, assistant installation and meter superintendent with Barking Corporation Electricity Department, has been appointed installation engineer in the High Wycombe Corporation Electricity Department.

Mr. H. R. Mills, M.Sc. (Lond.), A.M.I.E.E., has been appointed Assistant Director of the Science Department of the British Council. Educated at Taunton's School and University College, Southampton, he became a Professor of Physics in the Madras Christian College and specialized in spectroscopy. In 1935 he was appointed principal of the Cochin State Government College, affiliated to Madras University,
and served as a member of the Senate and the Academic Council. During the war he served in the Royal Indian Navy as an engineer It.-commander, engaged in anti-magnetic mine work and the training of electrical officers. In 1943 he was appointed Assistant Director of Education at Naval Headquarters, India, and liaison officer with the Director of Admiralty Research and Development (India).

Capt. P. Gibson, R.M., formerly of the Ministry of Works, has been appointed resident engineer manager by Neale \& Partners, Edinburgh.

The Sheffield City Council has approved an increase of the salary of the general manager and engineer of the Electricity Department, Mr. John R. Struthers, to $£ 2,500$ per annum.

Mr. J. C. Fraser, M.I. Mech. E., manager and engineer of the Johannesburg Electricity Department, is now paying his first visit to Edinburgh since he left there in 1904.

Mr. T. G. Symonds Babb, C.B.E., Chief Mechanical and Electrical Engineer of the Air Ministry Directorate-General of Works, and Mr. T. E. H. Pitt Kennedy, O.B.E., Superintending Engineer, retired at the end of August. They were entertained at the Savoy Hotel, London, on Saturday last by the senior staff of their Division, when Sir Ernest Holloway, K.C.B., O.B.E., Director General of Works, made presentations to them from their colleagues. Mr. Babb will be succeeded as Chief Mechanical and Electrical Engineer by Mr. A. Watson, B.Sc., M.I.E.E., M.I. Mech.E.

Mr. R. G. Flanagan, who during the war was inspector of cooking equipment, Northern Command, has returned to Carron Company as Northern sales engineer, Electric Cooking and Heating Dept. Mrs. Flanagan is resigning her position with the company, held during Mr. Flanagan's absence.

After forty-six years with the Post Office, Mr. A. E. Ryland, telephone manager in the Newcastle-on-Tyne area is to retire and will be succeeded by Mr. F. Hobbs, at present telephone manager at Middlesbrough. Mr. Ryland went to Newcastle as telephone traffic superintendent eighteen years ago and in 1932 was appointed telephone manager in South Wales. In 1936 he returned to Newcastle as telephone manager. He was awarded the O.B.E. during the war. Mr. Hobbs was telephone manager at Middlesbrough for two years. Mr. W. J. Bentlett, who was previously telephone manager at Middlesbrough, but has been doing special work in Germany, is returning to his former post at Middlesbrough.

Long service presentations were made in the works canteen of W. T. Henley's Telegraph

Works Co., Ltd., on August 26th, when five veterans received gifts of national savings certificates. These veterans, who had each completed over forty years' service when they retired at the end of June, were Messrs. E. Humphrey, W. H. Young, M. Sullivan, G. T. R. Ling and W. S. Vamplew. Mr. A. W. McArthur, M.I.E.E. (works manager), opened the proceedings and Sir Montague Hughman (chairman) made the presentations. Other officials present included Mr. A. T. Winder (assistant works manager), Mr. H. A. Hughes (personnel officer), Mr. S. E. S. Sellers (foreman, Rubber Covering Department), Mr. J. H. Savage, M.I.E.E. (chief electrician), Mr. G. H. Morris (foreman, Lead Covering Department), and Mr. J. T. Alderton (foreman, Laying-up Department).
Another Henley long service employee who has recently retired is Mr. P. J. Cross (chargeman), who commenced with the company in 1906. Mr. A. W. McArthur presided at a presentation ceremony held at the works on August 23 rad and paid tribute to the long and faithful service rendered by Mr. Cross.

The Caroline Haslett Trust has now awarded its scholarships in electrical housecraft for the session 1946-47. In accordance with the terms of the trust deed there has been a geographical distribution of scholarships, and this year's holders will train at colleges in Aberdeen, Newcastle, Bath, London, Liverpool and Bristol.

The scholarships, which are worth $£ 150$ for the session, have been granted to the following: Miss Margaret Nichol Burton (Liverpool); Miss Jill Oliver (Birmingham), Miss Barbara Cecil Redford (Bowdon, Cheshire), Miss Elizabeth Ruth Musson (Musselburgh), Miss Sadie S. Silver (Hull), and Miss Brenda May Gawne (Wallasey). The Committee have also made a grant to Miss Fay Constance Lynton, of Douglas, Isle of Man, who will train at the Manx Technical College.

Appointments Vacant.-Among the vacant positions advertised in this issue are the follow-ing:-Electrical engineer and manager at Bolton (salary $£ 1,600$ per annum, plus bonus); assistant designing engineers, senior engineers and engineers in the New Zealand State HydroElectric Department (salaries $£ 800-£ 850$, $£ 565-£ 800$, and $£ 435-£ 500$ respectively); chief constructional assistant, Brighton Electricity Department (salary $£ 1,000$ per annum, plus war bonus); power installations engineer and installation engineer, Sheffield Electricity Department.

## Obituary

Mr. G Gledhill.-The death occurred on September 2 nd of Mr. Gilbert Gledhill, a director of Gledhill-Brook Time Recorders, Ltd, and a past chairman of the Incorporated Sales Managers' Association. He was fiftyseven.

Wills.-Mr. A. J. Fuller, M.I.E.E., borough consulting and electrical engineer of Fulham, and a past-president of the Incorporated Municipal Electrical Association, who died in February, left $£ 17,273$ (net personalty $£ 15,403$ ).

Mr. R. W. Moore, of Whipp \& Bourne, Ltd., left $£ 995$ (net personalty $£ 937$ ).

Mr. F. M. Platt-Betts, Kensington, left $£ 201$, all to the Electrical Industries Benevolent Association "in consideration of benefits received."

## I.E.E. Students' Sections

THE opening meeting of the South Midland Students' Section of the I.E.E., for the 1946-47 session will be held on September 11 th at 6.30 p.m. at the James Wait Memorial Institute, Great Charles Street, Birmingham, when Mr. F. Crook (chairman of the Section), will give an address on "Electric Resistance Furnaces."

The summer outing of the North Eastern Students' Section of the I.E.E. will take place in the High Force Area on September 15th. A motor coach will leave Newcastle Central Station at $9.30 \mathrm{a} . \mathrm{m}$. and will proceed to Langdon Beck where it will meet a coach carrying members of the Teeside Area. Members should bring their own lunches, but tea will be served at the High Force Hotel. As usual ladies are cordially invited. The party will be limited to thirtytwo from Newcastle area and twenty from Teeside and the cost of the outing will be 14s. 6d. per person, payable in advance.

Members wishing to travel from Newcastle should notify Mr. J. L. Morris, while those from Teeside should get in touch with Mr. F. Linsley for further details.

## Liverpool Electrical Engineering Courses

PART-TIME day courses for electrical engineering apprentices will be held at Liverpool City Technical College during the winter session, which commenced on September 2nd. The courses have been devised for apprentices engaged in various sections of the electrical engineering industry - general electrical engincering, electrical installation work, manufacture of electrical apparatus and specialities, maintenance work and power generation, distribution and utilization. The Electrical Advisory Committee consists of representatives from the Automatic Telephone and Electric Co., Ltd., the City Electrical Engincer's Department, Electrical Contractors' Association, P.O. Telephone Department, and the Electrical Trades Union. There are also evening courses in electrical engineering.

## Institute of Welding

The North London Branch of the Institute of Welding is holding a meeting on Wednesday next at the Polytechnic, Regent Street, W. 1, at 7.30 p.m. when Mr. T. J. Palmer will give a lecture on "The Weldability of Malleable Cast Iron."

# Street-Lighting Equipment 

## Exhibits at Next Week's A.P.L.E. Conference

ALTHOUGH the exhibition, which is to be held from Tuesday to Thursday next week at the Central Hall, Westminster, in connection with the Association of Public Lighting Engineers’ Conference, will include much apparatus that is already well known, many new products make their first appearance. The preponderance of electrical apparatus continues to increase and three-quarters of the forty displays are of wholly or mainly electrical interest. The growing popularity of electric discharge lighting is also very noticeable. Brief details of the exhibits follow:-

Automatic Telephone \& Electric Co., Ltd. An exhibit showing the "Rythmatic" centralized remote control system is designed to represent a typical power station control room through the windows of which can be seen a model city with a complete network of street lights. In all other respects the exhibit is "life size" and visiting engineers may inspect a standard control desk and take over the control of the model network, injecting signal frequencies generated by a motor alternator of the type suitable for small installations. The switching operations which they have initiated can be seen functioning.

Prominence is given to the galvanometer type relay responding only to one predetermined frequency impulsed at a fixed rate or "rhythm." This dual selective principle of the relay ensures complete reliability in operation and immunity from interference. Moreover, its design imposes no limitations on the method of injection employed.

Brighton Lighting \& Electrical Engineering Co., Ltd.-This company will exhibit a comprehensive range of street lighting lanterns, brackets, both for pole and wall mounting, time-switch, fuse-switch and control gear in cast-iron boxes, illuminated pillars for traffic control, and flood-lighting projectors. For Group " A " lighting two new types, the "Triplite" and "Multilite" lanterns employ three gas-filled lamps in line. For Group "B " lighting there are types with single or double-piece refractor glassware, giving the maximum light output and control. Attention is also drawn to " Bleeco" illuminated bollards with traffic signs, and a new cast aluminium flood projector.
British Electrical Development Association.Attention is drawn to the prominent part played by electricity in providing economical, safe and adequate street lighting. Charts illustrate the progressive reduction in the average price of electricity used for street lighting, the large and steady expansion in the amount of electricity used annually, and the
quantity of illumination obtainable from various types of electric lamp per lb of coal per kWh generated. Other illustrations relate to the main principles governing the siting of street lamps, to particulars of various large authorities who have recently decided to adopt electricity for street lighting, and to the many advantages of this source of illumination.
British, Foreign and Colonial Automatic Light Controlling Co., Ltd.-Among a comprehensive range of time switches from 5 A single contact to 50 A mercury break. special interest is centred in the $10-\mathrm{A}$ model "GF." made in hand-wound clockwork or synchronous motordriven types. This is one of the smallest switches on the market, and is adaptable for use either in lamp standard bases, watertight cases or for fitting to existing control boxes. It has hand control for operating the switch or for test purposes. Change-over, two-circuit control and multi-operative switches, together with models for special purposes; are also shown.
British Thomson-Houston Co., Lid.-1lluminated panels show how the careful siting of the appropriate type of street lantern can make

B.T.H. "Mazdalux " horizontal enclosed lantern
striking improvements to the lighting of public highways. Typical cross roads, roundabouts, " $T$ " junctions, bends and single and dual carriageways are depicted to demonstrate how the maximum amount of light can be directed where it is most needed. The " Mazdalux" lanterns displayed are typical of the very wide range designed by the company to meet all requirements. A new range of lanterns designed to accommodate every size and type of " Mazda " and " Mercra " lamp used for street lighting, includes a horizontal enclosed type (illustrated) and makes it possible for an entire city, and all the roads leading to it, to be lighted with lanterns which have a uniform daylight appearance.
Concrete Utilities, Ltd.-A full-size sectional model of a 1 ft 6 in . bracket illustrates the
method of taking the cable through to the lantern, patented tension bolt fixing, and safety tube. There are also scale models of the latest lamp columns, with sections of concrete in various colours and finishes.
Edison Swan Electric Co., Ltd. Several new street lighting fittings will be available early in 1947. The range displayed includes the "London" minor, medium and major lanterns.
Electric Street Lighting Apparatus Co.Reflectors of the "Bi-Multi" system include

"Esla Bi-Multi AL/IHS" reflector for $85-\mathrm{W}$ or $140-\mathrm{W}$ sodium lamp
designs for use with sodium lamps, the "AL/ 1 HS " (45-W lamp) (illus.), "AL/2HS " (60-W) and "AL/3HS" (85-W or 140-W). All have the distinctive mirror facet construction.

Engineering \& Lighting Equipment Co., Ltd. The "Orbital" lantern is completely water-tight and the refractor plates are of improved design to give greater efficiency. The "Hamilton" fitting with its one-piece aluminium alloy body is designed for top or side suspension, while the "Golden Ray" fitting for sodium lamps has had the prismatic plates redesigned.

A new range of fittings will be exhibited for tungsten filament lamps, the "Royston" and "Stevenage," suitable for $300-500-\mathrm{W}$ gasfilled or $80-125$-W fluorescent mercury lamps, consisting of a one-piece aluminium alloy casting with a specially designed single-piece refractor.

"Ware" Iantern
(Engineering \& Lighting Equipment Co.)
The "Stevenage" has a clear outer globe and the fitting is dust-proof. The "Welwyn" and "Ware " (illus.) for 60-200-W tungsten filament lamps or $80-125-\mathrm{W}$ mercury lamps, have a
new design of single piece refractor, giving two-way distribution at 170 deg in the horizontal plane. The "Ware" has a clear outer globe and the fitting is dust-proof. There will be other fittings, new raising and lowering gear with only one moving part, a winch, control gear boxes, and ripple control relay units.

Falk, Stadelmann \& Co., Ltd.-To comply with the findings of the MO.T. Committee on street lighting in its final report all of the eight "Efesca" lanterns shown, except one, incorpor ate a bowl or dome type prismatic refractor. Both of the two types intended for Group "A" roads, the "Hilux " (illus.) and "Hotspur," are of the enclosed type taking 250 - or $400-\mathrm{W}$ m.v. lamps. For Group "B" roads there are


Falk, Stadelmann " Hilux' lantern
three enclosed units, the "Albacore," "Comet " and "Dragon," and three open type, the "Albatross," " Dalux" and "Albemarle."

Foster \& Pullen, Ltd.-Scale models indicate the range of public lighting equipment available. Any Group " B " scheme can be carried out by one or other of the lanterns shown.
General Electric Co., Ltd.-A range of street lanterns includes three new designs. A unit of rather unorthodox design for side streets (illus.) is a two wing directional lantern, each wing carrying six flat mirror facets. Side entry suspension at 30 deg from the vertical ensures that no condensation can enter the lantern from the bracket. The lantern can be used with filament lamps up to 200 W or with either of the two small "Osira" h.p.m.v. lamps. A new side street lantern for sodium lamps has windows in each side into which are cemented two $10-\mathrm{in}$. by 5 -in. refractor plates with sealed prisms. The lampholder and lamp steady are carried on an over reflector which hinges downwards to facilitate wiring.

Originally known as the "Double Dish" lantern, the "Dioptrion" lantern gives a controlled cut-off form of light distribution and is arranged for use with $250-\mathrm{W}$ or $400-\mathrm{W}$ horizontal burning m.v. lamps. It incorporates a magnetic defiector. Arranged for side entry

G.E.C. faceted reflector lantern forside streets
mounting, the die-cast, light alloy body carries two large dish-shaped refractors so that more than 90 per cent of the lantern surface is translucent. Despite this practically no light is directed above the horizontal. A refractor plate lantern for sodium lamps for main road lighting can be used with $85-$ or $140-\mathrm{W}$ sodium lamps. The "Uniway" lantern giving unidirectional lighting has advantages for lighting dual carriageway roads. It takes $80-\mathrm{W}$ or 125 -W m.v. lamps. The versatile "Difractor" lantern can be used for nearly every kind of main road lighting.

Gowshall, Ltd. -This company's illuminated guardposts have a high finish and are designed for ease of installation and maintenance. All components are standardized and can quickly be replaced on site by unskilled labour. Internally illuminated signs and external lighting fittings are displayed.

Holophane, Ltd.-Attention is drawn to the remarkable degree of resistance of Holophane glass refractors to temperature variations, moisture and atmospheric

"Actadis" contactor panel (Measurement, Ltd.)
over the past twenty years the company guarantees that mal-operation of these relays will not exceed 1 in 10,000 . To achieve this reliability the series emission method has been adopted, making it possible to propagate a powerful signal and to employ a correspondingly robust and simple relay of positive response. Other advantages claimed are minimum spillover interference; freedom from inadvertent operation by harmonics and surges; no limitation on network extensions; emission may be sectionalized, providing greater flexibility and better voltage regulation: and foolproof operation due to absence of complicated time coding. Another interesting exhibit is a rotating miniature reproduction of the "Actadis" installation which has been put in at Hazel Grove electricity works (illus.). impurities, and to their robustness and durability, which make them suitable for use in any climate. The company's Special Service Department is available to advise and assist with any particular problem and to suggest lay-outs to meet specific requirements.*

Horstmann Gear Co., Ltd.-Among a range of time switches the type "K" unit has the smallest practicable overall dimensions consistent with safe design. Self-starting synchronous motor-driven movements are fitted as standard. Special attention is directed to adequate provision in design and layout of the switchgear. A new electric wind movement has been evolved and solar dials are becoming increasingly popular.

Measurement, Ltd., shows its "Actadis" ripple control equipment. From its experience
or $400-\mathrm{W}$ m.v. lamps, gives close control of light in the vertical plane to ensure optimum distribution for maximum road brightness, with the avoidance of glare. The "Gower" bowl refractor lantern, with a copper body riveted to a cast-iron canopy, is suitable for use vertically with 250 - and $400-\mathrm{W}$ m.v., 80 or 125 -W fluorescent m.v. lamps, or with a dome refractor and clear outer well glass, 300 - or $500-\mathrm{W}$ m.f. lamps. Either two-way axial, two-way non-axial, or symmetrical distribution in plan is available with either type of lantern. Taking the same range of lamps the "Urmston" lantern has a neat arrangement for side-entry mounting. Available in three different lengths to take 45-, $60-, 85$-, or $140-\mathrm{W}$ sodium lamps, the "Poplar" lantern provides distribution of 160 deg in plan as standard, although a distribution of 180 deg can be supplied if required.

For Group " B" roadways, the "Ealing " unit is a top entry bowl refractor lantern for side street lighting. The one-piece bowl refractor supplied as standard gives a two-way non-axial distribution, but alternatively a bowl providing a symmetrical distribution can be supplied. It can be used with 80 - or $125-\mathrm{W}$ $\mathrm{m} . \mathrm{v}$. lamps or $100-150$ - or $200-\mathrm{W}$ m.f. lamps. The "Welwyn " top entry lantern, for 100-150or $200-\mathrm{W}$ m.f. or $80-125$-W m.v. lamps, consists of a one-piece aluminium alloy casting having a high resistance to corrosion. The complete lampholder assembly is readily removable.
Philips Lamps, Ltd.-The six ratings of mercury and fluorescent mercury lamps and the four of sodium will figure prominently on this stand. Attention is also drawn to lanterns shown by other exhibitors incorporating these lamps.
Poles, Ltd. In addition to small-scale models of "Adastra" galvanized sectional steel street lighting columns, there is a display of photographs of sixteen standard types of column suitable for Group "A" and Group " B" lighting and for supporting ornamental lanterns. On the front of the stand, at either side, are fixed a short hexagonal and circular column made from actual components used in practice. Components such as standard bracket arms in galvanized steel and spigot adaptors in cast aluminium alloy will be on view, together with a full size base section with inspection door and detachable slotted steel instrument panel fixed inside the column.

Radiovisor Parent, Ltd.-The Radiovisor lighting control unit operates according to daylight intensity. Lamps are automatically lighted during premature darkness in the daytime, and automatically extinguished when normal daylight conditions return. The unit, is being used for the control of street lighting, lighting in offices, factories, railway and works yards.

Record Electrical Co., Ltd.-A working model of a portion of a town lighting system illustrates some applications of the Record remote operated selective switching units. Selective switching
of lights is shown on two different systems of wiring-through a pilot wire, and by interruption of the main circuit when no pilot wire exists. Both schemes can be operated from a central point, either manually or by a time switch to give any pre-arranged combination of lighting up to eight.
Revo Electric Co., Ldd.-Lanterns of the "cut off," "semi-cut off" (illus.) and "non cut-off" types for use with sodium, m.v. and

$\begin{aligned} & \text { Revo "controlled light" fitting for } \\ & I 40-W \text { sodium lamp }\end{aligned}$
tungsten lamps provide wide distribution both laterally and longitudinally to give good illumination on the pavements as well as on the roadway. Graphs and illumination data will permit ready comparison of the relative merits of these units.

Two other interesting exhibits are a prototype unit for street lighting using twin 80 -W fluorescent lamps, and a lantern combining high efficiency in sodium light distribution with a certain amount of colour correction laterally for shopping centres.
Sangamo Weston, Ltd.-A display of meters includes Sangamo " Type HMT " house service meters of the single-, double- and triple-element pattern; the "Model S. 11 " rotating substandard meter for checking house service meters; and the "Lincoin" thermal type maximum demand indicator. Synchronous motor-driven time switches are available with a standard 24 -hour dial, a solar dial, or with a 1 -hour dial. The day omitting device enables the whole sequence of operations to be cut out on any predetermined day or days of the week. The model S .16 hour meter is designed to record the number of hours during which an electrical circuit or electrical apparatus has been functioning.

A new range of moving coil, moving iron and dynamo meter instruments comprises $12-\mathrm{in}$. scale laboratory standards, 6 -in. scale sub-standard and switchboard models and miniature panel mounting types in various sizes. The dynamometer wattmeters are to be supplied as single-, double- or triple-element types. Single-phase sub-standard wattmeters are available in three forms. The $6-\mathrm{in}$. scale moving-iron instruments have linear scales down to 10 per cent of the maximum reading.

A new $54-$ range, $6-\mathrm{in}$. scale test set gives measurements over a wide range of voltage, current and resistance including insulation
resistance at 500 V d.c. A pocket-type footcandle meter for general checking purposes is another new product.

Two types of moving-coil relays are exhibited, one for automatic control and the other with magnetic contacts which will not release until reset by hand or by remote electrical control. Both relays can be made to operate on currents as low as $5 \mu \mathrm{~A}$.

Siemens Electric Lamps and Supplies, Ltd."Sieray" electric discharge lamps, chokes and capacitors are arranged to show their internal construction. Two lanterns for Group "A" roads are the "Barnet-Sieray," incorporating Holophane refractor panels for use with the $250-$ and $400-\mathrm{W}$ "Sieray" m.v. or 300 - and 500-W "Sieray-Dual " lamps; and a new bowl refractor lantern.

For Group " B " lighting an enclosed version of the "Newton-Sieray" minor lantern incorporates a single-piece dome refractor, a clear-glass outer globe assisting maintenance in a dust-laden atmosphere. A second tantern is the "Marton-Sieray," a small bowl refractor unit. A working model of lantern raising and lowering gear demonstrates features of the contact head, in which the number of moving parts has been minimized.

A sample lighting scheme prepared by the Siemens Illuminating Engineering Department is available for inspection. The stand is lighted by $80-\mathrm{W}$ "daylight" fluorescent tubular lampe in decorative fittings of a type suitable for uss in public buildings. Photographs of other designs can also be seen. The lighting of the showcase is carred out with the new $2-\mathrm{ft}$. $20-\mathrm{W}$ "Sieray " fluorescent lamps.

Spun Concrete, Ltd.-Reinforced concrete hollow spun poles are a speciality of this firm, which claims by means of its centrifugal process to ensure uniformity at high density of concrete approximately 160 lb per cu ft ; absolute impermeability; infallible centralization of the reinforcement; and minimum weight with maximum strength.

Standard Telephones \& Cables, Ltd.-A working model using " Perspex " strip lighting indicates the basic principles of operation of the company's d.c. bias system of street lighting and off-peak load control. The operation of the various items used in this system is also demonstrated. A comprehensive range of the heavier grades of rubber and p.v.c. cables covers all types of public lighting installations. Attention is also drawn to the time-saving features of "Stanelco" resistance heating soldering tools.

Stanton Ironworks Co., Ltd.-A spun concrete lighting column is surrounded by a small stand in which there will be a porthole to allow the root to be seen. Three 2 in , to the foot scale models indicate other types of column. The Stanton column has a smooth granolithic finish obtained by grinding after the centrifugal moulding has taken place. This results in a permanent finish which does not require painting or other maintenance.

Stewart \& Lloyds, Ltd.- A lighting column $15-\mathrm{ft}$ mounting height, complete with swan-neck bracket, is shown fitted with switchgear, condensers, etc.; also a pillar type lighting column, with lantern and lighting unit, and cast-iron dwarf base for ornamentation purposes if desired. In addition there is a base section of a $25-\mathrm{ft}$ mounting height lighting column generally used for lighting traffic routes, together with part of the upper fluted shaft, collars and footpieces. Photographs show other types of lighting columns.

Venner Time Switches, Ltd.-Of special interest among a wide range of time switches of the hand wound, electrically wound and synchronous motor driven types is Type " MSSL," a self-starting synchronous motor driven solar dial unit. A demonstration set shows the application of the Venner pilot relay system to the control of public lighting. Various types of clocks and synchronous movements, as applied to time switches, will also be shown by the company.

## Jet-Propulsion Engine

ANOTABLE feature of the exhibition to be held by the Society of British Aircraft Constructors at Radlett, Herts, from September 12th to 15th will be an F2/4 MetropolitanVickers axial-flow jet-propulsion engine. This engine is the latest form of those installed in the Gloster aircraft which in November, 1943, made the first flight of a British machine powered by this type of engine and which embodied experience gained by the company in designing gas turbines for the same purpose since 1938: this in turn owed much to the research carried out by the company on materials for use with high-temperature steam.
The engine to be shown is 13 ft 3 in . long and $3 \mathrm{ft} \frac{3}{3} \mathrm{in}$. in greatest diameter and weighs $1,750 \mathrm{lb}$. Its maximum speed is $7,700 \mathrm{r} . \mathrm{p} . \mathrm{m}$. and its specific
fuel consumption is 1.05 lb per hr per lb ; the rated thrust is $3,500 \mathrm{lb}$. It comprises a singlestage turbine, a ten-stage axial-flow compressor and annular combustion chamber, into which kerosene is sprayed through twenty atomizing jets; Diesel oil has also been successfully used. Starting is by a de-clutchable electric motor.

Compensation for varying fuel demands at different altitudes is provided. A special electrically heated furnace was used to ascertain the required stress distribution with the steep temperature gradients in the turbine disc when in operation and other high temperature phenomena. A large amount of compressor testing with wide speed variations was carried out at the power stations of the Northampton Electric Supply Co. and of Wigan Corporation.

# South Afican Commission 

Review of Activities in 1945

TWE end of hostilities found the power supply industry in South Africa severely handicapped by shortages of generating capacity and distribution equipment to meet the widespread demand for electricity for mining, industrial and domestic consumers.

In its report for the year ended December 31st last the Electricity Supply Commission states that numerous requests for new or extended supplies were received including inquiries from towns and villages remote from any of the Commission's existing power stations. Apart from the shortage of plant and materials there was also a great scarcity of skilled labour. In addition prices rose to such an extent as to make the supply of electricity to isolated small communities uneconomic for the time heing.

The Vaal station, which will have ar installed capacity of $200,000 \mathrm{~kW}$ will supply the initial requirements of the developing gold mines in the


Concrete poles for the new 88-kV line between Harrismith and Bethlehem

Odendaalsrust area of the Orange Free State. The nearest mining development is taking place at a point 120 miles distant from the power station and it is proposed to transmit the power by means of an $88-\mathrm{kV}$ line. A new power station will probably be required by the ime the mines reach production stage and the
question of a suitable site is now being investigated. The two $33,000-\mathrm{kW}$ generating sets supplied by the Metropolitan-Vickers Electrical Export Co., Ltd., went into service in January and April, 1945. Of the three $33,000-\mathrm{kW}$ Ljungstrom main sets and the $7,000-\mathrm{kW}$ house set ordered from Sweden in 1939, the house set and No. 2 main set were delivered in October, 1945, and the last set was expected to leave Sweden in June this year. The first of the three machines is almost ready for commercial operation, and the other two are expected to be in service by November this year. A further house set and four additional boilers are on order for delivery within two years.

Complaints have been received from residents in the vicinity of Congella power station regarding coal dust and ash deposits from the station. The Commission while doing everything in its power to abate the nuisance, points out that when it was decided to build the station the site was in a swampy area isolated from any established residential locality or industrial activities. The belated commissioning of the $40,000-\mathrm{kW}$ set in February this year which should have been in operation in 1941, was attended by many operating troubles. The dust and grit extraction plant provided for the new $200,000-\mathrm{lb}$ boilers did not come up to guaranteed efficiency, and it has been necessary from time to time to take the boilers out of service in order to effect modifications to the precipitators.

## Table Bay Extensions

Orders for all the major items of works connected with the Table Bay power station extensions of the Cape Town City Council had been placed by the end of 1945 , but it is not anticipated that the new plant will be ready for service by the winter of 1947 as was planned in the first instance. Details of the system to supply power to the proposed main line electrification from Cape Town to Touws River, with the possibility of an extension of the scheme to Beaufort West, are still under consideration and no work has yet been put in hand. In conjunction with the proposed main line electrification, which will operate at $3,000 \mathrm{~V}$ d.c., the Railway Administration intends also to convert to that voltage the present suburban $1,500-\mathrm{V}$ system.

In the Natal Central undertaking, the extensions to the Colenso station referred to in the previous report are well in hand. Work on the new $88-\mathrm{kV}$ line on reinforced concrete poles from Harrismith to Bethlehem continued throughout the period under review.

In its last report the Commission sounded a warning that tariff increases might be unavoidable during the next few years as the result of
increased costs. No increases were made during the year under review, but some of the undertakings operated at a loss, and the net result of the year's working on all undertakings was a deficit of $£ 17,123$. The Durban undertaking was mostly affected and certain adjustments to the tariffs of that undertaking will therefore be necessary during the current year.

At December 31st last $872,650 \mathrm{~kW}$ of plant was installed in the Commission's main stations, and plant under construction or on order will increase the total to $1,085,856 \mathrm{~kW}$. The output for the year totalled $4,861 \cdot 4$ million kWh , a record, and exceeded the previous year's total by 317.6 million kWh . Sales amounted to 4,706 million kWh , an increase of $290 \cdot 3$ million kWh . The average cost per kWh sold advanced from $0 \cdot 1818 \mathrm{~d}$, to $0 \cdot 1930 \mathrm{~d}$. and the price received from $0-1755 \mathrm{~d}$. to $0 \cdot 1862$.

The revenue for the year was $£ 3,770,631$, as compared with $£ 3,353,508$ for the previous year and the total expenses were $£ 3,787,754$ (against $£ 3,345,681$ ), leaving a deficit, as already stated, of $£ 17,123$.

An addendum to the report gives statistics relating to the whole of the Union, extracted from the 1943-44 industrial census. This shows that the total electricity gencrated was $8,042 \cdot 9$ million kWh and the total sales were $6,919 \cdot 7$ million kWh . The total installed plant capacity of 318 stations was $1,905,035 \mathrm{~kW}$.

## Registration of Contractors

Ministry's Explanation

TT has been suggested to the Ministry of Works that many of those concerned do not fully understand the requirement that anybody doing building or civil engineering work in connection with certain activities must be registered under Defence Regulation 56AB. The Ministry has accordingly asked the trade press to explain the position.

Certificates of registration are granted by the Ministry upon receipt of a completed form (B.C.E.ZG.) which is obtainable from the Registrar, Building and Civil Engineering Contractors, Ministry of Works, 271-277, High Holborn, W.C.I. Control of entry into the industry has been discontinued and certificates are granted to all applicants, unless a previouslygranted certificate has had to be revoked or the applicant has been convicted of illegal building.

Among the activities covered by the regulation are:-(a) the construction, alteration, repair, decoration or demolition of buildings, or the provision of water, light, heating or other service for a building; (b) the construction, alteration, repair, or demolition of docks, harbours, bridges, roads, viaducts, aqueducts, canals, inland navigations, pipe-lines, plant foundations, cooling towers and ponds, cable trenches, cable ducts, railways, aerodromes, sea defences, river works, piers, quays, wharves,
reservoirs, filter beds, sewage works, sewers, tunnels and gasholders, the erection of overhead line supports and any works of a similar nature, or the provision of water, light, heating or other services for any such works; and (c) the carrying out of any processes, operations or manufactures incidental to the carrying on or any of the services detailed in (a) and (b).

The general effect of this is that all undertakings which are engaged wholly or mainly in the installation of heating, ventilation and electrical equipment in building and civil engineering work (among others) must be registered.

## Australian Voltages

## Standardization Proposals

THE recent decision in this country to adopt 240 V as the standard consumers' voltage has prompted the Electrical Engineer and Merchandiser (Melbourne) to review the position with regard to voltages in Australia. Our contemporary says that three different voltages are in use: New South Wales, Queensland, South Australia and Tasmania employ 240 V between phase and neutral, a voltage of 230 is standard in Victoria, and Western Australia uses 250 V . In parts of Adelaide and Melbourne there are $200-\mathrm{V}$ systems which are being changed over.

In 1938 the Standards Association of Australia recommended a standard voltage of 230 but at the same time added a proviso that in those States where 240 V predominated or had been declared standard by statutory regulation that voltage should be recognized as the permissible standard. In each case a variation of plus 6 per cent and minus 4 per cent was allowed.

In Western Australia, where there are relatively few consumers as compared with other States, there has been no attempt to bring the voltage into line. The Western Australian Government has embarked on a plan to standardize the frequency and with this in view is to equip the new South Fremantle station with 50 -cycle machines. A frequency changer is to be installed to convert the output of the existing East Perth 40 -cycle station. It is considered that this provides an opportunity for standardizing the voltage at the same time.

The prevalence of 240 V in Australia makes this the most economical standard, " and if the reasons for the British decision are accepted where they are applicable to the Australian conditions the choice is also technically substantiated."

## Glasgow Exhibition

A list of the exhibitors at the forthcoming technical exhibition at the Kelvin Hall, Glasgow (November 15 th to 27 th ) shows a very substantial electrical representation. The hon. director of the exhibition is Mr. D. M. Slorach, 19, Ladysmith Avenue, Sheffield, 7.

## Australian Trade

## Increased Imports in $1944-45$

THE Australian Government has published detailed statistics of the overseas trade of the Commonwealth for 1944-45. The figures relating to electrical goods and apparatus have been extracted and are shown in the accompanying table together with notes of increases or decreases compared with 1943-44. The trade was shared almost wholly between the United Kingdom and United States with little

| Class of Goods | $\begin{gathered} 1944-45 \\ £(000) \end{gathered}$ | Inc. or dec. on 1943-44 $£(000)$ |
| :---: | :---: | :---: |
| Dry cells | 144 | + 101 |
| From United Kingdom | 13 | 101 $+\quad 00$ |
| " United States | 131 | $+\quad 90$ $+\quad 34$ |
| Nickel alkaline batteries | 42 | $+\quad 34$ $+\quad 10$ |
| From United Kingdom . . | 12 | $+\quad 10$ $+\quad 24$ |
| Storage United States | 10 1 | $\begin{array}{r} 24 \\ +\quad 7 \end{array}$ |
| Storage battevies for motor vehicles | 10 | $\begin{array}{r} 7 \\ -\quad 17 \end{array}$ |
| Other batteries and parts From United States | 10 9 |  |
| Cable and wire, cotion-covered | 18 | $\begin{array}{r} \\ +\quad 8 \\ \hline\end{array}$ |
| From United Kingdom | 18 | +8 $+\quad 51$ |
| Telegraph and telephone cable | 105 82 |  |
| From United Kingdom | 82 22 | $\begin{array}{r} 7 \\ -\quad 44 \end{array}$ |
| Light and power cable, paperinsulated, lead-covered | - $53 *$ | - 13 |
| Other cable and wire for light and power | 452 337 | - 315 $-\quad 48$ |
| From United Kingdom . . | 337 113 | 148 $-\quad 265$ |
| Ohe" United States | 113 34 | $\begin{array}{r}\text { a } \\ -\quad 265 \\ +\quad 22 \\ \hline\end{array}$ |
| Other covered cable and wire From United Kingdom | 34 31 | $\begin{array}{r}+\quad 22 \\ +\quad 24 \\ \hline\end{array}$ |
| From United States | 3 | - |
| Motors under 1 H.P. (separate) | 118 | + 62 |
| From United Kingdom . . | 63 | $+\quad 24$ $+\quad 35$ |
| " United States | 51 4 | $+\quad 24$ $+\quad 3$ $+\quad 78$ |
| Switch units above 15 kV | 142* | 28 $+\quad 78$ |
| Switch units above regulators, etc. . | 6* | $\begin{array}{r}\text { + } \\ \hline-\quad 10 \\ \hline\end{array}$ |
|  | 25 | + 14 |
| From United Kingdom .. .- | 1 | - 14 |
| , United States | 24 | + 14 |
| Liquid slip regulators, thrustors, etc. | 1 | - $\quad 5$ |
| Generators, induction .- | 41 33 |  |
| From United Kingdom . United States | 33 8 | 1 $-\quad 6$ $-\quad 7$ |
| Genërators, a.c. variable speed, commutator type | $23{ }^{3 *}$ | 1 <br> $+\quad 6$ |
| Other a.c. generators From United Kingdom | 15 | $\begin{array}{r}6 \\ +\quad 1 \\ \hline\end{array}$ |
| From United States | 8 |  |
| Otherr d.c. dynamo-elec. machines | 99 | 13 $+\quad 13$ |
| From United Kingdom - | 72 | + 12 |
| From United States | 27 | 10 $+\quad 2$ |
| Alternators for turbines | 92 | - 10 $-\quad 39$ |
| From United Kingdom | 62 30 | $\begin{array}{r}10 \\ -\quad 39 \\ \hline\end{array}$ |
| , United States | 30 379 | + 29 |
| Generators for turbines | 379 | T |
| From United Kingdorn | 132 | $\dagger$ |
| ," United States .. | 144 |  |
| Relays, swirches, fuses, cut-outs, etc | 105 | $+\quad 32$ $+\quad 23$ |
| From United Kingdom . . | 105 33 | $+\quad 32$ $+\quad 9$ |
| Lamp̈s, filament, automobile | 30 | 19 |
| From United Kingdom . | 19 | - 11 |
| From United States .. | 10 | + 10 |
| Lamps under 20 V including tor | 50 |  |
| fashlights <br> From United Kingdom | 12 |  |
| From United Singes |  |  |
| .. Canada .. |  |  |

appreciable change in their respective shares.
Among noteworthy items in which increases were recorded were certain kinds of batteries, fractional-horse-power motors, telegraph and telephone material, transformers and radio parts. Radio sets were imported to a decreasing extent, as also were measuring and recording instruments and cable. The grand total was $£ 6,446,000$ against $£ 4,851,000$ in 1943-44.

| Class of Goods | $\begin{array}{r} 1944-45 \\ \quad(000) \end{array}$ | Inc. or dec. on 1943-44 $\notin(000)$ |
| :---: | :---: | :---: |
| Lamps, 20 V and over, gas-filled | 17 | + |
| From United Kingdom.. | 8 |  |
| , United States | , | $+$ |
| Other lamps, 20 V and over | 3* |  |
| Heating and cooking appliances | 30 | 8 $+\quad 13$ |
| From United Kingdom .. | 28 | 13 $+\quad 13$ |
| ,, United States | 77 | 5 40 |
| Measuring and recording instruments | 77 53 |  |
| From United Kingdom . | 53 |  |
| " United States | 23 | $\begin{aligned} & +\quad 1 \\ & -\quad 1 \end{aligned}$ |
| Regulating and controlling apparatus | 107 | + 19 $+\quad 1$ |
| From United Kingdom ., *. | 92 | $\begin{array}{r} \\ +\quad 62 \\ \hline\end{array}$ |
| United States | 14 | 8 |
| Rectifiers | 21 | 18 $-\quad 7$ |
| From United Kingdom | 11 | - 71 |
| ," United States | 10 | - 11 |
| Static transformers, under 66 kV | 64 | + <br> $+\quad 12$ |
| From United Kingdom . . | 59 | + 29 |
| ", United States ${ }^{\text {a }}$. | 52* | $+\quad 17$ $+\quad 25$ |
| Static transformers, 66 kV and over | $322^{*}$ | 17 $+\quad 269$ |
| Telegraph instruments and appliances | 324 50 | $+\quad 269$ $+\quad 31$ |
| From United Kingdom .. .. | 50 272 |  |
| Telephones United States | 272 156 | $\begin{array}{r}+\quad 31 \\ +\quad 236 \\ \hline \quad 9\end{array}$ |
| Telephones From United Kingdom | $\begin{array}{r}156 \\ 32 \\ \hline\end{array}$ | T 9 |
| , United States | 123 | $\dagger$ |
| Telephone switchboards and appliances | 899 | $+396$ |
| From United Kingdom . . | 295 | - 62 |
| , United States | 603 | + 458 |
| Electric vacuum tubes | 16 | + 6 |
| From United Kingdom | 2 | 5 |
| United States | 13 319 | - 5 |
| Radio valves | 319 | + 5 |
| From United Kingdom | 114 203 | + 12 |
| United States Canada | 203 2 | $\begin{array}{r}+\quad 12 \\ +\quad 33 \\ \hline\end{array}$ |
| Radiö receiving sets | 110 | - 131 |
| From United Kingdom | 30 | - 17 |
| " United States | 74 | - 119 |
| Canada | 4 | + 4 |
| Radio parts | 1,008 | - 371 |
| Fiom United Kingdom | 146 | 14 |
| " United States | 760 | $\begin{array}{r}14 \\ +\quad 259 \\ \hline 100\end{array}$ |
| , Canada .. | 100 | $\begin{array}{r}\text { a } \\ +\quad 100 \\ \hline\end{array}$ |
| Elecirical appliances, n.e.i. | 988 | $+\quad 474$ +309 |
| From United Kingdom | 692 | $+\quad 309$ $+\quad 152$ |
| " United States | 274 | + 152 |
| $\dagger$ Comparable figures not available. |  |  |

In 1944-45 Australia exported electrical goods to the value of $£ 299,000$ against $£ 183,000$ in 1943-44. The principal markets were New Zealand and the Pacific Islands with India and Ceylon also figuring. The principal classes were radio goods ( $£ 66,000$ ), batteries ( $£ 30,000$ ), cable and wire $(£ 23,000)$ and refrigerators ( $£ 22,000$ ).

# COMMEIBCE and IVIDUNTRY 

## Appliances for Home Market. Plant for Scotland.

## Rising Electrical Production

IN the Monthly Digest of Statistics for August prepared by the Central Statistical Office in collaboration with the Statistics Divisions of Government Departments details are given of deliveries of British-built machine tools, electric motors, welding sets and power tools. The value of deliveries of electric motors of from $1-300$ H.P. was $£ 1,017,000$ in June, as compared with $£ 1,119,000$ for May. The number of portable power tools delivered in June was 6,039 , as compared with 8,184 in May. Deliveries are given for July for welding sets. These show a total of 505 arc welding sets, valued at $£ 55,000$ and 109 resistance welding sets, valued at $£ 21,000$.

In a table showing the production and supplies of electrical appliances for the home civilian market, considerable increases are shown for the first quarter of the current year (the latest figures available) as compared with the last three months of 1945. The average monthly production of electric fires totalled 179,700 (against 122,000 in October-December, 1945), of which 163,900 were supplied for the home civilian market ( 115,000 ). Electric irons produced rose during the same period from 170,100 to 250,500 (home market from 155,000 to 214,100 ), electric vacuum cleaners from 20,400 to 33,100 (home market from 17,300 to 26,700 ), and electric kettles from 22,000 to 34,900 (home market from 21,000 to 29,400 ). The monthly average for 1937 was as follows:Electric fires: 115,000 produced ( 100,000 for home market). Electric irons: 112,000 produced ( 100,000 for home market). Electric vacuum cleaners: 34,000 produced ( 33,000 for home market). Electric kettles: 35,000 produced ( 30,000 for home market).

## Refining of Brass Scrap

The Ministry of Supply has entered into arrangements with copper refineries in the U.S.A. and Canada under which the Ministry
electrolytic copper. The brass scrap is mainly 70:30 ammunition scrap and ingots cast from ammunition scrap. The Ministry expects about 100,000 tons of copper to be returned to this country. The bulk of the contracts have been placed with American refineries.

## British Aluminium Acquisition

The British Aluminium Co., Ltd., announces that the Falkirk Rolling Mills, designed and operated for the Government during the war, have now been acquired for commercial purposes. The factory was originally laid out primarily for the production of heat-treated aluminium alloys for aircraft, but is now also producing sheet and coiled strip for prefabricated houses, furniture, and many other new or re-established peacetime uses for aluminium. The plant is one of the largest and most up-todate units in the country for producing sheet and strip rolled products in pure aluminium, and a full range of work-hardened and heattreated alloys.

## Blackpool Tableaux Wanted by South Africa

Blackpool Corporation Flectricity Committee has received a request from the city electrical engincer, East London, Cape Province, to sell him illuminated tableaux for use during the royal visit to South Africa next year. Having regard to shipping difficulties the Committee has decided that it cannot sell the tableaux but has agreed to forward illustrations and specifications and to render other technical assistance.

## Model Turbine

Our illusiration shows a model of a steam turbo-alternator, with its auxiliaries, recently made by Bassett Lowke for the English Electric Co., Ltd. Made to the scale of $\frac{1}{2}$ in! to the foot, it is a faithful reproduction in every detail


Model 32,000-kW English Electric turbo-alternator
will ship for treatment during the next fifteen months about 148,500 tons of brass scrap and the refineries will return the copper content as
of the original set installed in the Taylors Lane power station of the Northmet Power Company.

The original turbine is remarkable for the
high steam pressure and temperature employed 1,300 lb. persq in. at $950 \mathrm{deg} F$. The electrical output totals $32,000 \mathrm{~kW}$, of which $30,000 \mathrm{~kW}$ is accounted for by the main alternator, which generates at 33 kV . An unusual feature in turbo-alternator design is that the main shaft extends to a duplicate gear box from which two low-speed shafts are driven, each running at 1,010 r.p.m. One drives the house alternator, and the main and pilot exciters. To the other are coupled two variable voltage d.c. generators which, on the Ward-Leonard principle, are used. in connection with the unified boiler control system. The model should be of material assistance both in future turbo-alternator design and for exhibition purposes.

## Submarine Cable to Germany

The longest submarine telephone cable between this country and Europe has been laid since the end of the war by the General Post Office. It goes direct to Germany, is 200 nautical miles long, and provides five telephone circuits or four telephone and eighteen telegraph circuits. As originally laid it provided only one telephone and six telegraph circuits, but the additional circuits have been made possible by the provision of a special submarine repeater developed by the Post Office engineers.

## Radio-controlled Tractor

In co-operation with the Royal Aeronautical Establishment at Farnborough (Kent), Tractors (London), Ltd., The White House, Bentley Heath, recently gave a demonstration of a radio-controlled tractor at Knifton's farm, Bentley Heath, Hertfordshire. The radio equipment and mechanical accessories were almost standard parts from early models of the "Queen Bee" apparatus for pilotless aircraft. Standing in a corner of the field with a switchbox in his hand, the ploughman sent out various combinations of four radio signals which caused the tractor to start and stop, turn left and right, and plough when directed. The transmitter used had a range of 25 miles, but should the idea prove worth developing, a less powerful equipment could be designed with a range of one mile.

At the tractor end were a radio receiver and a relay box, which operated the various controls of a standard tractor by means of compressed air supplied from a cylinder. A future development will be either a compressor attached to the tractor motor, or a very low horse-power electric motor to produce the power for the mechanical operations. Mr. J. C. Reach, managing director of the company responsible for the experiment, believes it is capable of easing and speeding many of the operations in farming routine. It is suggested that one operator could control six tractors working in series.

## Builders' Manufactured Goods of Iron and Steel

On July 1st, a notice was issued announcing that builders' manufactured goods of iron and steel could now be obtained without a certificate to purchase. The following statement has been issued by the Ministry of Works in response to
requests for more information regarding procedure and for a list of items of builders manufactured goods covered by this procedure. The list of builders' manufactured goods include the following:-Domestic cookers (gas and electric), cast-iron and steel radiators, wash boilers (gas and electric), and lifts. Manufacturers are given a bulk supply of cast-iron and steel for the production of builders' manufactured goods to meet all requirements (including those of Government Departments, local authorities, public utility undertakings, builders and contractors and the general public). No "M" Form, or other purchase certificate is required, In the case, however, of those items of builders' manufactured goods which are included in the scheme for the priority distribution of building materials and components, the provisions of that scheme will, of course, apply. Items not classified as builders' manufactured goods include plain castings or finished steel which are not subject to any additional manufacturing process, e.g., structural steel, tubes, pipes and standard fittings therefor and wire products. These items are covered by the procedure described in the Control of Iron and Steel Orders which provides that, with certain exceptions, an " $M$ " Form must be obtained for individual requirements.

## Token Imports from Switzerland

As previously announced, arrangements have already been made for a small flow of imports to be known as "token" imports, to come into this country from Canada, the U.S.A. and Belgium. Arrangements have now been completed whereby token imports of the same goods will be admitted from Switzerland at the same rate of 20 per cent per annum by value of the Swiss manufacturers' pre-war trade in the goods in question with the United Kingdom. The Swiss manufacturer or exporter, should apply for this certificate to the Swiss Export Licensing authority, and should send it to the importer in the United Kingdom who will then make application for the import licence.

## Telecommunications Conference

The United States has been advised by the Soviet Government that September 28th has been fixed as the new opening date for the preliminary Five-Power Telecommunications Conference in Moscow. The conference was postponed last month at the request of Great Britain and America.-Reuter.

## Electrical Machinery for Australia

Machinery worth $£ 1,000,000$ is being supplied to Australian electricity producers by C. A. Parsons \& Co., Ltd. This was revealed by Sir Claude Gibb, chairman of the company, when he arrived in Sydney by air on a month's visit. He said the company was spending $£ 1,000,000$ on plant reconstruction in order to help meet orders at present held. Half of the orders, worth $£ 15,000,000$, are for export.Reuter.

## Improvements at an L.M.S. Depot

Improvements to be carried out by the L.M.S. Railway at its permanent way stores depot at Crewe include the provision of a $7 \frac{1}{2}$-ton capacity
electro-magnetic cranc, capable of lifting six rails at a time, in heu of two smaller cranes capable of lifting only one rail at a time. The new crane will operate on a ferro-concrete gantry 80 ft wide and more than 300 ft long, spanning a rail siding. An electric rail saw for cutting steel rails into any required lengths is also being installed as part of the improvement scheme.

## Turkish Telephone Orders

The Turkish Government has placed an order with the General Electric Co., Lid., for more than $£ 500,000$ worth of telephone transmission and teleprinter equipment. The whole of the equipment will be manufactured at the G.E.C. telephone works at Coventry, and delivery will commence in a few months' time. G.E.C. engineers will go to Turkey to supervise the installation. While completing an order for 15,000 automatic telephones for South America, the company has received an order for 15,000 more telephones from Montevideo, Uruguay. Orders for telephone equipment have recently been received from twenty different countries.

## Trade Announcements

Hendrey Relays, Ltd., have moved from Bourne End to a new factory in Bath Road, Cippenham, near Slough (telephone: Burnham 645).

The Hoffmann Manufacturing Co., Ltd., opened a branch office on September 2nd at 217, Westgate Road, Newcastle-on-Tyne, 1 (telephone: Newcastle 26508; telegraphic address: "Hoffmann, Newcastle").
E. K. Cole, Ltd., have announced a widening of their service organization which will handle the service interests of the Lighting and Heating Divisions of the company, Dealer Instruction Schools, Car Radio Installation Advisory Service. etc., in addition to the radio service. Mr. E. W. Shepherd (Service Centre-Somerton Works, Southend), becomes manager of all E. K. Cole service activities, and he will be assisted at headquarters by Mr. J. Proctor (commercial interests), Mr. C. E. Butler (works liaison and technical matters), and Mr. H. Fuller (chief clerk). At the Provincial Depots, the following district service managers have been appointed:-Messrs. D. A. Nicol (Glasgow) ; A. E. Rothschild (Manchester) ; and A. C. Hopkins (Bristol). In addition, Mr. S. A. Howard is resident engineer at Birmingham.
The Worcester Office of British Insulated Callender's Cables, Ltd., has been moved to 37, Broad Street. The telephone number is unchanged.

## Works Visit

On August 26th the Lord Mayor and Lady Mayoress of Birmingham (Alderman A. S.
Giles and Mrs. Giles) visited the works of Giiles and Mrs. Giles) visited the works of
William McGeoch \& Co., Ltd. Owing to the William McGeoch \& Co., Ltd. Owing to the
unavoidable absence of Mr. W. McGeoch, managing director, the visitors were received by Major P. McGeoch, director, and Mrs. P. McGeoch. Before the tour of the works the departmental managers and senior members of the staff were presented to the visitors. The works fire brigade was also inspected. In
the Switchgear Department, the Lord Mayor made a presentation to Mr. W. Barnett on behalf of the directors. Mr. Barnett, who is seventy-three, has just retired after forty-eight years service with the company. Other old employees were presented to the Lord Mayor during the tour.

## Surplus Machine Tool Sale

An " on-site" sale of 300 machine tools will be opened at the K.L.G. Plug Factory, Bridgend Trading Estate, South Wales, on September 18th and will continue until September 24th. Any machines not disposed of during this sale will be on view at the factory from September 25 th to October 1 st for competitive tendering. The machines include capstan lathes, millers, grinders, drillers, and miscellaneous types.

## Southwark Showrooms Extension

The Southwark Borough Council has purchased sites in Penrose Street, adjoining the power station, on which it is proposed to carry out extensions to the electricity showrooms at a cost of $£ 15,500$.

## "Industrial Ten"

The Board of Trade announces that the "Industrial Ten " supplement of clothing coupons for the $1946-47$ ration period will bc issued before the end of this year. The opening date will be announced in due course and employers and workers are asked not to send inquiries to the Board of Trade or to local offices of the Ministry of Labour.

The schedule of qualifying occupations will be similar to that for 1945-46, except that workers in clothing factories where the machines are not driven by mechanical power or where less than ten workpeople are employed are now included. No further claims in respect of the 1945-46 period can be entertained.

## Scottish Plant Orders

John Brown \& Co., Ltd., shipbuilders of Clyde, are to play an important part in Scottish hydro-electric developments now being carried out by the North of Scotland Hydro-Electric Board. Orders have been received from Boving \& Co., Ltd., London, for the construction of water turbines for the Clunie and Errochty generating stations on the River Tummel. John Brown \& Co. have undertaken this work, valued at over $£ 160,000$, in order to broaden the basis of their employment, and to assist in development schemes of a purely Scottish character. Three turbines are being supplied for each station, and the aggregate capacity of the two stations will be approximately 185,000 B.H.P.

Boving \& Co., Ltd., have also placed orders with Glenfield \& Kennedy, Ltd., for water turbines for the Pitlochry generating station of the Tummel-Garry scheme and for the Loch Morar scheme of the Hydro-Electric Board. The alternators for the Clunie and Errochty stations will be supplied respectively by the British Thomson-Houston Co., Ltd., and the General Electric Co., Ltd.

## Overseas Broadcasting Equipment Orders

Marconi's Wireless Telegraph Co., Itd., is to supply Iraq with an up-to-date broadcasting and telecommunication system. Short and medium wave transmitters, together with studios, including a concert hall, and all the necessary control gear, are to be provided to a total value of approximately $£ 35,000$. The company has also secured the contract for the supply and installation of a complete new radio station on the island of Timor for the Portuguese Ministry of Colonies. All the radio equipment on Timor was demolished by the Japanese when they evacuated the island, and as a temporary measure since then, a Portuguese warship lying off the coast has bcen the islanders' sole means of radio communication with the outside world. The equipment will include three transmitters. Two of these are shortwave sets and the third a medium-wave set. Another order is for the supply of broadcasting equipment to the Jornal do Commercio of Recife, Brazil. The contract covers the supply of one $20-\mathrm{kW}$ medium-wave air-cooled broadcasting transmitter, which can be adapted to work on 10 kW when required, two $25-\mathrm{kW}$ short-wave broadcasting transmitters, studio equipment, and frequency modulated v.h.f. links.

## Electrical Apparatus at Leeds Exhibition

Electrical fittings figure prominently at the Homes of To-morrow Exhibition, opened last Friday by Mr. Lewis Silkin, Minister of Town and Country Planning, at Lewis's Stores, Leeds. An attractive and decorative fluorescent lighting system is displayed by the Electric Lamp Manufacturers' Association, and the importance of efficient lighting is demonstrated. Considerable interest is being shown in the "Simmerstat " oven control and the "Aerovap" unit for exterminating flies. Smith's English Clocks, Ltd., show a selection of clocks, including three types of movement in section form.
Elfson's display a cabinet wringer equipped with electric drying and airing apparatus.

## Electrical Manufacture at Burnley

Mr. T. Fletcher, of Burnley Aircraft Products, L.td., has purchased Ashfield Factory, Burnley, and proposes to start the manufacture of rotary switches for domestic appliances, thermostats and water storage heaters.

## Electricity as a House Modernizer

How electricity can transform old-fashioned town residences into flexible casily-run practical apartments will be seen at the " New Homes from Old " Exhibition, organized by the Housing Centre, to be opened on September 11th by the Minister of Health, at the Tea Centre, Regent Street, London. The British Electrical Development Association exhibit will show the conversion of a large Victorian living room into kitchen-dining room, with a practical utility room for laundry, etc. The practical kitchen will be equipped with the latest style electric cooker, family-sized refrigerator, and the smaller accessories such as toaster, coffee percolator
and electric kettle. In the utility room there will be a washing machine, fitted drying cabinet and ironing equipment, and a "Dulec" electric water heater under the draining board.

## Merz \& McLellan (India), Ltd.

Owing to the growing importance of their work in India, Messrs. Merz \& McLellan have established a separate associated firm there under the title of Merz \& McLellan (India), at 16, Lee Road, Calcutta, the pariners being the present partners in Mcrz \& McLellan and Mr. F. H. Sharpe, who has been their chief engineer and manager in India for some years.

## Institute of Marine Engineers

The presidential address to the Institute of Marine Engineers will be delivered by Sir Amos L. Ayre, on September 10 th at 5.30 p.m. at the Institute, The Minories, London, E.C.3.

## Trade Publications

Trico-Folberth, Ltd., Great West Road, Brentford, Middlesex.--Illustrated and priced leaflet reintroducing illuminated electric direction indicators for motor vehicles.
Thomas Bolton \& Sons, Ltd., P.O. Box No. 3, Widnes, Lancs. Booklet (No. 120) containing 44 pages of tabulated data on copper and its alloys in the forms of wires, strip, sheets, bars and tubes for electrical and other uses.

## TRADE MARKS

TTHE following applications have been made for trade marks. Objections may be entered within a month from August 28th :-

Ardite. No. 639,891, Class 6. Welding rods of common metal alloys.-Hard Metal Tools, Ltd., Fletchamstead Works, Fletchamstead Highway, Tile Hill Lane, Coventry.

Clipvac. No. 635,555, Class 7. Power operated clippers for horses, cattle and sheep.The Wolseley Sheep Shearing Machine Co., Lid., Wolseley Works, Electric Avenue, Witton, Birmingham, 6.

Boffin. No, B640,601, Class 7. Wringing, washing, ironing, clothes drying, clothes airing and meat mincing machines, and lawn mowers.Walter Raylor, 20, Westbourne Road, Birkdale, Southport.

W (design). No. 637,262, Class 9. Electrical apparatus and instruments included in Class 9. -Westool, Ltd., St. Helens Auckland, Co. Durham.

Reosound. No. 641,495, Class 9. Apparatus and instruments for reproducing and recording sound.-R. E. Owen, 76, Clifton Road, Sutton Coldfield, Warwickshire.

Wipac. No. 640,729, Class 12. Electrical parts and fittings for motor vehicles, all being goods in Class 12.-Wico-Pacy Salcs Cpn., Ltd., 11, Wadsworth Road, Perivale, Greenford, Middlesex.

Tronex. No. 640,850, Class 17. Electrical insulation material, insulation parts, insulators, and packings and jointings (in the nature of packings).-T. C. Wheaton Co., North Second Street, Millville, New Jersey, U.S.A. Address for service : c/o S. Sokal, 1, Great James Street, Bedford Row, London, W.C.1.

# Circuit Interpuption 

By R. W. J. Cockram, А.м.ı.е.е., А...Mech.E.

ALTHOUGH a considerable mass of technical data has been collected by various research and testing stations in regard to conditions prevailing on rupturing an electrical circuit, little of this is available to the designer of control apparatus. The study of breaking conditions can be either a simple elementary problem where small power values are concerned or it may lead to most intricate investigation for large circuit breakers of modern design.

The influence of the mechanical engineer is very much in evidence in the design of all forms of switching apparatus. The knife switch, that simple mechanical device which requires so much maintenance and replacement of worn and eroded components, soon found favour due to ease of production and apparent ability to give, by means of series and parallel operation, any required combinations of the connected points. Soon an attempt was made, by means of a quick-breaking bar, to reduce burning of contacts on opening, but contact resistance values between blades still caused local overheating, and hence oxidization, with consequent deterioration of contact conductance.

Electrically operated switches next found place for automatic control, but the essential polar construction of the knife switch was retained. Here another step was taken in comparatively recent years in the incorporation of silver and rhodium contact tips welded to the parent copper. This was an attempt to improve working conditions whilst carrying current, for the oxides of the metals used are all relatively good conductors compared with oxide of copper. Other methods adopted were the "wiping" action of contacts on closing, line-and-point


Fig. 1.—Oscillograms of "Satchwell" micro-gap switch interruption
contact to reduce mating surface areas and careful spring-pressure adjustment to such values that conductivity is assured without approaching too close to the "welding-in" pressure on overload. Various forms of arc-control devices have also been developed, including asbestos chutes, through which the arc is pulled by magnetic means to a long length to ensure rupture.

Protective circuit breakers have been developed to a high degree of efficiency, and many are the basic theories advanced for the rupture of the circuit under fault conditions. Early tendencies were towards oil immersion with the enclosure of contacts in strong "explosion pots" to resist the considerable forces occurring on fault rupture. Various ingenious methods of using these forces to render the arc self-destructive then appeared, wherein the arc energy, in displacing the surrounding oil, forced other clean, cool oil across its own path. In the "Dion-Grid" the are is magnetically pulled radially along its length into small ducts containing fresh oil. Later developments for oil-less breakers include the use of compressed air literally to blow out the are and the injection of inert gases into the arcing space.

A further characteristic of rupturing conditions is the effect of the amount of space available to the arc. The rotary switch, by virtue of confining the arc to a small chamber, gives improved breaking characteristics, and thereby achieves a small space factor for the power to be controlled. Where larger powers are to be controlled, chambers are operated in parallel, which again reverts to an arc-splitter effect. This, however, is the only direct form of arc control incorporated, for the physical
characteristics preclude the fitting of "blowout " coils. Two forms of mechanism are fitted: a quick break for d.c. circuits and a slow break for a.c. circuits, the latter taking advantage of the inherent characteristics of alternating values of e.m.f.

This multiplicity of control features (by no means completely covered here) indicates that designers hold few ideas in common of the conditions to be met. Little information appears to be available as to what factors govern the physical dimensions required for breaking a given circuit, what precise influence the inductance of the circuit has beyond that of producing a transient value of voltage far in excess of normal and to what extent the restriking voltage will control design. In this field design would seem to be largely a matter of convention and reproduction of features fixed many years ago, showing that a large field exists for the research engineer who is sufficiently far-sighted to consider a long-term policy in design. Much work is being carried out in this direction, and as an instance of this a few examples of the results of scientific approach to the problem are given.

The micro-break switch finds its main application in the control of domestic circuits, i.e., where natural frequencies ( $\mathrm{f}=1 / 2 \pi \sqrt{ } \mathrm{LC}$ ) far below 2,000 cycles per $\sec$ may be anticipated. This means that a rate of rise of restriking voltage of less than $3 \times 10^{0} \mathrm{~V}$ per sec will occur at the contacts, which is much less than the rate of rise of electric strength of small air gaps (Slepian gives $25 \times 10^{6} \mathrm{~V}$ per sec ). Uuder test


Fig. 2.-Mechanism of Sunvic hot-wire vacuum switch
conditions an air gap of 0.005 in . breaks down at 850 V at 25 deg C , and thus gives a factor of safety of $850 / 230=3.7$.

With a combination of these two characteristics of small air gaps, the arc on separating contacts by 0.005 in . on a $230-\mathrm{V}$ supply can persist only until the next voltage zero. Thereafter it will be unable to restrike unless the natural frequency of the circuit gives a rate of rise of voltage of the order of $25 \times 10^{6} \mathrm{~V}$ per sec. The speed of operation of the contacts should be as high as possible, in order, first, to reduce the duration of high resistance at point of breaking contact and, secondly, to ensure that, at the next voltage zero, the the gap is sufficiently large to prevent restriking of the arc, i.e., contacts must separate in a quartercycle or 5 micro-sec on a 50 -cycle supply.

A further claim for the micro-break switch lies in its reduction of the arc energy by restriction of arc length, thereby minimizing erosion of contacts. This follows from the electrostatic considerations above for, since the velocity of the electrons emitted is proportional to the product of length of gap and magnitude of the field, so also will be the kinetic energy of the electrons on arrival at the opposite contact. Restriction of arc length therefore greatly lessens the bombardment of this contact face, thereby reducing contact pitting*.

Another way of considering micro-break switching involves the electrostatic forces

[^0]between the electrons emitted from the contacts at the high temperature occurring at the instant of contact separation. The velocity of these electrons, being proportional to the length of gap is, in the micro-break switch, restricted to such low velocities that the electrons repel one another due to inherent electrical charges. This repulsion, which is "swamped" by the high electron velocity of the unlimited break switch, takes place with a miniature explosive force which causes lateral spread of the elements of the arc. Under such conditions the are may be considered self-destructive*. The oscillograms (Fig. 1) show how, irrespective of the point of contact separation "A", the arc fails to restrike after the first current zero.
By operating the micro-gap switch by the expansion of wire when carrying current and enclosing the whole mechanism under vacuum conditions, a considerable advance is made in this form of control apparatus. The operation of the hot-wire vacuum switch is shown in Fig. 2. Maximum ratings of this switch at present stand at 30 A for 250 V and 20 A for 600 V , with either a.c. or d.c. conditions and a contact separation of about 0001 in. Contact erosion is then practically negligible and the switch will operate millions of times without appreciable deterioration.

The heating circuit, being formed by a very flat coil, is almost non-inductive and, requiring only a few mA , may be controlled by very light contacts requiring no quick-make or break action. Having small mass the unit is not subject to risk of operation characteristics due to vibration, and no temperature differential is experienced between pick-up and drop-off voltage values. As a further development the switch may be rendered capable of controlling inductive circuits by the inclusion of a surge suppressor connected across the main contacts (Fig. 3). This form of

[^1]switching device, then, shows a considerable step forward towards scientific control of the electric circuit, for it minimizes maintenance work and, what is more important, is entirely reliable.
A form of switching device developed from the conventional tilting mercury switch shows another method of attacking this problem from a scientific angle. Various forms of operation have been evolved, but that shown in Fig. 4 seems to indicate the line giving the greatest return. Operating features are as follows: Two electrodes are inserted, one at the top, the other at the bottom, into a glass tube containing mercury. The upper electrode is extended into a quartz-glass plunger which has an annular magnetic armature fixed at its upper end and contains a second pool of mercury at the bottom. On operation a relay coil pulls this inner tube down into the mercury and contact is made by the two pools of mercury meeting through the holes provided in the inner tube. On de-energizing the coil the inner tube again floats to the top of the outer mercury pool and disconnects the circuit under controlled air conditions. Two further holes higher up in the inner tube prevent collection of mercury there.

Switches of this type have been developed for controlling up to 150 A at 400 V . Absence of any moving parts (except for the central tube), together with controlled atmospheric conditions in the sealed tube, gives a life of many millions of operations.

Switches of this design have been produced for 250 A at 24 V . By arranging for the plunger to flood mercury over a weir and through various restricting orifices, it is possible to obtain controlled notching start conditions for motor control applications.

Numerous switches may be operated from a single solenoid coil since very few ampereturns are required to operate the armature. This method, adapted for over-current trips,
prevents possibility of single phasing of motors. The energizing current for these contactors and relays is extremely small, some instruments taking only one twenty - thousandth part of the controlled current.

The last two examples appear to
(1) Lower electrode in contact with pool of mercury (II).
(2) Outer glass container.
(3) Orifice in wall of inner quartz plunger ( 10 ).
(4) Magnetic armature attached to quartz plunger ( 10 ).
(5) Special seal to electrode (8) to ensure perfect contact.
(6) Flexible connecting lead.
(7) Container for seal (5).
(8) Upper electrode dipping into mercury in lower partion of plunger (10).
(9) Orifice to prevent collection of mercury in upper part of plunger ( 10 ).
(10) Quartz-glass plunger
(11) Pool of mercury in plunger kept at higher level than the mercury outside.
(12) Mercury in outer glass container.


Fig. 4.-Non-tilting Sordoviso mercury switch
indicate that controlled atmospheric operating conditions may hold the secret of successful control of the electric circuit. Extending the life of operating contacts would materially assist in lowering maintenance costs and reduction of moving parts will considerably increase the mechanical life of components.

The writer acknowledges the loan of illustrations for this article by Sunvic Controls, Ltd., Sordoviso Switchgear, Ltd., and Mr. F. C. Fuke of British Mechanical Productions, Ltd., who tendered useful advice on the micro-break switch.

Swedish Water Power Resources.-The Svenska Vattenkraftfoereningen in its annual statistical report estimates the total resources of waterpower in the country which have already been. harnessed or which can be exploited on a remunerative basis at 41,250 million kW , a figure which according to the report, will be reached in about 40 years.

## NEW BOOKS

An Index of Mathematical Tables. By Dr. A. Fletcher, Dr. J. C. P. Miller and Professor L. Rosenhead. Pp. 451. Scientific Computing Service, Ltd., 23, Bedford Square, W.C.1. Price 75 s.

As a result of the increasing development and more extended use in recent years of calculating machines as a primary means of tabulation, the number of fundamental tables placed at the disposal of scientific workers has enormously increased. At the same time the results are likely to be far more accurate than those which are arrived at by more laborious methods.
With the growing tendency to apply mathematics to problems of industry, the merit of a book of this kind becomes increasingly more practical. Its subject is restricted to mathematical tables and it does not normally cover experimentally determined numbers such as physical and other constants, but it should fulfil its intention of providing " a working tool for the working scientist" in a wide variety of investigations and should be of value to both users and makers of such tables.

In Part 1, each of the component twenty-tour sections is devoted to tables of a particular group of functions ranging from primes, factors, products and quotients to numerical operations involved in harmonic analysis and synthesis. Part 2 consists of a 70 -page bibliography under the names of the authors of books and papers quoted in Part 1 and some special statistical tables in addition. The work is a model for compilations desirable in other fields of knowledge, where the difficulty of keeping in touch with progress becomes inevitably more and more pronounced as that progress accelerates.-C.O.B.

The Modern Diesel. Edited by G. Geoffrey Smith and revised by Donald H. Smith, M.I.A.E. Pp. 254; figs. 200. Iliffe \& Sons, Ltd., Dorset House, Stamford Street, London, S.E.I. Price 6s.
This is the tenth edition of a handbook covering the theory and practice of Diesel engines which was first published in 1930. Since then the compression-ignition engine has attained predominance for road and rail transport and for marine craft down to the smallest sizes, mainly owing to research and experiment carried out by road-transport manufacturers.

In this book new British engines are described and the technical characteristics and performance capabilities responsible for developments up to the present time are discussed. A considerable proportion of the space is devoted to fuelignition equipment and combustion-chamber design, with emphasis on the swing towards direct-injection systems, especially those of the toroidal-cavity piston type.-C.O.B.

## ELECTIRICITY SUPPII

Tenants' Wiring Scheme. Indian Water-Power Development.

Aberdeen.--Increased Demand.-In present ing his annual report at a recent meeting of the Corporation Electricity Committee, Mr. A. Gardner, city electrical engineer, stated that there had been an increase in output under all headings. The large rise of nearly 16 per cent in the domestic tariff supplies was due to the continued change-over to this tariff by consumers and to the difficulties experienced by householders in obtaining solid fuel. The position of coal stocks was giving some anxiety.

> Ashton-under-Lyne.-LOANS. The Electricity Committee is applying to the Electricity Commissioners for sanction to borrow $£ 3,000$ for mains and services, $£ 2,500$ for transformers and substation equipnent and $£ 1,000$ for meters. Sanction has been received to the borrowing of $£ 1,500$ for unspecified works.

Burnley.-Street Lighting Department.The Town Council has approved in principle the establishment of a separate street lighting department.

Glusburn.-Street Lighting Conversion.The Parish Council proposes to convert the gas lighting for main roads to electric lighting and has made a provisional agreement with the Electrical Distribution of Yorkshire, Lid., for 123 electric lamps at an annual cost of $£ 354$
Hebden Bridge.-Year's Working.-Councillor J. W. Cockeroft, chairman of the Hebden Royd Council, reports that during the past year the gross profit of the Hebden Bridge electricity undertaking was $£ 2,436$, and the net profit $£ 519$.
Holmes Chapel (Cheshire).--Street Lighting.
The Parish Council has borrowed $£ 420$ for the installation of electric street lighting in the parish.
Ilkeston (Derbyshire).-SUPpLY TO COUNCIL Houses.-No fewer than 740 of the 900 Council house tenants have had their houses wired for electricity despite the early opposition of the Town Council. After this early opposition had been overcome by the formation of a Council House Tenants' Association, a scheme, estimated 10 cost $£ 5,000$, was launched. Led by exCouncillor J. Hoult, the tenants formed a company, the llkeston Assisted Wiring Co., LId., to sponsor the scheme, on a cash or hirepurchase basis, as individual tenants desired. This company engaged eight ditterent firms to carry out the wiring. On four of the Council housing estates the wiring is overhead, and on the fifth it is underground. So far between thirty and forty houses have actually been connected, power being supplied by the Derbyshire \& Nottinghamshire Electric Power Co. Completion of some houses is held up owing to lack of materials.
Kilwinning (Ayrshire). - All-Electric" Houses.-The Town Council, having been assured that with the W.B.A. permit which the Council had it could obtain delivery within reasonable time of cookers, etc., it has agreed that its housing scheme shall be all-clectric.

Middlesbrough.-Estate Supply.-The borough electrical engineer (Mr. H. Haigh) is preparing a scheme for supplying electricity to the second portion of the Thorntree Estate.

Stockport. - Street Lighting. - The Electricity Committee has approved the erection of concrete pillars for public lighting by electricity at an estimated cost of $£ 2,169$ and the lighting by electricity of Belvedere Avenue and Somerford Road.

Stockton-on-Tees.-No SUPPLy for New Houses.--The Town Council has been notified that the Ministry of Health is not prepared to sanction the installation of electricity in houses on the Mount Pleasant Estate owing to the shortage of materials and having regard to the fact that alternative services have already been provided.

Power for Local Industry. - The Town Council has received sanction to borrow $£ 29,355$ in connection with the supply of electricity to the Bowesfield industrial site comprising $£ 14,216$ for mains and $£ 15,139$ for plant. Application has been made to borrow $£ 5,050$ for substation work.
Upton-by-Chester. Street Lighting Con-VERSION.-The Parish Council has borrowed $£ 888$ for the conversion of fifty-three gas standards to electricity.

## Overseas

Austria.-IMProved Supply for Vienna. Considerable improvement in the electricity supply for Vienna is expected as the result of the recent inauguration of a $100,000-\mathrm{V}$ supply line from hydro-electric generators in the South of Austria to the capital. This line was recently switched on by the Mayor of Vienna. The Germans completely destroyed the cables connecting Vienna with its supply stations at the end of the war.

India. - North Madras Scheme.-Construction of the Machkund hydro-electric project is being started almost immediately by the Madras Electricity Department, it is reported. Sir S. V. Ramamurti, who is in charge of development in Madras, said that the mineral, forest and agricultural wealth in North Madras was immense and that the only thing wanting was cheap hydro-electric power. Surveys which had been carried out showed that minerals in the area included bauxite, manganese, iron, graphite, mica and gold. The forest wealth was also immense, and industries which could be developed in the area were shipbuilding, jute manufacture, textiles, groundnut products and sugar.-Reuter's Trade Service.
Switzerland.--Increasing Power Output.Some recently issued figures show that during the war period there was a noteworthy increase in electric power output in Switzerland, a total of about 9,600 million kWh having been attained during 1945 as compared with 7,134 million kWh in 1939, an advance of approximately 35 per cent. It is estimated that 99 per cent of the
power production of the country is hydroelectric. The increased consumption is stated to be largely due to the scarcity of coal for house heating and to the shortage of domestic help which has caused householders to resort more and more to the use of electric fires, cooking stoves and other appliances.

## TRANSPORT

Canada.-Winnipeg Comparisons.-Statistics published in Mass Transportation show the operating results of the Winnipeg Electric Co. and its subsidiaries in 1945 for the three types of transport-street-cars, trolley-buses and motor-buses. Street-cars numbered 215, which operated $7,534,000$ miles and carried $60,109,000$ passengers, equivalent to 7.97 per mile. The 30 trolley-buses ran $1,127,000$ miles and carried 9.658 .000 passengers, or 8.56 per mile, while the 161 motor-buses ran $5,716,000$ miles and carried $27,952,000$ passengers ( 4.89 per mile). Gross revenues were $\$ 4,094,000, \$ 649,000$ and $\$ 2,026,000$ respectively, with operating expenses at $\$ 2,775,000, \$ 286,000$ and $\$ 1,884,000$. After allowing for taxes (excluding petrol tax) and depreciation there was a net profit on the street-cars of $\$ 656,000$ (equal to $\$ 3,052$ per vehicle) and on the trolley-buses $\$ 271,000$ ( $\$ 9.043$ per vehicle). On the motor-buses there was a deficit of $\$ 182,000$ ( $\$ 1,133$ per vehicle). On a mileage basis motor-buses had a superior showing as regards accidents, with only 0.821 per 10,000 miles, against 1.473 on the trolley-buses and 1.938 on the trams. Delays through defects in vehicles were considerably more numerous on motor-buses than on the other forms of transport, numbering 4.947 per 10,000 miles operated compared with 1.388 for the street-cars and 1.221 for the trolley-buses.

Glasgow.- New Trams.-A capital expenditure of $£ 727,150$ this year is involved in proposals for the extension of the Glasgow Corporation transport system, $£ 200,000$ being earmarked for the acquisition of new trams.

Manchester. - Operating Results. - The accounts of the Transport Committee for the year ended March 31st last show a deficit of $£ 97,664$ on the tramways, a surplus of $£ 89,630$ on the mator-buses, a surplus of $£ 38,909$ on the trolley vehicles, and a deficit of $£ 13,421$ on the parcels department.

Wolverhampton.-YEAR's WORKING.-New records in the mileage run and the number of passengers carried are shown in the abstract of accounts of the Municipal Transport Department (Mr. C. O. Silvers, general manager and engineer) for the year ended March 31 st last. The total revenue from trolley vehicles was £ 498,711 , as compared with $£ 488,692$ tor 1944-45, and from motor omnibuses $£ 182,734$ (against $£ 178,249$ ), making a total of $£ 681,445$ ( $£ 666,941$ ). The total working expenses. were $£ 521,648$ (against $£ 466,689$ ), and after providing for war service allowances and sickness allowances, there was a gross surplus on the trolleybuses of $£ 105,448$ ( $£ 138,893$ ) and on the motor omnibuses of $£ 45,362$ ( $£ 51,628$ ), a total of $£ 150,810$, which with revenue from other sources makes $£ 154,361$. After providing for loan charges, taxation, etc., there is a net surplus of $£ 49,343$, as against $£ 33,696$ for the preceding year. The general rate fund again receives $£ 10,000$ and after providing for deferred maintenance and deferred vehicle purchase, the balance of $£ 9,166$ is transferred to reserve fund. The number of miles run during the year rose from $6,474,582$ to $6,661,702$, and the passengers carried from $91,034,729$ to $92,106,902$.

## South African Electrical Purchases

NEW electrical materials will be released only to public authorities for the illumination of public buildings during the Royal visit next year, and only Government and public authorities will be permitted to erect stands, says the Minister of Economic Development in a statement on the use of building materials and electrical equipment for temporary purposes during the Royal tour. The statement says that inquiries about the release of electrical materials for illuminating buildings and the use of timber for stands have been carefully considered, but it is felt that the supply position is so difficult, and the need for housing and other buildings so great, that the use of materials for these purposes would not be justified.

British-made electric irons of the latest design are now being sold in South Africa at less than the pre-war price. This is due to the operation of mass-production methods in Britain and the price control in South Africa. The manager of a firm of importers said he had been fortunate in receiving a shipment of about 1,800 irons recently. "At 11 a.m. of the first morning on which I displayed them they had sold so rapidly that I only had fifty left. The pre-war price of
this iron in Cape Town was 57 s . 6d. To-day it is on sale at 38s. The manufacturers in Britain are giving us preferential treatment for exports, and South Africans can expect for some time to buy these irons more cheaply than the people in Britain. What was an exclusive design with limited production before the war is now being mass-produced, and the factory cost is actually lower than in 1939. Johannesburg received a consignment of 4,000 of these irons. They were sold out in a few days. We now have 20,000 on order, but we do not know when further shipments can be expected." The profit margin now allowed by the Price Controller on electric irons is 65 per cent. American irons of similar design, when obtainable, are on sale at about 55 s .
The Controller of Building Materials announces that control of the sale of domestic electrical refrigerators has been lifted. This step has been made possible by the fact that increased supplies have been reaching the country in the past few months and that all reports indicate that this improvement will be maintained. Control was maintained in order to enable hospitals and other essential services to obtain their requirements.

## RECENT INTRUDUCTIONS

## Notes on New Electrical and Allied Products

## Another "N.H.D." Cooker

A new electric cooker just going into production at the new Blackwood works of South Wales Switchgear, Ltd., Treforest, in con-


National Housing Drive cooker nection with the National Housing Drive, incorporates all the usual up-to-date qualitiesattractive appearance, easy-cleaning features, thermostatic oven control, toe recess, etc. The oven has a capacity of 2,570 cu in., the hotcupboard measuring 16 in. wide, 7 in. high and 13 in. deep.

The oven has a loading of $1,600 \mathrm{~W}$. the 8 -in. hotplate $1,800 \mathrm{~W}$ and the grill boiler $2,000 \mathrm{~W}$. Solid or radiant type hot-plates conforming to the E.D.A. specification will be fitted as an extra, with "Lokost" or" Simmerstat "control. Standard finishes which will be available include cream and black, cream and green, mottled green, and mottled grey.

## Modern Design Radio Set

The first of the 1946 broadcast radio receivers to be introduced by Ferranti, Ltd., Hollinwood, Lancs, is the transportable Model 546 incorporating a plate aerial. It is a.c./d.c. mains operated, consuming 55 W and furnishing 1.5 W output to a 6.5 in. mains-energized moving-coil speaker. The superheterodyne circuit uses four valves and a rectifier, operating in the medium and long wavebands. The glass tuning scale is edge-lit with a rotating pointer and the off-white moulded cabinet is of modern style. The set is 7.5 in . high, 11.5 in . long, 6 in . deep and weighs 10.5 lb .

## Direction Indicators

Production of direction indicators and actuating switches for motor vehicles has been recommenced by Trico-Folberth, Ltd., Great West Road, Brentford, Middlesex. There are exterior and built-in models, each with an amber arm either 7 or 8.5 in . long, internally illuminated by a miniature festoon type bulb for operation from the 6 - or $12-\mathrm{V}$ car battery. The dashboard switches, toggle and rotary, include a self-cancelling time switch which
automatically lowers the signal arm after ten seconds time lag.

Hunt Safetisigns, Ltd., an associated firm of the same address, has for some time been manufacturing a commercial model with a 12 -in. arm for installation on coaches and other large passenger vehicles.

## Switch-tripping Cabinet

A new design of cabinet for housing an "Exide" battery for energising switch-tripping circuits in power and sub-stations is announced by the Chloride Electrical Storage Co., Ltd., Clifton Junction, nr. Manchester. The top portion houses a selenium rectifier for trickle charging the battery. The transformer of the rectifier effectively isolates the battery from metallic contact with the mains. For visual indication of the battery's condition there are a voltmeter and press switch which brings into circuit a resistance load to ensure that the battery voltage is measured under working conditions.


The Planté type plates have heavy section inter-cell connectors and a hydrometer and bottle of distilled water are provided with the cabinet, which is made of heavy gauge sheet steel, black crinkled stove enamelled on the outside and treated to withstand sulphuric acid on the inside. It can be locked against unauthorized interference.

## Swiss Hydro-Electric Plant

BUILDING began in 1942 of the new Rupperswil-Auenstein hydro-electric plant on the River Aar, and it recently started production for the Swiss Federal Railways and the Forces Motrice du Nord Est. The annual
canal 2.5 km long, rejoining the river one kilometre further on. The barrage has three 22 -metre wide double gates.
The plant comprises two $23,000-$ H.P., 100 r.p.m. turbines. The power is stepped up from


Upstream view of the Rupperswil-Auenstein hydro-electric plant
output will be about 210 million kWh , which will be divided between the two consumers.
The plant has been built to the left of the barrage, the water being taken through an escape

11 to 66 and 132 kV by means of two singlephase transformers for the Swiss Kailway substation at Rupperswil. Three-phase current is stepped up to $50,000 \mathrm{~V}$ for the Forces Motrice.

## A.S.E.E. Diplomas

FOLLOWING an investigation into a suggestion by Mr. H. W. Swann, M.I.E.E., in his presidential address to the Association of Supervising Electrical Engineers in 1941, for some test which would ensure the competence of the engineer in the electrical work for which he is responsible, the A.S.E.E. inaugurated such a scheme last year.
The scheme provides for the award, to the candidates who pass the whole of an examination, of a diploma to indicate a standard of ability in electrical installation or maintenance work or both. Endorsements indicate a candidate's possession of any or all of certain special qualifications over and above the basic requirements, and credits are awarded for high proficiency in special subjects.

The object of the scheme is not only to encourage and reward the endeavours of those who desire to advance in the industry, but to provide the employer with a proof of ability in matters on which he expects to rely upon his employee's understanding and judgment.

The standard for the award of the "Swann Diploma" is high and the examination is in two parts. Part I comprises a question paper to be answered in writing at the candidate's home (or elsewhere) and an oral examination, conducted at a centre, on the written answers.

Part II is also oral and deals with practical and technical subjects, Section (r) being designed to bring out those special qualifications which may lead to endorsement of the diploma with honours or credits.
The first examinations were held in Glasgow, London and Manchester on May 29th and 30th, and the report of the examiners, of whom Professor R. O. Kapp, B.Sc., M.I.E.E., Pender Professor of Electrical Engineering, University College, London, is the chief, indicates that the basis of the scheme is most satisfactory, and gives that individual attention necessary in an examination based on practical experience.

The results of the 1946 examination have been announced:-In Electrical Installation and Maintenance Work passes were secured by Messrs. B. C. Tanner (Worcester Park, Surreycredit), J. U. Smith (Nottingham-credit), H W. Jones (Tottenham-credit), H. Coulls (Snodland, Kent), C. R. D. Morse (Ealing), and P. H. Usher (Chislehurst). Mr. J. Delaney (Waterloo, Ashton-under-Lyne) passed in Electrical Installation Work. Passes in Part I only were secured by Messrs. B. H. C. Gurr (Bexley Heath), W. A. Smith (Folkestone), and E. J. Moore (Sidcup).

It is expected the next examination will be held in May, 1947.

## FINANCIAL SECTION

## Company News. Stock Exchange Activities.

## Reports and Dividends

Veritys, Lid. -Presiding at the annual meeting held on Monday last, Mr. B. C. Evans (chairman and managing director) said that the change-over from war production to normal working was proving extremely difficult, for while the reorganization of the works had to a large extent been carried out and the new plant installed, there were factors outside their control which prevented them from obtaining an adequate output. While there was no shortage of orders there was an acute shortage of essential materials. Costs of all commodities were rising and there was a lag in the adjustment of selling prices, and it was difficult, while the shortage of materials continued, to forecast when an economic level of output and prices could be attained. There was a big demand for marine motors, but the production must dovetail with the shipbuilding programme, and deliveries would in the majority of cases not be required until next year. Having regard to the reduction in output at the present time they had decided not to recommend any further dividend in respect of 1945, and to further strengthen their resources by placing $£ 7,500$ to the contingencies reserve, building this up to $£ 57,500$.

The British Vacuum Cleaner \& Engineering Co., Lid., held its annual meeting on August 27th, when Mr. H. C. Booth (chairman), who presided, in the course of his speech said that practically the whole of their war effort was directed in channels outside the scope of their normal peace-time production, and the transition problems had been very great on that account. The volume of production, therefore, taking the year as a whole, was substantially lower than that of the previous year. Problems of reconversion and the shortage of materials were likely to result in a further temporary setback for the current year. When their full production capacity was established they would be able to add some entirely novel lines to their established range of domestic electric appliances which would be complementary both as to production and distribution. The new developments would not interfere with, or reduce, their main production, but it was their intention to broaden the scope of their activities in the electrical appliance field. Two new works had been acquired in areas where adequate labour facilities existed and both these factories were now in the initial stages of production.

The Kalgoorlie Electric Power \& Lighting Corporation, Ltd. - In the course of his speech at the annual meeting held on August 28th Mr. A. J. Fippard (chairman), said that following the visit of Mr. C. E. Sexton to Kalgoorlie, the Corporation had decided to install further plant to take care of the estimated increased demand for the next ten years or so. It was desirable to erect an entirely new generating station and to install new boiler plant, together with a new $15,000-\mathrm{kW}$ turbine-driven generating set. It was also proposed to change the transmission and distributing systems to permit the
use of $11,000 \mathrm{~V}$ instead of the present $3,300 \mathrm{~V}$. Preparations were being made so far as possible for making the changes but no definite steps could be taken until they secured a renewal of their concession. Negotiations were well advanced for a renewal for twenty-one years.

The Nigerian Electric Supply Corporation, Ltd., reports a net profit for the year to February 28 th of $£ 122,713$, as compared with $£ 147,844$ for the preceding year. The final dividend is 7 per cent making 10 per cent for the year (against 8 per cent), plus a bonus of $2 \frac{1}{2}$ per cent (against 2 per cent).

Thomas De La Rue \& Co., Ltd., report a profit for the year ended March 31 st last of $£ 616,485$ as compared with $£ 478,683$ for the preceding ycar. The final dividend is 35 per cent making 45 per cent for the year (against 40 per cent).

Thorn Electrical Industries, Ltd., reports trading profits of the company and its subsidiaries of $£ 65,092$, after depreciation, for the year ended March 3 Ist last, as compared with £80,063 for 1944-45, and a net balance of $£ 27,742$ (against $£ 26,978$ ). General reserve receives $£ 15,000$, and the ordinary dividend for the year is maintained at 20 per cent, less tax, leaving $£ 10,955$ to be carried forward (against £10,713 brought in).

The Engineering \& Lighting Equipment Co., Ltd., reports a net profit for the year ended March 31 st last of $£ 13,308$, as compared with $£ 21,357$ for the previous year. The net profit is arrived at after providing $£ 4,500$ for future taxation (against nil). The ordinary dividend for the year is maintained at 8 per cent less tax by the final payment of 5 per cent.

The Telephone \& General Trust, Ltd., is maintaining its interim dividend at 3 per cent.

The Lancashire Electric Light \& Power Co., Ltd., has announced an interim ordinary dividend of $2 \frac{1}{2}$ per cent (same).

The Rheostatic Co., Ltd., is again paying an interim ordinary dividend of 4 per cent. This year, however, it is payable on increased capital.

The London Electrical \& General Trust, Ltd., is paying a final ordinary dividend of 4 per cent (against 3 per cent), making 6 per cent for the year (against 5 per cent).

Walsall Conduits, Ltd,, is paying an interim dividend of 20 per cent (same).

Brown Bros., Ltd., have declared an interim dividend of $2 \frac{1}{2}$ per cent (same).

## New Companies

H. Ponton \& Co., Ltd.-Registered August 19th. Capital, $£ 4,000$. To acquire the business of H. Ponton \& Co., 55, Sloane Square, S.W.1, and to carry on the business of electrical, radio and television engineers, etc. Directors: $H$. Ponton, and three others. Regd, office: 55, Sloane Square, S.W.I.

Robert Hendricks, Ltd. - Registered July 30th. Capital, $£ 1,000$. Manufacturers of, and dealers in, electrical goods and apparatus, etc. J. Cohen is the first director. Regd. office: 20-23, Halton House, High Holborn, W.C. 1.
Apex Radelec, Ltd--Registered July 12th. Capital, $£ 500$. Radio engineers, electricians, electrical engineers, etc. Directors: J. W. Greaves and A. B. Garton. Regd. office: 2-3, Pilkington's Buildings, Hartington Road, Middlesbrough.

Modern Electrical Industries (Northern), Ltd.Registered August 1st. Capital, $£ 5,000$. To carry on the business indicated by the title. Directors: A. Read, Mrs. Gwendoline $H$. O'Neill, E. O'Neill and W. J. Read. Solicttors: Wooler, Burrows \& Appleby, Leeds.

Lindsey Electrical Co., Ltd.-Registered August 2nd. Capital, $£ 2,000$. Manufacturers of, and dealers in, electrical apparatus, etc. Directors: H. J. Bennett, J. D. Coo and L. Bennett. Solicitors: Hopkıns \& Goodwin, Grimsby.
Vickery \& Bowker (Holcombe Brook), Ltd.Registered August 12 th. Capital, $£ 2,000$. To acquire the business of electrical engineers and wireless dealers carried on by A. F. Vickery and N. Bowker at 8, Longsight Road, Holcombe Brook. Directors : A. J. Vickery and W. N. Bowker. Regd. office: 8, Longsight Road, Holcombe Brook, near Bury.
Barton Electrical Co., Ltd.-Registered August 12th. Capital, $£ 600$. To carry on the business indicated by the title. Directors: J. A. Barton, G. D. N. Nabarro and A. E. Wright. Secretary: A. E. Wright. Regd. office: The Old Dee Works, Saltney, Flint.
G. Duder Gray, Ltd.-Registered August 10th. Capital, $£ 5,000$. Electrical engineers and general electrical installation contractors, lighting specialists, etc. Directors: G. D. Gray and Mrs. Margaret E. Gray. Regd. office. 30, Guildford Road, Woking.
H. Lawrence Electrical, Ltd.-Registered August 8 th. Capital, $£ 1,000$. Electrical, welding and general engineers, etc. Directors: $\mathbf{H}$. Lawrence, Major H. F. Kingston and Hilda E. Hulands. Regd. office: 34, Aldersgate Street, E.C.1.

Broughton Electrical Co., Ltd.-Registered August 8 th. Capital, $£ 100$. Manufacturers of, and dealers in, dynamos, motors, armatures, magnetos, batteries and electrical plant, etc. Directors. H. E. Alexander and Blanche Sapper. Regd. office: 11, Albert Square, Manchester, 2.

Austin Turner \& Co., Ltd.- Registered August 10 th . Capital, $£ 5,000$. To acquire the business of an electrical contractor carried on by G. A. Turner, 101, High Street, Harlesden, N.W., as George Austin Turner. Directors: G. R. Bourne and G. A. Turner. Regd. office: 101, High Street, Harlesden, N.W.

Barwell Electrical Products, Lid.-Registered August 17th. Capital, $£ 1,000$. Manufacturers of, and dealers in, radio and electrical instruments, appliances and apparatus, etc. Directors: M. W. Wells, D.G. Barrow and Mrs. Phyllis E. Wells. Regd. office: 255, Earlsfield Road, Wandsworth, S.W.

Modern Electrical Industries (Southern), Ltd.-Registered August 15th. Capital, $£ 3,000$. To carry on business as indicated by the title. Directors: J. D. Macnee and D. G. Jones. Regd. office: 9, Hatherley Road, Sidcup.
Wheeler \& Pearce, Ltd.-Registered August 14th. Capital, $£ 5,000$. To acquire the business of an electrical engineer and contractor, etc., carried on by $\mathbf{H}$. Wheeler as "Wheeler \& Pearce" at Trafalgar Street, and 73, Milton Street, Sheffield. Directors: H. Wheeler, G. B. Crawshaw, Blanche Wheeler and Mary B. Crawshaw. Regd. office: 73, Milton Street, Sheffield.
A. Barlow \& Co., Ltd.-Registered August 15th. Capital, $£ 1,000$. Wholesale and retall electrical and radio engineers, etc. Directors: H. A. Barlow and Mrs. Irene A. Barlow. Secretary: H. A. Barlow. Regd, office: Sealey House, Church Hill, Loughton.

Edmund Bassett \& Son, Ltd.-Registered July 24th Capital, $£ 1,000$. Manufacturers of, and dealers in, all kinds of electric light fittings and equipment, etc. Directors: E. E. Bassett and Dorothy G. Bassett. Regd, office: 105, Station Road, Edgware, Middlesex.

Beasley Brothers, Lid.-Registered August 17th. Capital, $£ 1,000$. Importers, exporters and manufacturers of, and dealers in, electrical fittings, radio receivers, etc. Directors: J. B. Beasley and G. E. Beasley. Regd. office: 109, Pitfield Street, N. 1.

Tudor Radio, Ltd.-Registered August 20th. Capital, $£ 1,000$ To carry on the business indicated by the title. Directors: F. W. Gill and A. C. Hooker. Secretary: Emanuel C. Silver. Regd. office: 29, Broadwater Street, West Worthing.
Jack Porter, Ltd.-Registered August 20th. Capital, $£ 1,500$. To acquire the business of a radio and electrical engineer now carried on by W. J. Porter at 22, College Street, Worcester, as "Jack Porter." Directors: W. J. Porter and Mrs. D. Porter. Secretary: Mrs. D. Porter. Regd. office : 22, College Street, Worcester.

## Bankruptcies

J. Leivers, radio electrical engineer, Victoria Radio Stores, 94, Victoria Road, Kirkby-inAshfield, Notts.-Public examination, October 3rd at the Court House, St. Peter's Gate, Nottingham.
P. M. Gill, radio and electrical dealer, carrying on business at 166-170, Partington Lane, Swinton, under the style of Swinton Radio Service, and at The Circle, Davyhulme, Lancs, as Radio House. - Application for discharge to be heard on October 11th at the Court House, Encombe Place, Salford.
W. S. Poole, electrician, High Street, Queensbury, near Halifax.-Last day for receiving proofs for dividend, September 14th. Trustee. Mr. E. T. Sanders, 71, Manningham Lane, Bradford, official receiver.
R. J. Thurlow, electrical engineer, carrying on business at 27 , Fore Street, Ipswich.-First and final dividend of 5s. $9 \frac{1}{2} \mathrm{~d}$. in the $£$, payable September 10th at 13a, Great Colman Street, Ipswich

## cantral

for
slip-ring matars


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

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

## WORKS: ASTON, BIRMINGHAM 6

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


HEAVY DUTY FANS.
MECHANICAL DRAUGHT FANS.
SINTERING FANS.
HOWDEN-LJUNGSTROM AIR PREHEATERS.

HOWDEN TURBULENT FLOW AIR PREHEATERS.

HOWDEN I.C.I. GAS WASHERS.
HOWDEN VORTEX DUST COLLECTORS.

Howden auxiliaries for all types of boilers, from the largest power station plant to the smallest industrial installation.

## HOWDEN

James Howden \& Company (Land) Ldd. 195, Scotland Street, Glasgew. C.5, and 101-103, Baker Street, London. W.1.

## STOCKS AND SHARES

IIEAVY falls in prices in the Stock Exchanges of New York, Calcutta and Bombay, threw a general heaviness over the House in most of its departments. In American securities there is little market on this side, for the simple reason that only in the shares of a comparatively few companies is it possible to deal with any freedom. Sales can be made from here, but not purchases, except in Brazilian Tractions and a handful of others. Why the apprehensions of New York, due to the European complications, should affect markets in gold mining shares and our domestic industrials, it is difficult to explain, but the fact remains. Labour conditions at home do not make for cheerfulness in the Stock Exchange markets. In spite of the adverse factors, however, prices do not go back to any material extent, and a fresh advance in British Government securities served to hearten investment markets generally.

## Company Results

British Vacuum Cleaner 5 s . shares have risen 1s. further, to about 28 s . 6d., since the appearance of the full accounts, and the chairman's review of the conditions which accounted for the fall in 1945 profits. On the dividend of 20 per cent-reduced from 30 per cent the shares yield $£ 312 \mathrm{~s}$. 9 d . per cent. Veritys report shows that the dividend, maintained at $7 \frac{1}{2}$ per cent, is covered more than twice by available earnings. At 8 s . 9 d ., the 5 s . shares give a return of $4 \frac{1}{4}$ per cent. The Engineering \& Lighting Equipment ordinary dividend is again brought up to 8 per cent, although a decline in net profits for the year is announced in the preliminary statement. At 3s. 3d., the 2 s . shares pay $£ 418 \mathrm{~s}$. 6 d . per cent on the money. Thorn Electrical 5 s . shares at 32 s . yield $£ 32 \mathrm{~s} .6 \mathrm{~d}$. per cent on the 20 per cent dividend.

## London Associated Electricity Undertakings

Before the war, London Associated was paying regular annual dividends of 7 per cent, 3 per cent of which was an interim payment. Interims were discontinued after 1939, and the full distribution dropped to 3 per cent in 1942. It was restored to 4 per cent for the next two years and to 6 per cent for 1945. The company has now resumed interim payments, with a distribution of $2 \frac{1}{2}$ per cent on account of 1946. At 25 s ., the shares yield $4 \frac{3}{4}$ per cent on last year's dividend. This suggests that a return to the pre-war 7 per cent dividend level is not regarded as an early prospect.

## Price Fluctuations

Home Railway stocks drew a little support from the Government's request for the substitution of oil for coal. Southern 5 per cent preferred at 72 is $1 \frac{1}{2}$ up and Transport " $C$ " has continued its advance, with a rise to 61. The Home electricity supply list is firmer, with several gains of 6 d . Electrical Finance are 1 s .
harder at 61 s . Of the Indian shares, Calcutta Electrics lost 3 s ., at 60 s ., but Cawnpores are 6 d. up at 57 s .6 d . Calcutta Trams shed 2 s .6 d . to 65 s . Cable stocks are moving irregularly. Great Northern Telegraphs at 33 and AngloAmerican 6 per cent preferred are both a point higher. Cable \& Wireless ordinary and preference at 112 and 115 respectively, have receded, and Canadian Marconi at 15 s . are lower. London Electrical \& General Trust has increased its dividend to 6 per cent for the year, against 5 per cent, and the shares are 1 s .6 d . better at 24 s .6 d .

## Manufacturing and Equipment

Chloride Electrical Storage have hardened to £5. The feature in this list is a rise of 17 s . 6 d . to $13 \frac{1}{8}$ in De la Rue. This followed the declaration of a dividend making 45 per cent for the year, against 40 per cent in the previous twelvemonth, and figures showing $£ 137,000$ increase in profit. Decca Records hold their rise to 61 s .3 d. A.C. Cossor further recovered to 36 s . ; E. K. Cole eased off to 32 s .6 d . A gain of 1 s .6 d . made Greenwood \& Batley 53s. 6d. Johnson \& Phillips 85s. 6d., Murex 91s. 3d. and Vactrics 19s. 6d. are amongst the shares to show improvement. Power Securities at 32s. are up 1s. Westinghouse Brake went back to 76 s . Peto Scott Electrical Instruments at 11 s . are 3d. better.

## British Power \& Light Dividends

Last March the British Power \& Light Corporation raised the ordinary dividend frorn 7 to 8 per cent, and, from surplus taxation reserves, paid an additional 2 per cent as a cash bonus. For the current year, the interim has been increased from 2 to 3 per cent, with the caution, however, that the object is to bring the interim and final distributions into equitable relationship, rather than to indicate a bigger total for the year. Clearly the interim decision gives no encouragement to the optimists inclined to take the full distribution of 10 per cent for 1945 as firm. But on the 8 per cent dividend alone, the shares at 32 s . yield a round 5 per cent.

## Aron Meters

The extent to which the transition problems of 1945 affected the profits of Aron Electricity Meters proved greater than had been expected. The price of the ordinary shares dropped from 70 s ., to less than 60 s . on the cut in the dividend from 15 to 10 per cent, and the issue of the preliminary profits statement. According to the latter, trading resulted in a loss of $£ 33,000$ as compared with a profit of $£ 19,000$ the year before. E.P.T. repayments, however, came to the rescue, and after provision for taxation, the net surplus is $£ 12,500$, which covers the 10 per cent dividend with something to spare. On the reduced distribution, the yield on the shares at 57 s . 6d. ex dividend is just under $3 \frac{1}{2}$ per cent.

## NEW PATENTS

## Electrical Specifications Recently Published

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

NC. BARFORD.-" Tubing of hollow electrical resonators." 19448. November 20th, 1943. (579834.)
K. Baumann and Metropolitan-Vickers Electrical Co., Ltd.-"Steam turbines." 12277. September 22nd, 1941. (579812.)
A. D. Blumlein and E. L. C. White.-"Pulse generating thermionic valve apparatus." 1689. January 7th, 1940. (579725.)

British Thomson-Houston Co., Ltd.-"Gas turbines." 6853/45. March 20th, 1944. (579759.)

British Thomson-Houston Co., Ltd. (General Electric Co.).-" Methods of making moulds for casting metals." 18740. September 29th, 1944. (579716.) "Ignition distributors." 3698. February 28th, 1944. (579864.)

British Thomson-Houston Co., Ltd., and A. Bowen.-"Lanterns for electric gaseous discharge lamps." 15612 . December 3rd, 1941 . (579731.)

British Thomson-Houston Co., Ltd., and C. J. Milner.-" Secret signalling systems." 5975. April 3rd, 1940. (579726.)

British Thomson-Houston Co., Ltd., and W. J. Scott.-"Glass-to-metal seals." 1363. January 25th, 1944. (579788.)

Brush Development Co.-"Piezo-electric gramophone pick-ups." 10774/42. July 31st, 1941. (579738.)

Callender's Cable \& Construction Co., Ltd., and D. T. Hollingsworth.-"Wave guides for high-frequency electric currents." 11744. June 20th, 1944. (579876.)

Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. "Protection relay." $6207 / 39$. February 25th, 1938. (579800.)

Electric \& Musical Industries, Ltd., and H. G. Lubszynski. "Electron emissive cathodes." $15088 . \quad$ October 10 Hh , 1940.

## (579804.)

English Electric Co., Ltd., J. K. Brown, J. M. Hawkins and R. F. J. Weil--"Apparatus for electric arc welding." 15235. August 10 th, 1944. (579711.)

Express Lift Co., Ltd., J. H. Partridge and L. E. W. Wells.-"Electrical resistors comprising a ceramic support and wire wound thereon." 9200. July 3rd, 1942. (579735.)
C. H. Flurscheim and Metropolitan-Vickers Electrical Co., Ltd.--"Air or gas blast electric circuit breakers." 590. January 6th, 1945. (579839.)
J. Forman and Pye, Ltd.-" System of radio vision and location." Cognate applications $12624 / 41$ and $15037 / 41$. September 30th, 1941. (579813.)

General Electric Co., Ltd., and D. O. Hawes. - Apparatus for frequency-modulating carriers, particularly of a very high frequency." 18051. December 18th, 1942. (579745.)

General Electric Co., Ltd., and E. B. Power.-
"H.p.m.v. electric discharge devices." 13880 . August 25th, 1943. (579826.)
General Electric Co., Ltd., and C. E. Ransley. ""Silicon-crystal rectifiers." 13025. August 11th, 1943. (579824.)

General Electric Co., Lid., G. W. Edwards and R. W. Sloane.-"Electrical generators, amplifiers or modulators." 9834 . June 5 th, 1940. (579803.)

General Electric Co., Lid., V. J. Francis and E. H. Nelson.-"H.p.m.v. lamps." 10813. July 2nd, 1943. (579748.)

General Electric Co., Ltd., I. Jenkins and S. V. Williams.- "Methods for the surface carburizing of steel." 15391. November 2nd, 1942. (579742.)

General Electric Co., Ltd., M. Benjamin, B. S. Gossling and J. W. Ryde.-"Non-lınear impedances." 14315 . September 18 th, 1940. (579845.)
L. W. Germany and Pye, Ltd.-"Circuit arrangement for producing a sine wave voltage from a pulse wave-form." 6137. April 3rd, 1944. (579794.)
S. H. Gorden.-"Automatic electric resiss tance welding machines." 1311. January 22nd, 1940. (579724.)
R. C. Graseby.-"Apparatus for paying out cable, wire and the like." 13052. October 9th, 1941. (579814.)
J. S. Hall and Metropolitan-Vickers Electrical Co., Ltd.-" Means of manœuvring control in marine turbines." 12275. September 22nd, 1941. (579810.)
D. L. Hings.-" Radio-frequency generating and modulating systems." 9240 . July 23rd, 1942. (579736.)
D. B. Hoseason, H. West, D. Smith and Metropolitan-Vickers Electrical Co., Ltd."Direct current dynamo-electric machines." 9433. May 29th, 1940. (579802.)
H. L. Mansford. "Thermionic amplifiers. 7623. April 24th, 1944. (579685.)
B. J. Mayo.-"Velocity-modulated electron discharge devices employing hollow resonators." 8632. May 29th, 1943. (579818.)

Philips Lamps, Ltd., and A. J. Pinkney,-"High-frequency heating arrangements." 20179. October 18th, 1944. (579717.)
Revo Electric Co., Ltd., A. E. Felton and A. Crawford.-"Double pole electric switch mechanism." 16469. August 30th, 1944. (579713.)
L. Sharp and R. Winder.-" Electric light fittings for local lighting to one or more positions from a single lamp source." 12368. July 30th, 1943. (579821.)

Siemens Bros. \& Co., Lid., M. Reed and G. H. Parks.-"Electrical communication system." 7888. April 27th, 1944. (579687.)

Siemens Electric Lamps \& Supplies, Ltd., and J. N. Aldington. " Electric discharge lamps." 7887. April 27th, 1944. (579686.)

Sperry Gyroscope Co., Inc.-"Directive electromagnetic antenna structure." 17313/42. January 29th, 1942. (579746.) "Directive antenna structures." 1834/43. February 4th, 1942. (579763.) "Electromagnetic energy

Iransmission apparatus." 8449.43. May 27th.
1942. $(579764$. R. A. W. Spooner, $\because$ Pipe and cable coup lings," 9600. May 18th, 1944. (5798.38) Standard Telephones \& Cables, Lid.- Phase changers." 20392/43. January 8th, 1943. (579782, "Electro-deposition of selenium." 19830/43. December 1st, 1942. (579851.) Circuit arrangements for the generation of electrical pulses of variable duration" $375 / 44$ January 8th, 1943. (579853.)
Standard. Telephones \& Cables, Ltd. - Distance indicating radio detection system.

31111/44. February 20th, 1943. (579863.)
Standard Telephones \& Cables, Ltd. (International Standard Electric Corporation). Pulse modulation systems." 17891. October 29th, 1943. (579777.)

Standard Telephones \& Cables, Ltd., and D. Bannock. -"Predictors for use with antiaircraft guns," 12501. September 26th,

Standard Telephones \& Cables, Ltd. and R. Hilton.--" Time base circuits for cathode ray tubes." 1976. February 3rd, 1944. (579682.)

Standard lelephones de Cables, Lld., and J. D. Weston.-" Combined glide and approach path systems for aircraft." 3885 . March 1 st 1944. (579865.)

Standard Telephones \& Cables, Lid., and E. O. Willoughby,-.. Radio antenna." 18436. November Sth, 1943. (579778.) . ${ }^{\text {. }}$ Keying arrangements for radio frequencies." 7479 April 21st, 1944. (579873.)
J. Stone \& Co, Ltd., and A. H. Chilton.-"Electrically-propelled torpedoes." 1083. January 27th, 1941. (579728.)

Taylor, Tunnicliff \& Co., Ltd., and W. Vose. "Dielectric composition." 4815 . March 15th. 1944. (579868.)
A. Tustin and Metropolitan-Vickers Electrical Co., Ltd.-"Electric motor control equipments." 14765. Noyember 1st, 1940. (579727.)

## CDNTRACTINFORMATIOX

## Accepted Tenders and Prospective Electrical Work

## Contracts Open

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


#### Abstract

Aberdeen.-September 18 th. Electricity Department. Substation, North Anderson Drive. Forms from the city electrical engineer.

Australia. - Queensiand. - October 17th. City Electric Light Co., Ltd., Brisbane. $15,000-\mathrm{kW}$ steam turbine and accessories. (Specification 412 , first copy 2 guineas, others 10s. 6d.) H. Baskerville, secretary, Boundary Street, Brisbane. (Tenders.)

Bentley-with-Arksey.-September 14th. Ur-


 ban District Council. Electrical installation in 70 permanent houses on Scawthorpe estate. R. N. Penlington, engineer, Council Offices, Cooke Street (deposit of $£ 1$ 1s.).Chesterfield.-September 12th. Electricity Department. Seven $250-\mathrm{kVA}$ outdoor distribution transformers. H.v. and m.v. cables. (August 23rd.)

Dundee.-September 10th. Public Health Committee. Electric lighting installation at administrative block, Maryfield Hospital. Particulars from city quantity surveyor, 21, City Square.

Edinburgh.-September 21st. Electricity Department. Switchgear, transformers and substation equipment. (See this issue.)

Kingston-upon-Thames. - September 30th. Borough Council. Tower wagon for street lighting purposes. (August 23rd.)
Manchester.-September 17th. Electricity Committee. Battery and charging equipment at two substations; and $660-V$ d.c. traction switchgear at three substations. (August 30th.)

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

New Zealand. - September 24th. Public

Works Department. Two 10,000-kVA, $110 ; 11-\mathrm{kV}$ transformer banks and two spare units. Specification can be seen at the New Zealand Government offices, 415, Strand, W.C.2. (Tenders.)
Peebles-shire.-September 17th. County Council. Electrical work in connection with twenty houses at West Linton. D. Peddie, M'Kay \& Jamieson, architects, 8, Albyn Place, Edinburgh, 2 (deposit of $£ 11 \mathrm{~s}$.)

Seaton Valley.-U.D.C. Electrical installation in 104 houses on the Hostel Estate at Cramlington. Plans by the Surveyor, Council Offices, Seaton Delaval.

Southampton.-September 18th. Electricity Department. Fourteen electric refrigerators of the compressor type and of 5 to $7 \mathrm{cu} \mathrm{ft} \mathrm{capacity}$. (See this issue.)

Stockport.-September 11th. Town Council. Electrically-driven borchole pump for the Gas Department. T. Reynolds, gas engineer, Portwood Gasworks.

Wolverhampton.-October 8th. West Midlands Joint Electricity Authority. Supply, delivery, erection, testing and setting to work of two $33,000-\mathrm{V}$, 3 -phase, $15-\mathrm{mVA}$ feeder reactors. (See this issue.)

## Orders Placed

Doncaster.-Electricity Committee. Accepted. Cables ( $£ 6,237$ ). -Enfield Cables.

Eccles. - Town Council. Accepted. Electrically-driven pumping plant at Sewage Works (£2,551).-Pulsometer Engineering Co.

Glasgow.-Corporation. Accepted. Electrical work on housing schemes:-1,548 houses, Pollok -R. J. Sinclair \& Co.; 132 houses, Pollok-Argyle Electrical Co.; 54 houses, Balornock and Robroyston-Stewart Brothers; and 36 tenement houses and 34 hostel houses, Sannox Gardens-Argyle Electrical Co.

Greenock.-Corporation. Accepted. Electrical work for housing scheme ( $£ 8,648$ ). Hurry Bros., Greenock.
Manchester.-Transport Committee. Accepted Trolley-bus motors and motor-generator sets, 10 be used as spares. Met.-Vickers Electrical Co.

## Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.
Aberdeen.-Dining halls, etc., at three schools and extensions of existing meals facilities at other schools; J. A. O. Allan, Ross \& Allan, architects, 10, Bon-Accord Square.
Baildon.-Houses (60), Knoll Estate, for U.D.C.; P. A. Watford, surveyor, Town Hall.

Batley.-Houses (48), Halifax Road Estate, for T.C.; borough engineer, Brunswick Street.
Blackpool.--Schools, Grange Park and Layton; borough engineer.

Boldon (Co. Durham).-Houses (88) on the Somerset Estate at East Boldon; Gordon Durham \& Co., Ltd., builders, East Boldon.

Bowburn (Co. Durham),-Houses (80) at Bowburn and also prefabricated Airey houses at five places for R.D.C.; housing architect, Byland Lodge, Durham City.

Bradford.-Extension to science block, Highfield School, Tong Street, for T.C.; city architect, Town Hall.

Bury.-Houses (166), Brandlesholme No. 2 site, for T.C.; Building Contractors (Bury), Ltd., 16, Castle Street.

Chatham.-Houses (52), Wayfield Estate ( $£ 60,856$ ), for T.C.; E. W. Ballard, builder, Cranford, Birling Avenue, Rainham.

Cleethorpes.-Houses (100), Clee Road site, for T.C.; A. B. Cooper, borough engineer, Council House.

Durham.-Extension to factory of Adams (Durham), Ltd., confectionery manufacturers (£65,000); E. M. Lawson, Barras Buildings, Barras Bridge, Newcastle-on-Tyne.
Farnham.-Houses (50), Heath End site, for U.D.C.; G. Maxwell Aylwin, architect, 26, West Street.
Featherstone.-Houses (68), and bungalows (18), Purston Estate, for U.D.C.; R. W. Bainton, clerk, Council Offices.
Forres.-Houses (90) for Town Council (electric cookers); burgh surveyor.
Glasgow.-Residential nursery school, Fairlee ; city engineer. Factory, Possilpark, for Fibreglass, Ltd.; J. Houston, architect.

Glossop.-Houses (36), Sheffield Road site, for T.C.; R. S. Ainscough, Ltd., bulders, The Sound, Delph, Oldham.

Great Yarmouth.--Permanent houses (65), Magdalen College Estate, for T.C.; H. F. Dyson, borough engineer, Town Hall.

Greenock--Offices for Messrs. Scott, shipbuilders; the manager. Public health offices and clinic; proposed new destructor and
central garage at Ladyburn; and new public baths for Corporation; master of works.

Hull. Rebuilding blocks B and B1., Newlown Buildings, Southcoates Lane, for T.C.; city architect.
Huyton.- Houses (100), Hag Plantation ( $£ 107,976$ ), for U.D.C.; Fortus Construction, Ltd, builders, Rigby Street, Liverpool, 3.
Ilkeston.-Houses (133), Cotmanhay Estate, for T.C.; A. O. Marshall, borough engineer, Town Hall.

Inverness.-Factory for Celotex Company; manager.

Kiveton Park.-Houses (100), various sites, for R.D.C.; surveyor, Council Offices.

Lanarkshire.-Reinstatement of annexe at Bishopbriggs H.G. school for county council; W. R. Watt, county architect, 34, Albert Street, Motherwell.

Littlehorough.-Houses (78), Hollingworth Lake site, for U.D.C.; G. F. Wild, surveyor, Council Óffices.

Melton Mowbray.-Houses (154), Asfordby and Nottingham Road, for U.D.C.. Wm. Moss \& Son, Ltd., Queens Road, Loughborough.

Newburn-on-Tyne.-Houses (126), Claremont Estate, for U.D.C.; G. Bainbridge, builder, Copperas Lane, Lemington.

Newcastle-on-Tyne.-Leather factory in The Side, for T. Owen; A. H. Fennell, Bridge End Chambers, Chester-le-Street.

Alterations to a factory in High Bridge for J. Paul \& Sons, Ltd.; C. Solomon, 3, St. Mary's Place.
Goods lift to four floors at premises in Guildford Place for Brough's, Ltd., provision merchants; Tasker \& Child, Trinity Buildings, New Bridge Street.
Workshop and offices in Nixon's Place, Haymarket, Newcastle, for the Haridix Co.; Dixon \& Bell, Pearl Buildings.
New Romney.-Houses (50), for T.C.; Culpin \& Son, architects, 3, Southampton Place, London, W.C. 1

North Kesteven.-Houses (114), North Hykeham and Bracebridge Heath, for R.D.C.;
J. Chadwick, surveyor, 31 , Clasketgate, Lincoln.

Oldham.-Works extensions and new office; Phoenix Doubling Co., Cromwell Street. Houses (16), Dove Street; Greenwoods Building Industries, Lid., Salem Works, Lees Road.

Otley.-Houses (56), Lineholm estate, Bradford Road, for U.D.C.; F. Laughey, clerk, Council Offices, North Parade.

Potters Bar.-Houses (38), Baker Street and Dugdale Hill ( $£ 47,180$ ), for U.D.C.; Newland Bros., Ltd., builders, Potters Bar.

Saltash.-Houses (124), Warfelton; S. C. Drabble, borough engineer, Church House, Saltash, Cornwall.

Sheffield.-Extensions and alterations to maternity unit, Nether Edge Hospital ( $£ 31,775$ ); R. C. Hutchinson, Ltd., builders, 430 , London Road, Sharrow.

Shildon (Co. Durham).-Houses (40), Dale Road, Shildon, for the U.D.C.; Kitching \& Co., architects, 40, Albert Road, Middlesbrough.

Slough.-Permanent houses (124), Stoke Poges Lane; borough enginecr, Town Hall.

## Automatic coil winding



A representotive group of Coils wound on the Durban I Machine.


## The Durban 1 with A.C. Geared Motor

The Neville's Durban 1 Automatic Coil Winding Machine is designed for winding all types of coils up to $12^{\prime \prime}$ in length. Wire from II to 35 S.W.G. can be used. A foot operated clutch, and built in control gear are included in the specification. Faceplate speeds from 50 to 340 r.p.m. are obtainable and a $\frac{1}{2}$ horse
power 1425/447 r.p.m. geared motor can be supplied. An experienced staff of specialists is always prepared to give individual attention to any coil winding problems, and full particulars of the complete range of coil winding machines can be obtained from Dept. MD. Your enquiries are invited.

## NGVILIM ${ }_{(\text {anverpoou) }}$ LTD

THE SIMMONDS TOWER • GREAT WEST ROAD • LONDON A COMPANY OF THE SIMMONDS GROUP 合


# CLASSIFIEID ADVEIRTISEMENTS 

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

THE CHARGE for advertisements in this section is 2/-per line (approx. 7 words) perinsertion; ONLY OFFICIAL AND GOVERNMENT ANNOUNCEMENTS CAN NOW BE DISPLAYED:-30/- DET inch. Where the advertisement includes a Box Number this counts as six words and there is an additional cbarge of 6 d . for postage of replies SITUATIONS WANTED. - Three insertions under this beading can be obtained for the price of two if ordered and prepaid with the first insertion.

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

Original testimonials should not be sent with applications for employment.

## OFFICIAL NOTICES, TENDERS, ETC.

## WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

Contract No. 181-Ocker Hill Generating Station :

TCHE above-named Authority invite tenders for the supply, delivery, erection, testing and setting to work of two 33.000 -valt. 3 -phase. 15 -MVA Feeder Reactors.

Copies of the conditions, specification and form of tender may be obtained on payment of one guinea, which will, after the Authority have come to a decision on the tenders received, be returned to the tenderer, provided he shall have sent in a bona-fde tender and shall not bave withdrawn it. Additional copies can be obtained on a further payment of one guinea per copy, which sum will not be returnable. Cbeques should be made payable to "West Midlands Joint Electricity Authority:

Tenders must be forwarded in the envelope provided so as to reach the undersimned not later than noon on Tuesday, 8th October, 1946. The Authority do not bind themselves to accept the lowest or any tender.
H. F. CARPENTER,

Phœenix Buildings
Clerk and Manager.
Dudley Rd., Wolverhampton
26th August. 1946.

## CITY AND ROYAL BURGH OF EDINBURGH ELECTRICITY DEPARTMENT

TMHE Lord Provost, Magistrates and Council of the City of Edinburgh invite tenders for annual contracts for the supply of the following equipment:
6.6-kV Ring Main Switchgear (Speciffeation No. 200) ; 500-kVA Three-phase Transformers (Specification No. 201) : Medium Voltage Substation Equipment (750-a. Air-break Circuit Breakers and H.R.C. Fuse Feeder Untis) (Specification No. 202): Substation Relay Panels (Solkor and Translay Equipment) (Specifleation No. 203).

Conies of the specifications, etc., may now be obtained from Mr. J. F, Field. Engineer and Manager, Electricity Dedartment, Dewar Place, Edinburgh, 3.

Sealed tenders, endorsed "6.6-kV Ring Main Switchgear Specification No. $200^{\prime \prime}$ (as the case may be), must be delivered to the undersigned not later than $10 \mathrm{a} . \mathrm{m}$. on Saturday, 21 st September, 1946. The Corporation do not bind themselves to accept the lowest or any tender.
J. STORRAR. Town Clerk

City Chambers, Edinburgh

## COUNTY BOROUGH OF SOUTHAMPTON ELECTRICITY DEPARTMENT

## Electric Retrigerators

TNDDERS are invited for the supply and delivery of fourteen Electric Refrigerators of the compressor type and of 5 to 7 cubic feet capacity

Short specification and form of tender may be ohtained from Mr. W. G. Turner. Borough Electrical Engmeer, Civic Centre. Southampton, by application and on payment of one guinea. which will be refunded on recelpt of a bona flie tender. Additional copies may be purchased at a cost of 10 s . 8 d . each.
Sealed tenders, endorsed " Electric Refrigerators, " must be delivered to the undersigned not later than Wednesday, 18th September, 1946. The Council does not bind itself to accept the lowest or any tender.
R. RONALD H. MEGGESON

Civic Centre. Southampton.
Town 19rik
23rd August. 1946
2389

## SITUATIONS VACANT

## SUNDERLAND EDUCATION COMMITTEE

## The Technical College

Principal: D. A. Wrangham M.Sc.(Lond.), Sen. Wh.Sc. M.I.Mech.E., D.I.C.

$A^{\text {P }}$PPLICATIONS are invited for the post of Lecturer in the Electrical Engineering Department. duties to commence as soon as possible. Salary in accordance with the Burnham Technical Scale. The commencing salary will include an allowance for approved industrial or pro fessional experience (after the age of 21 years) up to ? years, or in special cases up to 10 years.

The standard of the full-time day courses is that required for an Honours Degree, and of the evening courses the Higher Natinnal Certificate. Candidates should have a good Honcurs Degree in Electrical Engineering, with qualifleations in Telecommunications. and have had practical experience in modern develonments in this fleld. Forms of application and further particulars may be obtained by sending a stamped addressed foolscap envelape to the Registrar, The Technical College, Sunderland. Application forms should be returned to the undersigned as soon as possible.

Education Offices.
W. THOMPSON.
15. John St., Sunderland

August. 1946.
Director of Education

Ausas. 1010.
BOROUGH OF AYLESBURY ELECTRICITY DEPT.
Appointment of Assistant Mains Engineer (Junior)

APPLICATIONS are invited for the above appointment at a salary in accordance with Grade 9, Class F, N.J.B. ה̌chedule, at present $£ 358$. rising to $£ 373$ per annum Candidates must have had good technical education and training, with practical experience in the installation and maintenance of F.H.T. and L.T. underground distribution systems and equipment, together with some experience in mains drawing affice work and mains records. The post is superannuated and the appointment is subject to the successful candidate passing a medical examination

Applications. stating age. training and experience. to be sent to the undersigned not later than September 23. 1946.
F. BENT. M.I.E.E. A.M.I Mech.E.,

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

2380

## CITY OF MANCHESTER ELECTRICITY DEPT

APPLICATIONS are invited for the position of Senior Assistant Chemist. Candidates must have had experience in power station chemistry, and hold the Higher National Certiffcate or equivalent diplona

Salary to commence, $£ 455$ per annum. The appointment will be subject to the City Council Superannuation Scheme. and the successful candidate will be required to pass a medical examination.

Applications, giving full particulars of age, technical training and experience, together with copies of recent testimonials, must be endorsed " Senior Assistant Chemist' and addressed to the Chief Engineer and Manager. Electricity Deparment, Town Hall. Manchester. 2. not later than $10 \mathrm{a} . \mathrm{m}$. on Monday, 16 th September, 1946. Canvassing, directly or indirectly, will disqualify

Town Hall, Manchester, 2.
PHILIP B DINGTE.
29th August, 1956
Town Clerk
2385

## NAVAL SERVICE OF CANADA

Alimited number of suitably qualifed Civilian Electrical Engineers are reçuired immediately by the Royal Gamadian Navy for service in the Dominion of Canada.

The appointments will be for two years' duration, with the pussibility of extension. Travelling expenses from the United Kingdom to place of employment in Canada, and, in the event of termination of appointment, return to the United Kingdom, will be provided for successful candidates, and their wives and childiren, at first class rates. Reason. able costs of moving household effects to place of residence in Canada, and return to the United Kingdom. will be provided. Salaries will be dependent upon qualiflcations.

Applicants should hold the Higher National Certificate or a University Degree in Electrical Engineering. and should have had good practical training and experience in industry. In addition, war-time experience in the detailed layout. installation and testing of electrical systems in modern cruisers, aircraft carriers and destroyers is essential.

Applications, giving full details of age, nationality, general and technical education. industrial and war-time experience. are to reach the Canadian Naval Mission Overseas. 10. Haymarket, London, S.W.1, not later than Monday, 16 th September, 1946. Copies of not more than three recent testimonials are to be forwarded with applications.

2373

## CITY OF OXFORD ELECTRICITY DEPARTMENT

Appointment of Senior Electrical Cooking Demonstrator

APPLICATIONS are invited for the position of a Senior Electrical Cooking Demonstrator in the City of Oxford Electricity Department. Candidates must be well educated and should hold a recognised Diploma in Domestic Science such as E.A.W. Electrical Housecraft Dinloma. The person appointed must be thoroughly competent to practise cook ing by electricity and to advise consumers either in the demonstration room or in the consumers' kitchen.

In the absence of a recognised scale for this class of appointment the salary offered is £350. plus war bonus of $£ 482 \mathrm{~s}$. Der anoum. The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937 , and the selected candidate will be required to pass a medical cxamination.

Applications, clearly marked " Demonstrator," should be addressed to the City Electrical Engineer and Manager, 37, George Street, Oxford, and must be received not later than Monday, 23rd September, 1946.

HARRY PLOWMAN. Town Clerk.
Town Hall, Oxford.
2424
BOROUGH OF COLCHESTER ELECTRICITY DEPT.

## Switchboard Attendant

$\mathbf{A}^{\mathrm{p}}$PPLICATIONS are invited for the appointment of Switchboard Attendant. Applicants should have had experience in the operation of high and low tension control switchgear in a generating station, including synchronising of alternators, load control and running rotary convertors. This is a temporary appointment, but for a period of at least 12 months.

The rate of pay will be 2s. $6 \frac{1}{4}$ d, per hour and the conditions in accordance with National Joint Industrial Council, Ne. 8 Area.

Applications in candidates' own handwriting, stating age. experience and when able to take up duties, accorapanied by conies of two recent testimonials, to be forwarded to the undersigned not later than Monday, I6th Sept., 1946.
Electricity Offices,
G. P. DIXON, A.M.I.Mech.E.,
36. Osborne Street, Colchester, Essex.

CITY OF LONDON ELECTRIC LIGHTING CO. LTD.

## Junior Draughtsman

APPLICATIONS are invited for the position of a Junior Draughtsman in the Distribution Department of the above Undertaking.

Applicants must have been trained as Draughtsmen and have experience in a Drawing Office of an Electrical Undertaking. Electrical qualifications will be an advantage. Salary according to age and qualiflcations.

Applications, giving full particulars, to be sent to the undersigned not later than September 12 th.
G. H. FOWLER, M.I.E.E.

Falcon House,
Distribution Supt
Aldersgate St., London, E.C.1.
2244

SMEFFIELD CORPORATION ELECTRICITY DEPT

APPLICATIONS are iovited for the following OWOETions:- INALLATTONS ENGINEER. Anplicunts must have had a sound technical and practical fraining in electrical engineering, wither with a manufarturing elec. trical eng neering firm or with an electricity supply minertaking and must be Graduate or Corporate members of the Institution of Electrical Engineers or possess equivalent technical qualiffeations.

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

Applicants must possess a thorough knowledge of the care and maintenance of works electrical plant, including the rewinding of motors and the repair and maintenance of switch and starting gear, together with experience of all applications of electrical development normally undertaken by a supply authority
The salary will be in accordance with Class M. Grade 8A, of the National Joint Board Schedule, commencing at 8597 per annum.

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

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

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

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

JOHN HEYS.
Town Hall.
Town Clerk.
Sheffield. 1
2417

## WEST MIDLANDS JOINT ELECTRICITY AUTHORITY

Appointment of Relief Charge Engineer, Ocker Hill Generating Station

THE above-named Authority invite applications for the position of Relief Charge Engineer at Ocker Hill Generating Station at a salary of $£ 437$ per annum, Class G. Grade 8A, of the National Joint Board Schedule.

Candidates must be experienced in the operation of steam turbo-alternators, high-pressure boilers and auxiliary plant in a modern generating station. Corporate membership of either the Institution of Electrical Engineers or the Institution of Mechanical Engineers will be an advantage.

The appointment will be subject to the Authority's Superannuation Scheme under the Local Government Superannuation Act. 1937, and the selected candidate will have to pass a medical examination
A pplications, stating age, training and experience, accompanied by copies of three recent testimonials, should reach the undersigned not later than the 20th September, 1946. Canvassing, either directly or indirectly, will disqualify.
H. T. CARPENTER,

Phoenix Buildings,
Clerk and Manager.
Dudley Road. Wolverhampton
28 th August. 1946
2414

## WESSEX ELECTRICITY COMPANY

THERE are vacancies in the Company's Distribution Centres in Berks, Oxon and Wilts for Fiectricians, Plumber-Jointers. Overhead Linesmen.

Conditions of service and rates of pay in accordance with the Nos, 6 and 9 District Joint Industrial Council's regulations. Apply to the above Company at Oxford Road. Newbury, Berks.

2381

## COUNTY BOROUGH OF BRIGHTON ELECTRICITY DEPARTMENT

## Chief Constructional Assistant

APPLICATIONS are invited from Chartered Civil or Mechancal Engineers for the above position. The person appointed will be directly responsible to the Elecrical Engneer and Manager and will act as his chie sistant in the cary hing out of large power station
Applicants must have bad extensive experience in the carrying out and supervision of civil engineering and building works and plant installation as well as the staff control and office administrative duties associated with the execution of large projects. Some experience of dock and harhour works will be considered an advantage.
The appointment will be subject to (a) the scheme of onditions of service of the National Joint Council for Local Authorities' Administrative. Professional. Technical and Clerical Services: (b) the provisions of the Local Superamnuation Act. 1937, and the selected candidate will be required to pass a medical examination. The salary will be $£ 1,000$ per annum, plus war bonus, at present 559 16s. per annum
Applications, with copies of two recent testimonials and, additionally, the names of two persons to whom reference may be made, are to be sent to Mr. H. Pryce-Jones. M.Eng., Engineer and Manager, Brighton Corporation Electricity Department. Electric House. Castle Square. Brighton. 1. endorsed "Chief Constructional Assistant." and received by him not later than noon on Monday, 23rd September, 1946. Canvassing, either directly or indirectly, will disqualify.
Town Hall, Brighton. 1.
J. G. DREW

September, 1946.
Town Clerk

## CROWN AGENTS FOR THE COLONIES

## Colonial Government Appointments

APPLICATIONS from qualifled candidates are invited for the following post: Accountant required by the Government of Malaya Electrical Department for one tour of three years in the first instance, with prospect of per manency. Salary $\$ 4 n 0$ a month rising to $\$ 800$ a month. Dollar $=2 \mathrm{~s} .4 \mathrm{~d}$. Initial salary according to age and war service. Children's allowance, $\$ 70$ a month for the first child and $\$ 50$ for second child. Outft allowance $£ 60$ Free passages and liberal leave on full salary. Candidates, between 25 and 35 years of age, must be Associates of the Institute of Chartered Accountants or of the Society oi Incorporated Accountants and Auditors, or possess similar professional qualifications, and should have had experience in accountancy in a municipal electricity denartment or other electricity undertaking. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, to the Crown Agents for the Colonies, 4, Millbank, London. S.W.1, quoting M/N/16829. on both letter and envelope.

## ROYAL BURGH OF PERTH ELECTRICITY DEPT

## Appointment of E.H.T. Plumber-dointer

$A^{1}$PPLICATIONS are invited for the above appointment from Jointers having first-class experience in raains, services, pillars and switchgear, up to 11 kV

Wages and conditions in accordance with the Scottish D.J.I.C. Schedule, Zone B. Present rate 27d. per hour. The appointment will be subject to the provisions of the Local Government Superannuation (Scotland) Act. 1937. and the passing of a medical examination. A house will be available at a very early date for the successful applicant
Applications, giving fullest particulars of age, experience and earliest date available for duty, with two testimonials or the names of three people to whom reference may be made, should be addressed to John N. Atkinson. A. M.I.E.E. Burgh Electrical Engineer. Pewer Station. Perth. 2421

## NEW ZEALAND GOVERNMENT

$\mathrm{A}^{\mathrm{P}}$PPLICATIONS are invited for the positions of Assis tant Designing Engineers, Senior Engrneers and Engineers in the State Hydro-Electric Department, the salary scales respectively being $£ 800 / £ 850$, $£ 65 / £ 800$ and £ $435 / £ 560$ New Zealand currency

Applicants should be Clartered Civil Engineers or should hold a recognised Degree in Engincering, with experience of design and contruction

For further particular apply by 30th September to the High Commissioner for New Zealand, 415. Strand, London, W.C.2.

## COUNTY BOROUGH OF SOUTHPORT ELECTRICITY DEPARTHENT

## Appointment of Lady Demonstrator

$A^{1}$PPLICATIONS are invited for the appointment of Lady Demonstrator in the Electricity Department at a salary in accordance with the National Scale of salaries ( $£ 252$-£288, olus war bonus, at present $£ 48$ 2s. per annum)

Applicants should be over the age of 21 years and must have had a good general education. and hold a recognised Diploma in Domestic Science and/or the E.A.W. Electrical Housecraft Diploma. Applicants must be competent to arrange and conduct lectures and cookery demonstrations, and advise on the selection and use of electrical appliances of all types.

The appointment will be subject to the provisions of the Local Government and Other Officers Superannuation Act, 1937, and the successful applicant will be required to pass a medical examination
Forms of Application may be obtained from the Borough Electrical Engineer. 188, Lord Street. Southport, to whom they should be returned not later than Saturday. 14th September. 1946, in an envelope endorsed' 'Lady Demonstrator.

Town Hall, Southport.
R. EDGAR PERRINS.

23rd August, 1946.
Town Clerk.

## KIRKCUDBRIGHT COUNTY COUNCIL <br> CIT DEPARTMENT

## District Electrician/Linesman

APPLICATIONS are invited from suitably qualified men for the post of District Electrician/Linesman in the Castle-Douglas area. The duties will include the installa tion and maintenance of domestic and farm electrical equipment, meter fixing, erection of cverhead service lines, etc, Preference will be given to applicants having previous experjence with an electricity undertaking. and a know ledge of the aperation of rural distribution systems will be an added advantage.
The terms and conditions of the appointment will be in accordance with the J.I.C. Agreements, and the present wage, including war bonus, is $£ 53 \mathrm{~s} .10 \mathrm{~d}$, with the possibility of an increase up to $£ 511 \mathrm{~s}$. 8d, within a short period. After two years' continuous service the post will carry superannuation benefit and the man selected may be re quired to pass a medical examination.

Applications, giving details of age, experience, whether married or single, and accompanied by two testimonials, should be forwarded to the undersigned for receipt by the 16 th September. 1946.
A. N. BOTT.

Electricity Dept.. County Electrical Enginecr.
165 King St.. Castle-Douglas.
26th August, 1946.
2390

## COUNTY BOROUGH OF BOLTON

## Appointment of Electrical Engineer and Manager

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

The salary will be at the rate of $£ 1,600$ per annum, plus bonus
The appointment will be terminable on either side by three months notice in writing: will be subject to thr provisions of the Ioncal Government Superannuation Act. and the succossful candidate will be required to pass a medical examination

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

PHILIP S. RENNISON. Town Clerk
Town Hal\}. Bulton.
2407

ACIIVF and experienced Representative required to develop the sale of all types of rubber and mains cable in the South Wales area. Applications, detailing training and experience, should be sent to-The Fmployment and Welfare Officer, Johnson \& Phillins Ltd.. Victoria Works, Chariton, London, S.E.7.

2376

## ASSOCIATED MUNICIPAL ELECTRICAL ENGINEERS \& ELECTRICAL POWER ENGINEERS ASSOCIATION

## NOTICE-BOLTON CORPORATION

## Appointment of Electrical Engineer and Manager

THE Standing Joint Committee of the above Associations desire to point out that the above post is not adver. tised in accordance with the Agreement made by the National Joint Cormmittee of Local Authorities and Chief Electrical Engineers (Electricity Supply Industry). According to this Agreement and the latest available data (subject to any adjustment which may be necessary under the intermretation of the Agreement) a commencing ealary should be paid, under Clause 10 . of $£ 1,91615 \mathrm{~s}$, for the flrst year, rising to $£ 2.255 \mathrm{in}$ the third year, and thereafter subject to adjustment above or below in accordance with the National Agreement

ALL ENGTNEERS, WHETHER ENGAGED IN THE ELECTRICITY SUPPLY INDUSTRY OR NOT, ARE URGENTLY REQUESTED NOT TO APPLY FOR THE POST NOW BEING ADVERTISED, AND IF AN APPLICATION HAS AIREADY BEEN MADE IT SHOULD BE WITHDRAWN
(Signed) Joint Secretaries
A.M.E.E.-A. P. MACALISTER.
E.P.E.A. -J. F. WALLACE.

2408

Afully-qualifled Electrical Engineer required for a section of a large iron and steel works in North Lincs. The section includes the generating station. Experience necessary in some or all of the following: Planning, specification, installation and maintenance work as applied to heavy industry. electrical manufacture. including technical and commercial work. Reply. stating fully details of education, training, experience. qualifications and present salary, to-Box 2391. c/o The Electrical Review
A PPLICATIONS are invited for the position of Winding Shon Foreman with a progressive electrical engineering firm in East London specialising in motor repairs of all sizes, beth A.C. and D.C. Applicants must have wide experience in, and be fully conversant with, the following : (a) Taking particulars of windings and obtaining former sizes; (b) Methods and materials for insulating: (c) Armature and stator winding of all sizes: (d) Coll winding of all sizes, including heavy bare strip: (e) Shop organization. rate fizing and control of mixed labour. Applicants should state age. qualifications and experience, and if selected for interview their travelling expenses will be refunded. Apply-Box 2278, c/o The Electrical Review.

ARMATURE Winder (Male), with experience of D.C. machines up to $25 \mathrm{~h} . \mathrm{p}$. Hackney district. Write, stating age, wage and details of experience, to-Box 2369,

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

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

A RMTURE Winders and Improvers required. A.C. and D.C... Electrical Power Repairs (Gillingham) Lid., Strover
Street. Gillingham. Kent. Street. Gillingham. Kent.

9365
neral
RMATURE Winders and Improvers wanted Phillips \& Electrical Lid.. 40, Waterford Road. S.W.6. 9496 A SSISTANT Foreman for winding department. A.C. D.C. Motors, fractional to 500 h.p. Permanent prorressive position to suitable applicant.-Higgs Motors. Witton. Rirmingham.
( $C^{\prime}$ VUN. Office Manager requirud for Electrical Department. Colombo Engineering frm. Must be accustomed electrical correspondence. supervision, costing. stock and sales. Attractive terms would be offered man of good education and personality. Preferably young. unmarried. Write Box ZO.303. Deacons Advertising, 36, I padenhali St.. London. E.C.3.
CHIEF Draughtsman required for drawing office staff of six products: electrical motors, generators, rotary transformers, motor alternators up to 10 kW . all freruencies, all voltages, including thigh tension. Salary according to ability, south-east London district. Reply stating experience, technical training and salary required to Box 2309 , c/0 The Electrical Review.

CCHARGEHAND Armature Winder for repairs and rewinding of D.C. electric machinery up to $1.000 \mathrm{~h} . \mathrm{p}$ Top rate, good conditions, North-West London area.Box 2370, c/o The Electrical Review
CHIEF Progress Engineer required by firm of electric motor manufacturers, London dist. State experience and salary required. - Box 2084, c/o The Electrical Review. CHIEF Storekeeper required. London area. Applicants should' have had good storekeeping experience in an engineering stores (preferably electrical), should be capable of using initiative and must, have had experience in supervising stores personnel. Please state, in confidence. age. experience and salary desired.-Box 2416. c/o The Electrical Review.
CLERICAL Assistant required for stores office. Must have good knowledge of electrical material. - London Flertrical Co., 92, Blackfriars Road, S.E.1. 104 COMMERCIAL Engineer required for Exporter's office in Central London. Energetic man with initiative and having wide general electrical and mechanical engineering knowledge. Recent purchasing experience and Spanish language an advantage. Please state qualifications, recent appointments, age, and salary required to--Box 9532 c/o The Electrical Review.

CoONTROL Gear Manufacturers, near London, require young engineers for estimating and technical work. Bnx 9458 c/n The Electrical Review.
ESIGNER-Draughtsman (Senior) required for new development on light engineering, electrical and mechanical work, mainly on electro-dynamic machinery and autornatic switchgear. Works apprenticeship and previous experience in this class of work are essential. Apply-Personnel Manager, J. Stone \& Co. Ltd. Arklow Road. S.E. 14

SITRIBCTION Department, Temporary Junior Assistant required. Experience in dealing with consumers enquiries, installation inspectors, and issuing jointers instructions essential. Salary in accordance with N.J.R. Schedule. Grade 10. Class H. at present commencing at £345 p.a. Applications, stating age and technical experience to-Chief Engineer and Manager, Corporation of Wimbledon, Electricity House, Durnsford Road, Wimbledon. S.W. 19 .
OMESTIC appliance manufacturers require Comm. Rep. Durnsford Road, Wimbledon. S.W. 19 . 2405 for East and S.E. London and Essex. Details toBox 2353, c/o The Electrical Review.

DRAUGHTSMAN, preferably with experience of Electrical control gear, required by London manu facturers. Elderly man willing to give part or full time would suit. Fulf details of experience and salary $T$. quired to Rov 2399. c/o The Electrical Review
DRAUGHTSMAN required by manufacturers of Electric Motors in London area. Good grospects for suitable Motors in Lox 2316. c/c The Electrical Revjew.

$\mathrm{D}^{\mathrm{man}}$RAUGHTSMAN required for switchgear contract work on Cubicle and Flat Back types of A.C. and D.C. Switchbcards. Full particulars of experience. technical training and salary required to-Erskine. Heap \& Co. Ltd.. Lancashire Switchgear Works, Manchester $\bar{T}$.

2339

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

9513

DRAUGHTSMAN wanted. experience in transformers. promising position for versatile younger man. Apply, stating age, experience, salary required, toBrentford Transformers Ltd.. Windmill Road, Brentford. Middlesex.

2401
D RAUGHTSMEN required in North London area, experienced in work on electrical, optical or light mechanical apparatus. Draughtsman also required for material schedules section. Write, stating age, previous experience and salary required.-Box 2344, c/o The Electrical Review.
HLECTRIC Motor Repairs. Winding. etc. Foreman required for small repair shop. London distrint. Partnership basis could be considered.-Box 2233, c/o The Flectrical Review.

WT. ECTRICAL and radio factors require first-class Travellers with connection and car. London and country. Remunerative position. Write fully-Marcus Fisher \& Co.. 37. Aylmer Parade. London, N.2. 2349 TLFCTRICAL and Radio Wholesalers require London Mand Country Travellers with car, also indonr \& Co. Ltd.. 3T, Aylmer Parade. Tondon. N.2. 2404 CLECTRICIANS IOr installation and maintenance work. Used to screwed conduit work and contactor control gear of all types as used on machine tools. Modern factory. good conditions, canteen. etc. Appls-Labour Officer, Courtaulds Ltd.. Clayton-le-Moors. Accrington.

2393

$\mathbf{E}^{\text {L }}$
LECTRICAL Engineer, age not over 35, required for large modern industrial plant in West Afrien Must be qualifed techncally and practically in the installation, oderation and maintenance of industrial generating plant, switchgear transmission and distribution equipment. all types of electric motors, factory, office and household applances and wiring. Salary from e700 per annum, separation and children a allowances married men. Tours of 21 months duration, free passages, furnished quarters, membership to pension fund. Apply, giving full particulars of training and experience, to Rox 1280, c/o Charles Barker \& Sons Litd., 31, Budge Row. London, E.C.4. 2247 TLECTRICIAN. Top wages for really efflent man.

Central London work. Permanency.- Box 2375, c/o The Electrical Review.

ENGINEER Publicist. Wanted by a large engineering company in the North of England, senior and junior trained engineers, electrical or mechanical, for technical editorial work on descriptive literature. press articles, house journals and catalogues. Must have had experience in this class of work. Write-Box 301. 8 Serle Street, London, W.C. 2

2372
RNGINEERS and Draughtsmen are invited to apply to $\triangle$ a large electrical engineering firm in the Midlands which has vacancies in the switchgear department for Technical Sales, Contract, Costing and Design Engineers: also experienced Technical Engineers capable of handling large projects for generation, transmission and distribution. Vacancies also exist for Draughtsmen for circuit diagram and general work.-Box 69, c/o The Electrical Review.
FIRM in London area require several Senior Draughts men for their transformer dept. Expehience on large high-voltage units an advantage but not essential, Very sood salary and excellent prospects to suitable men. State age and experience.-Box 2352 , c/o The Flectrical Review. TIRM of electrical contractors in Scotland requires Manager. Must be qualified electrical engineer with commercial experience and organising ability. Capable of taking full charge. Excellent opportunity to man of initiative. State full particulars of experience, salary required, and give references.-Box 9526 , c/o The Electrical Review
TMPERIAL Chemical Industries Itd. Applications are invited for the position of Shift Charge Engineer in the company's power stations in Runcorn and Widnes. Applicants. who should not be less than 33 years or more than 45 years of age, must have had a sound practical and technjical training in mechanical engineering and good experience of the shift operation of modern steam nower station equipment, including turbo-alternators and water tube boilers of not less than $10,000 \mathrm{~kW}$ and 50.000 lbs . steam / hour capacity respectively. Generous commencing salary. Applications, which must give the applicant's date of birth and full details of qualifications and experience. including a list in chronological order of poste held, should he addressed to-Staff Manager. Imperial Chemical In dustries Itd.. General Chemicals Division, Cunard Building. Liverpool, 3.

2239
ISSPECTOR required by manufacturers of small and medium size A.C. Motors in London area. Sound snowledge of testing and detail inspection essential. Good prospects for suitable man.-Box 2315. c/o The Electricai Review.
TNSTRUMENT Makers and Service Engineers required for Mechanical and Electrical Instruments used in connection with the testing of Aero Engines and general industrial plant. Please state general training. experience. position and salary. and forward any inquiry to The Employment Manager, Messrs. Rolls-Royce Limited. Derby.
JNTELLIGENT Girl or Boy required for electrical show. rooms (Iondon).-Biox 2384, c/o The Electrical Review. T INESMEN required. competent to deal with construction and maintenance of E.H.T. and T.T. lines in Essex. N.J.I.C. rates and conditions. Write, stating age and
TONDON Transformer Products Ltd., Bridgend. South Wales, requires services of two Designers fully conversant with all types of oil and air-cooled transformers up to 1.000 kVA . Permanent progressive positions. to 1.000 kVA Permanent progressive Dositions. All
applications to-London Transformer Products Ltd.. Gob-
rold Estate. Cobbold Road. Willesden. N.W.10. MICHELIN Tyre Co. Ltd., Stoke-on-Trent, require Senior Draughtsman with good experience of installation electric machines, cables, switchgear. L.T. and H X. Minimum qualification. Ordinary National Certificate, Electrical. Write Labour Office in confidence, stating salary required for 44 -hour week.
GWITCHGEAR Engineer for estimating, preparation ol tenders and handling contracts. Experienced man equired. Manchester district - Box 2364, c/o The Electrical Review.

PRODUCIION Manager required for London factory moving to Brighton. Thoroughly experienced with all stages of production. particularly low voltage lamps of all types. must be able to take full control. Please write full details of experience and salary required. Box 2186. $\mathrm{c} / \mathrm{o}$ The Electrical Review

${ }^{2186}$EPRRESENTATIVES (two) required for (a) S.W. postal districts and part Surrey. (b) S.E. postal districts and part Kent and Surrey, by leading radio and electrical wholesalers. State age, previous selling experience, territory covered.-Box 2382, c/o The Electrical Review.
GALES Engineer for Trausformer Company. Young man with good connections in the industry, good education and technical training to enlarge and build up existing sales connections of important special type equipment. Write, stating age, experience, salary re quired to-Brentford Transformers Ltd., Windmill Road. Brentford. Middx
CFNIOR Draughtsman required for large variety of rotating electrical machines of small and medium size. State age, experience and salary required.-
W. Mackie \& Co. Ltd., 129, Lambeth Road, London, S.E.I. S.E.1. office o? South Wales Switchgear Ltd. Previous sales experience not necessary, but first-class switchgear engineering knowledge escential. Apply in writing, giving full particulars, to-South Wales Switchgear Lid., Treforest, Glam. 2388
RANSFORMER Contracts Engineer for inside work. used to dealing with enquiries and orders up to 3,000 kVA, Write, stating age, experience and salary required, to--The Personnel Officer. Foster Transformers \& Switchgear Ltd. Apex Works, South Wimbledon, S. W. 19. 2292 TRANSFORMER Design Engineer required by progressive firm. manufacturing all types of transformers up to 1.000 kVA . Write, stating age, experience, salary required, to-Brentford Transformers experience, salary required, to Brentiond Transformers
Itif. Windmill Road. Brentford, Middx.

WETL-known Electrical Engineering Company have vacancies for suitable lads, over 16 years of age. with matriculation or general schonl certificate, for apprenticeship in the above industry, Good rates of pay and living accommodation provided.-Box 101, c/o The Electrical Review.

## APPOINTMENTS FILLED

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position apolied for has been flled. may we suggest. that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.
B OROUGH of High Wycombe-Installation Engineer: Box 1945-Joint Manager: Box 1986-Asst. Engr. : Mid-Lincolnshire Electric Supply Co. Ltd.-Asst. Con sumers Engineer. All applicants are thanked.

## SITUATIONS WANTED

ACapable Engineer (36), with managerial and ad ministrative experjence, seeks responsible position London area. Fully conversant all machine tools, planning and progress, time study, rate fixing, Salary apmox. £750.-Bnx 9538. c/o The Electrical Review position with a future required by ex- FlightLieutenant, experienced sales manager and buyer in he electrical trade.-Box 9438, c/o The Eilectrical Review. young man (25). at present Section Engineer on production of light Diesels in large Midlands factory. desires change of position. Would accept reasonable salary to gain executive experience.-Box 9525, c/0 The Electrical Review:

A BLE. active and versatile Electrical Engineer (42) sound technical knowledge and wide practical ex perience, wishes to negotiate for responsible permanency with established concern, central or $N$. London or $S$ Midands. Salary £850/£950 eubject to superannuation adjustment. Installations, maintenance, sales, cor respondence, technical literature, drawing. Well versed constructional and general engineering. Willing to trave] when necessary. Car available.-Box 2422, c/o The Elertrical Review.
A CCOUNTANT-Secretary. 37, 14 years' experienre electricity supply industry. England and abroad requires positinn with progressive concern.-Box 9439 c/o The Electrical Review

$A^{1}$DVERTTSER is desirous of contacting an Electrical Engineering firm, preferably Iondon area with view of obtaining position as Works Manager or equivalent responsibility. have held similar position for several years. Well educated, mechanically and electrically. con yersant with modern method, office routine and machine tools for precision work, energetic and strict disciplinarian. -Box 9534, c/0 The Electrical Review.

$\mathbf{A}^{\text {D }}$DVERTISER (31), fully qualifed Cbartered Electrical Engineer with college ard works training ex R.E.M.E. Major, sequires post witb responsibility. Would suit firm of repute requiring a branch manager or area representative where ability to meet customers and discuss their problems is of importance. Galary about $£ 700$. Further details supplied.-Box 9547, c/o The Electrical Review

ADVERTISER (50), Buyer, stock control, costing, firstclass commercial background and organizer, experience all types of electrical supplies and accessories, machine and small tools, metals. steam fittings. available at early date.-Box 9478. c/o The Flectrical Review.

AM.I.E.E.. A.M.I.Mech.E., age 32, 13 Yrs, ${ }^{\circ}$ experience in design, manufacture and application of electric motors, and in the workshop management of maintenance of diverse mech. and elec. plant, seeks responsible post, home or Dominions, on plant maintenance, works production or technical sales. Available immediately.-Box 9494.

AThe Electrical Review. 20 years manufacturing and development experience, chief draughtsman, dynamo, electric machinery, etc., desires advancement. London or Home Counties preferred.-Box 9521, c/o The Elec. trical Review.

A.M.I.E.E., 40, Asst. Works Engineer, 6 years, 500 personnel, chief electrician 3 years, requires post in
field or works engineering. Any locality. -Bor 9551 c co The Electrical Review.

AM.I.E.E. (41), ind, app., experienced O.H. and U.G. distribution systems, power stations. Practical. technical and commertial experience electricity uadertakings. Situation desired overseas.-Box 9476, c/o The Electrical Review.
A SSOCIATE I.E.E., age 46, 5 years charge factory maintenance and installation, seeks post Coventry

${ }^{\text {ana }}$- Box 9501, c/0 The Electrical Review. YER desires change. Experienced all branches elec. and genl. engineering, especially radio and
$\qquad$ ting--Box 9536, c/o The Electrical Review

CHARGF Hand Fiec. Tester of f.h.p. motors, A.C./D.C. yrs exp-Rox 9516, e/o The Flectrical Review. CHARTERED Electrical Engineer (39), design, technical sales and consulting experience motors, control gear, transformers and instruments, invites enquiries re senior executive post. London area or Home Counties. Knowledge of marine, mining and industrial markets. Williag to undertake representation. -Box 9424 , c/o The Electrical
Review.
CHARTERED Electrical Engineer, 42, seeks post. experienced administration and installation of electrical and radio equipments.-Box 9423, c/o The Electrical Review.
YOMMUNIOATIONS Specialist, just demobbed after branch, R.N.V.R., requires job in which 17 years' wide experience this field will be used to best advantage. Experience includes develonment work on. and instal. lation, operation and maintenance of, marine and aircraft W/T, R/T and D/F gear: high-speed line telegraphy (Creed perforators, columin printers, etc.) : teleprinters; picture telegraphy equipment: auto telephone and carrier telephony circuits: Asdic Radar and pulse transmission techniques: modulated light comm. systems. Holds current 1st Class P.M.G. Certificate and prefers unusua. job abroad. Age 34. Minimum salary $£ 600$ p.a.-Box 9504 , c/o The Electrical Review.

DESIGNER Draughtsman, A.M.I.Mech.E-, Grad.I.E.E. seeks post leading to position as electrical engineer. Box ox 9550, c/a The Electrical Review

DRAUGHTSMAN-Designer, experienced
electrical heating design, requires a position in Swansea area.-Box 9499 , c/o The Electrical Review
4LECPRICAL and Plastics Engineer, who held the post of chief enginecr for many years in an electrical engineering firm and later in a plastics firm, and who is a well-known writer of technical articles on electrical and plastic subjects, requires post as Sales Manager or Assistant Sales Manager, or Publicity Manager. Write to-Box 9477 , c/o The Electrical Review.

$\mathbf{E}^{1}$LECTRICAL Engineer, requiring change of em ployment, seeks progressive and responsible post. preferably in South or South-west. England. Wide experience in installation and maintenance. Good worker. Box 9435 , c/o The Flectrical Review.
HLECTRICAL Eingineer (38). Dutch, 14 years reprethe Netherlands, desires job in South Africa.-Box 2343, c/o The Electrical Review.
HLFOTRTCTAN-Fitter, wide experience wiring, erection, d electrical and mechanical apparatus, plant, machinery, etc.. A.C. and D.C. motors, automatic control. frst-class etc., A.C. and D.C. motors, automatic cont
work. - Box 9542 , c/o The Electrical Review.

ELECTRICAL Engineer. A.I.E.E., M.A.S.E.E 25 yequirements.-Box 9506 , c/o The Electrical Revies TLECTRICAL Engineer (31), requires post as Iecinica

14Reoresentative. Many years' experience in super viso LISy capacity,-Box 9548, c/o The Electrical Erad.I.E.E 1 LECTRICAL Engineer (25), Eighes National Certificates Electrical and Mechanical Engineerng Author of articles, papers, etc., part-time tochmice ecturer seeks technical and/or commercial sales position in Dublin. Would travel for a British firm - Box 9505 , c/o The Electrical Review.

ELECTRICAL Supervisor (43), at present own business as contractor, exp. all branches electrical installation work, estimating. costing, correspondence, as well as prac. tical exp., seeks progressive position as Representative, sales and service, or with factor. Own car.-Box 9469 , c/o The Electrical Review.
HLECTRICTAN, capable, long experience installation and maintenance seeks advantageous change, S.W London, N. Surrey areas.-Box 9464, c/o The Electrical Review.
CI.ECIRICIAN, competent all systems, anywhere, dis.

$\mathbf{E}^{\text {I }}$engaged.-24, Rusham Road. S.W.12. 2315
CLECTRICIAN wants job anywhere. 30 YTS. in trade. all systems, cbarge or otberwise.-B. 13. South Vale, S.E. 19 most

- NGINEER. age 41, practical experience covers most aspects electricity supply work and organization. Specialised knowledge tarifis, measurements, relays, h. and general testing techniques applied over a wide teld: A.M.I.E.E., versatile, adaptable, desires change, moderate salary. -Box 9426 , c/o The Electrical Review.
15 NGINEER. Electrical, Mechanical, seeks change. pplicate experience stations, layofs, public works, etc. - Bcx 9535, c/o The Flectrical Review

EBCx 9535, c/o The Electrical Review.
QNGINEER, graduate (32), with works apprenticeship. 8 years design experience control gear and electromechanical devices, seeks responsible design position, London area. - Box 9537, c/o The Electrical Review
F X.Arm. Art. R.E.M.E., experienced all types of installations and A.C./D.C, machines, requires position is Maintenance Electrician, London area.-Box 9475, c/o The Electrical Review.
TXPERIENCE counts. Estimating. supervising. specifications, schemes for complete installations, introduce new business, make contracts pay, good salesman, would represent good firm, age 48, own car, London or Home Counties - Box 9429, c/o The Electrical Review.

GENERAL Manager seeks an appointment with electrical engineering firm where wide knowledge of the electrical industry can be fruitfully employed. commercial and sales experience gained at two of the largest organizations in the country. Products covered include motors, transformers, switchgear, bakelite accessories, lighting units, cables, electric cookers and domestic appliances generally. Capable organiser and stafi controller.-Box9433, c/o The Electrical Review.
TNDUSTRIAL Electronic Designer seeks responsible post.-Box 9442, c/o The Electrical Review.

$\mathrm{I}^{\mathrm{N}}$FSTALLATION, Subervision. Technical Sales or similar Dost wanted by qualified Designer. Industrial elec. tronic and audio frequency experience.-Box 9517. c/o The Electrical Review.

KEEN Electrical Engineer (21), disengaged Oct., desires progressive position; having H.N.C. and served an indentured apprenticeshid.-Box 9444. c/o The Electrical Review.
T IVEIRPOOL district, Electrical Engineer with technical 1 and extended commercial experience desires accupation with manufacturers, contractors or others. Experienced estimator: familiar with markets.-Box $9462, \mathrm{c} / 0$ The Electrical Review.
MAVAL Officer (Flectrical Branch), aged 32, desires situation of trust and responsibility. Over 5 years Commissioncd Service, 2 years teaching R.A.F. Electrical School. Released 30th September.-Box 9463 . c/o The Electrical Review.
RADIO, Telephone and Instruments Production and Methods Engineer. A.M.I.P.E... age 36 . Keen administrator and disciplinarian Quality productions only. Experienced all factory methods and processes.Box 9533 , e/o The Electrical Review
TRANSFORMER (Dower) Engineer, 3 . A A I EE
11 yrs. exp. manufacture. design estimates seeks change-Box 9530 , c/o The Electrical Review
TRANSMISSION Telephone Engineer, 11 years jnstalling carrier and audio equipment. 3 years test and inspection same. Own car. Midlands pretcred.-Hos 9492 , c/0
The Electrical Review

## AUCTION NOTICE

Ta Builders and Contractors: Domestic Street, Leeds, Holbeck: Wednesday, 18th September, at 10.30 a.m James A, Brearley will sell by auction for Messrs. H. L. Reynolds Ltd., who are acquiring new premises, under notice to quit, land being required by Leeds Corporation. therr Builders' and Contractors' Plant. Shloon Cars. Shooting Biakes, viz.: 1 3-ton Electric Overhead Crane (approx. 40 ft . span); 15 ton Coles Diesel Ejectric Nobile do. 12 -ton Coles Petrol Electric do.: 2 3-ton Steam do. and Rail Track: 12 -cwt. Portable Crane; approx. 95 tons 55 and 85 lb . Rail Stock and Crossings: Dennison 40 -ton Weigb Bridge. $16^{\prime} \times 18^{\prime}$ : $25-\mathrm{cwt}$. Hoist; Qty . $\frac{1}{2}$ to 5 -ton Blocks; 1 to 3 Sheath Blocks; Light and Heavy Steel Winches: 120 Crane Concrete Tipping Skips: New and Secondhand Concrete Mixers: Steam Jacketted Mixers and Pans: Acid Mixer; Portable Stane Breaker: 6 V.Q.B.N. Ruston Diesel Engines (reconditioned): 3 Generator Dynamos, 110 v.: Electric Motors; Dynamos and Switch gear; 100 Battery Charging Sets; Lighting Sets; "International," "Cletrac " and "Case "Engines and Spares; 10-ton Tangye Hydraulic Jacks; New Electric Welding Set: Electric Petrol Pump (as new): 3 comp. 1.500 -gal. Storage Tank; 500 -gal. Petrol Storage Tanks; Diaphragm Centrifugal Pumps: Trailer and Portable Pumps: Lge. aty. 4" Suction and Pressure Hose: Air Receivers: 5 Compressor Drills; Blast Hole Drill Bit، 3 A.P.1: Steam Electric Heating Convectors: Gravity Feed and Mechanical Coaveyors: New Rubber Conveyor Belting Jubilee Wag gons; Turntables and Rails; Lister Portable Works Trucks: 20 Works/Greenhouse Heating Boilers; 8 Steel Huts with sliding doors ( $48^{\prime} \times 30^{\prime}$ to $144^{\prime \prime} \times 35^{\prime}$ ): Lge, aty Steel Sections and Roof Trusses; Steel Tubing and Scaffolding: Lge. qty $6^{\prime \prime}, 10^{\prime \prime}$ and $20^{\prime \prime}$ Steel Tubes and Fittings; Clips: Piping: Reinforcing Rods : Steel Strip: Lge. qty. Galv. Corrugated Sheets: Barbed Wire: Chemical Lavatories (as new): 20 new Stcrage Bins: 5 Utility Shooting Brakes (brand new bodies): 1936 Dennis 14 -str. Workman's Bus with lge. compartment; 1939 Hudson 22-h.p. Saloon: Fordson Waggons and Tractors: Qty. Rubber-tyred Wheels. Also Office Lino., Safe, and other miscellaneous items too numerous to detail. On view any day prior to sale during business hours. Auctioneers: Boro Mart. Halifax (Tel. 4408).

2406

## FOR SALE

Traders buving and selling hereunder must observe the Restriction of Resale Order, S. R. \& O. 1942 No. 958.

## BURGH OF LERWIGK ELECTRICITY DEPT

$\mathrm{O}^{-}$FFERS are invited for the following equipment in first-class condition :
1 G.E.C. Battery Charging Booster. 26-h.p., 1.000r.D.m. $460 / 510$-volt D.C. motor direct coupled to 2.0/115-volt, $8.6-\mathrm{kW}$ generators, mounted on base plate complete with switchboard,
1 Milking Booster, English Electric. .7-h.p.. 1,500r.p.m., 230 -volt motor direct coupled to 6 -volt, $50-\mathrm{amp}$. generator, mounted on base plate, complete with switchborrd.

2 Find Cell Regulators
2 " Salford " Air Circuit Breakers, mounted on volished slate, 400 amp, 230 volt D.P., complete with overload and no:volt coils. New

1 Triple Pole similar to above. New.
Offers to: Engineer and Manager, Electricity Works,
Lerwick, Shetland.
2398

## BOROUGH OF MORLEY

## Sale of Siren

0FFERS are invited for the purchase and removal of one "Gent " 8-h.p. Siren, suitable for operation on 3-phase, 400 -volts, 50 -cycles system, and complete with main switchiuse and ancillary equipment, situated at the Town Hall, Morley. Inspection may be made by prior arrangement with the undersigned, to whom tenders should be delivered not later than Tuesday. 17th September, 1946.
E. V. FINNIGAN.

Tuwn Hall,
Town Clerk.
Morley, Yorks.
2319

## ACCRINGTON CORPORATION ELECTRICAL ENGINEERING DEPARTMENT

SEVEN panels "Edlison " Unit Type draw-out Switchgear suitable for three-phase, 400 volts, four-wire supply, each pane? being fitted with an oil circuit breaker, capacity 146 amps, having three overloads. time lags, ammeter and cable sealing box. Borough Filectrical Emmeter and cable searoration Hectricity Works, Off Hyndburn Road. Accrington.

2396

Abrilliant opportunity ! Uaused Diesel Engines, exGovt. surplus stock. Following sizes at present released: $44,52,60,88,100,132$ h.D., all multi-cylinder vertical, latest designs (1944). A1 makes; complete Gen. Sets built at short notice. Ask full details from-The Filectroolant Co.. Wembley.

2427
used
A. Cooksley 8 Co. Ltd, offer large selection of used Electric Motors, A.C. and D.C. Write-21/25,

Tabernacle Street, London, E.C. 2 (Monarch 3357/58). 46 number of Lighting Sets from $\frac{10}{2} \mathrm{~kW}$, Petrol and Diesel driven, 110 or 220 v. D.C.. or various descriptions. Further details from The Electroplant Co.. Wembley, Middx.

2428 number of unused, portable, petrol-driven Welding Sets, suitable for use with electrodes, sizes 6 to 12 .Fyfe. Wilson \& Co. Ltd.. Bishod's Stortford.

2412 C, and D.C. House Service Meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one year. Repairs and recalibrations. The Victa Electrical Co., 4 ? Battersea High Street, S.W.11. Tel. Battersea 0780. 19 A.C. and D.C. Motors, all sizes, large stocks, fully 1 guaranteed, Milo Engineering Works, Milo Road, East Dulwich, S.E. 22 (Forest Hill 2278-9). 102

AC./D.C. 5-valve Superheterodyne Sensitive 3 -wave Band Receiver. Excellent tone. Attractive modern cabinets in "Plastele" or polished wood, $£ 1616 \mathrm{~s}$. Usual trade terms and facilities. Early delivery. Trade anly. Morgan. Osborne \& Co. Ltd., Southview Road, Warling. ham, Surrey.

110
A.C. Motors, $1 / 75$ th h.D. to $5 \mathrm{~h} . \mathrm{D}$. . all valtages. Also Road.C. The Johnson Engineering Co., 319, Kennington Road London, S.E.11. Telephones, Reliance 1412/3. 57 A portable, petrol-driven Generating Sets. Export enquiries invited.-Fyfe. Wilson \& Co. Ltd.. Bishop's Stortford

2409 B. \& W. Water Tube Boilers for disposal. Two 50.000 lbs . per hour, 310 lbs . W.P., together with economisers, etc., erected or F.O.B. - Burford, Taylor \& Co. Ltd. Middlesbrough

85

BATTERY Chargers for home and export. 4 models 2-6-12 v.. 1. 2 or 4 amp. D.C., any mains voltage. Generous trade terme. Write for catalogue-The Banner Electric Co. Ltd., Hoddesdon, Herts. Tel.: Hoddesdon 2659.

EEANTEE Festoon Striplight Holders, made of X20 Bakelite, for use with 7/.029 T.T.R. cable, require no tools or screws for wiring. Immediate delivery of any quantity. Passed by the fire authorities. Used by corporaticns and supoly companies all over the world. Large auantities of British made Electric Lamps and Cable always in stock. The Beeantee Illuminations (London) Ltd. Temporary Address, 6. Upper Street, Islington, London, N. 1 (Phone, Canonbury 4555).
BOXES, 5 ft . 5 in . long by Ift. 4 in , wide by 6 in , deep and 3 ft . 9 in. long by 1 ft . 6 in wide by 8 in . deep; perfectly new: suitable for packing machinery or spare parts: large supplies available. Prices from-Tollesbury Trading Co. Itd.. Woodrolfe Rd.. Tollesbury, Essex. 2419

BT.A. A comprebensive service is now available for all classes of tools and equipment for the accumu lator trade.-B.T.A.. 246 Cavendish Road, London S.W.12. Tel. : Baiham 6691/2.

BURDETTE \& Co. Ltd. stock Reconditioned A.C. and D.C. Motors and Starters equal to new. Day and night service.-Stonhouse St., Clapham, S.W.4, Mac. 4555. 17

CEFA Hall Lanterns. Pendant Fittings and Wall
Brackets: also Shade Makers, Gymbals, etc. Actual manufacturers. - Central London Engineering (Fabrications) Itd., 120. Old Street, E.C. 1 (CLE. 2586).
C.M.A. V.I.R. Cables. 2.500 yds. 3/029: 3.000 yds 3/036: 2.500 yds. 7/029: 1.800 yds. 7/036: 700 yds T/044. C.M.A. Lead Cables, 450 yds. $1 / 044$ T.: 100 yds. 3/029 S.: 4.000 yds. $3 / 029$ T.: 400 yds. 3/029 T.C. 400 yds. $3 / 036$ T. ; 300 yds. $7 / 029$ T. Atlas $230 \cdot v o l t$ Pear Lamps, 300100 -watt. 20060 -watt. $£ 375$ the lot, or separate offers.-Box 9512, c/o The Electrical Review.
COMPTETE Steam-driven Power Station, comprising three boilers. two $240-\mathrm{h} . \mathrm{p}$. Skinner Uniflow engines with direct connected $215-\mathrm{kVA}, 70 \%$ PF generators, and one $535-\mathrm{h} . \mathrm{p}$. Nordberg Uniflow engine with direct connected $429-\mathrm{kVA} .70 \%$ PF generator, all 440 volt, 3 -phase, 50 cycle condensers, switchboard, voltage regulator and all auxi liaries. Installed in Cyprus.-Box 9520, c/o The Elec trical Review.
CONDENSERS, $21,38,146 \mathrm{kVA}, 3$-phase, 50 cycles, for P.F. correction. 200 -amp.. 3-phase, B.B. Trunking and accessories. 1.000 gals. Switch Oil. L.C. and Armoured Cable, 12 to .3 sq. inch. 3 and 4 core. Oil immersed Sw. Gear. 1.100 amp, to 100 amp., A.C. Starters for Squirrel Cage Motors. - Midland Counties Electrica Engineering Co. Ltd., Grice Street, Spon Lane. West Bromwich.

DC. Motors. new. $200 / 230$ volts, 1,400 I.p.m., 8 to 313 h.p. also 110 volts, D.C. 21 h.D.. several available with starters.- Stewart Thomson \& Sons (L'pool) Ltd.. Fort Road, Seaforth Liverpool, 21 (Telephone Number. Bootle 2697), or 28. Victoria Street, Westminster, London, S.W. 1 (Telephone Number, Abbey 2101).

ELECTRIC Motors and Dynamos. We hold one of the largest stocks of new and secondhand motors. Secondhand machines are thoroughly overhauled. Inspection and tests can be made at our works. For sale or hire. Send your enquiries to-Britannia Manufacturing Co. Ltd.. 22-26. Britannia Walk, City Road, London, N. 1 (Pbone. 5512.3 Clerkenwell).

ILECCRIC Motors, etc. We supply all types and sizes, etc., of electrical machinery. Send your enquiries to Be-Be Engineering. 3, Retreat Close, Kenton, Middx. Word LECTRIC Motors, $1 / 3$ h.D. 3.000 r.D.m.. D.C. 112

Lvolts. Also 220 volts. Stock delivery, $£ 8$ each. Joha Steel, Cyde Mils, Bingley, Yorks.

$\mathbf{E}^{\mathrm{L}}$ECTRIC Welding Plant, Engine and Electric, A.C. driven, 300 amps . output, complete with weather-

$\mathrm{E}^{\text {prof }}$covers.-R0x 34, c/o The Electrical Review. ECTRICAL Equipment (from dismantled air raid shelters, etc.).

For particulars apply to-City Engi neer. Town Hali, Newcastle-upon-Tyne.

LADDERS, single and extension, from-Ramsay \& Sons (Forfar) Ltd., Forfar.

9004

$L^{A}$AMINATIONS, quantity stator and rotors for frac. tional h.p. motors. Fosters. Ottways Avenue, Ashtead, Surrey. 9428 ators. up to 1.200 arops., for the most part unused. Send requirements to-Fyfe, Wilson \& Co. Ltd.. Bishop's Stortford. Tel. B.S. $1000 / 1$.
TARGE range of toasters, fans, portable and wall electric fires, radiators, convector heaters, floor standard and table lamps, electric irons (heat controlled and others), vacuum cleaners, hair dryers, novelty bowl fires, boiling rings, electric rettles, immersion heaters. (Radics very shortly available.) Large range of torch cases. cycle lamps and all types of lighting and H.T. batteries, etc. Detailed list and catalogues available. Place your orders in good time.-Brooks \& Bohm Ltd., 90. Victoria Street. London, S.W.1. Phone, Victoria $9550 / 1441$. Inland Telegrams, ${ }^{\circ}$ Beebats, Sowest. London.
TESLiE Dixon \& Co. for Dynamos, Motors. Switchgear, Chargers and Telephones. - 214, Queenstown Road. Battersea, S.W.8. Telephone, MACaulay 2159. Nearest Rly. Sta,: Queen's Road, Battersea (S.R.)
IMITED quantity of Opa: Ceiling Fittings. exAdmiralty stock. Suitable for offices, shops, kitchens, and bathrooms. Enquiries to-Southampton Electrix Limited, 126a. Macnaghten Road. Bitterne Park, Southampton. 9529 TSTER Diesel Alternator Set, comprising 14-h.p. Lister Vert.. twin-cyl. diesel engine, direct coupled on bedplate to $9.4-\mathrm{kVA}, 380 / 3 / 50$ alternator. with direct coupled exciter and complete with switchboard; D.C. Generating Set, Petter $S$ type oil engine, cartridge start. completely reconditioned, coupled to $13 \frac{1}{2}-\mathrm{kW}$ Verity's $230-\mathrm{v}$. D.C. generator, complete with new set Tungstone batteries, 57 cells for $75-\mathrm{amp}$. hour: B.T.H. D.C. Generator, 510 volts, 177 amps, 90 kW , ring oil bearings. 250 revs., shunt wound, single bearing for direct coupling: Flectrical Co., London, 230-v. D.C. generator, 1,400 r.p.m.. 14 amps R. O.B.: One-tenth-h.p. Emerson D.C. Motor, 220 v.. 900 r.p.m. compound wound: i.h.p. Edmundson, $230 \cdot v$. . D.C., ball-bearing Motor: One-thirdh.p., Met. Vick., 230 -v. Motor, continuous rated, 1,425 r.p.m., ball bearing; 1 $\frac{1}{2}$-h.p., Met. Vick., 200 v.. D.C. Motor, 1.380 r.p.m., plain bearings. Selwood, Wide Lane, Southampton. Phone 75238.

2397
11 ONOMARK, Permanent London address. Letters re1 directed. 5s. p.a. Write-BM/MONO53, W.C.1. 68 OTOR Generator Sets and Convertors, all sizes and voltages from $\frac{1}{3} \mathrm{~kW}$ ud to 500 kW in stock.Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, City Road, London, N.1. Telephone, Clerkenwell 5512, 5513 \& 5514.

28 unches-Stilwell \& Sons Ltd. 152, Far Gosford Street, Coventry.
$\mathrm{O}^{\mathrm{NE}} 230$-h.p., 730 -r.p.m.. $400 / 440$-valt.. 3 -phase, 50 cycle, 3 .bearing, slip-ring Motor by ." F.C.C.: ${ }^{\text {B }}$ on fabricated base.-Newman Industries Limnited. Yate, Bristol.

2325 ONE-ton Short Wheel Base Open Trucks by Guy, Morris, Ford, etc., new in $1941 / 43$, ex M.O.S., all in excellent condition. New batteries, good tyres, rugged construction and will withstand considerable hard wear. Prices from £120 to £180-Mathew Brothers, Matbro Works, Sandy Lane North, Wallington. Phone, Wallington 4050. 1899 DHONE 98 Staines, 90 kW Ruston Diesel Set, 110 vo. ditto. D.C. : $25-\mathrm{kW}$ Mirlees ditto, 110 vo.; $7 / 9-\mathrm{kV}$. k R Ruston Pump. $8 \frac{1}{2}{ }^{\prime \prime} \times 6^{\prime \prime} \times 13^{\prime \prime}$. -Harry H. Gardan \& Co. Ltd. Staines.

60
DLATING Generators, unused, several ranging from 350 to 700 amps., 6 to 12 volt, plain or with A.C. or D.C. motor drive. Particulars from-Stewart Thomson (Liverpool) Ltd., Fort Road, Seaforth, Liverpool, 21 (Bootle 2697): or 28, Victoria Street, London. S.W. 1 (Abbey 2101).

PV.C. and Cotton-covered Bell Wire, single, twin, triple and four core, in beautiful assorted colours, from 6s. 6d. per 100 yds.: send fd. for samples and lists. We also have in stock irons, fires, extension speakers, etc. -Northern Industries. Dept. 8. 199. Broughton Lane, Salford, 7.

2217
REBULLT Motors and Generators. Long deliveries can often be avoided by purchasing rebuilt secondhand plant. We can redesign or replace surplus plant of any size. Send us your enquiries. Over 1,000 ratings actually in stock here- Dynamo \& Motor Repairs Ltd.. Wembley Park. Middlesex (Telephone, Wembley 3121. 4 lines); also at Phœenix Works, Belgrave Terrace, Soho Road, Hands worth. Birmingham (Telephone, Northern 0898).
76 CAHY Converters in stock, all sizes; enquiries invited, - Universal Flectrical, 221. City Road, OTARY Converters, 200.kw, $6,800 / 3 / 50$ input 16 valts 2 wire D. \% output, complete with Trans-
 kW . $\mathrm{h}, \mathrm{AnO} / 3 / 50$ input. $418 / 462$ volts, three-wire D.C. output, complete with transformers, starting panels, D.C. machine panalg, F'irst-class condition. Two sets avail ahle-Stewart Thomson \& Sons (Liverpool) Ltd., Fort Rnad Seafnoth, Liverpool, 21 (Bootle 2697); or 28. . Victoria Strept, Tinndon. S.W. 1 (Abbey 2101).
DOINN Hardwnod

$R^{0}$dellven Hardwod Pattresses, any quantity, good CKS and Bags in exco The Electrical Review modities, as low in excellent condition for all commodities, as low as 4d, each. Write-John Braydon Lud. $29 n, T$ Thtenhan Court Road. W.1. Tel. No.
Museum 6972.
 20 ${ }^{-1}$ to $44^{\prime \prime}$. - Hyams, 5, Glengall Road, London, S.E. 15. 9488 GPIRAL Elements for electric fires, boiling rings, and N other appliances, supplied to order.- Flectrotbermal Engineering Ltd., 270. Neville Road, London, E.7. 54
GPIRALS, frst quality, 500, 600, 750 and 1,000 watt. SPLRALS, all voltages, for immediate delivery.-Box $59, \mathrm{c} / 0$ The Electrical Review
CTAFF Time Checking and Job Costing Time Recorders 0 (all makes) for quick cash sale. Exceptional condition. Write - Box 528, Smiths. 100, Fleet Street. L.ondon, E.C.4.

CTARTER and Control Gear, all types from $1 / 5 \mathrm{~h} . \mathrm{D}$. to $13 \mathrm{~h} . \mathrm{p}$. i also large quantity of Cable, all types, including Welding Cable, Single Armoured, etc- Electron Equipment (Portsmouth) Ltd., 3, Fint Street. Portsmouth (Phone 6961)

2347
STEAM Generating Plant. The following is a selection of sets available in our comprehensive stock: $2,000 \cdot \mathrm{~kW}$ B T.H.Turho-Alternator, 6.600/3/50. 180/210-1bs. pressure, complete with surface condenser and all auxiliaries, seen running. $1.250-\mathrm{kW}$ Brush Ljungstrom Turbn-Alternator $400 / 3 / 50,200 \mathrm{lbs}$. pressure, complete with surface conden ser and all auxiliaries, seen running. 750-kW Adamson / Mather \& Platt High-pressure Pass-out Turbo-Generator, 200 -lbs. initial steam pressure, passing out $25,000 \mathrm{lbs}$. per hour at 80 lbs. pressure, 500 volts, three-wire D.C., with balancer, complete with surface condenser and all auxiljaries. First-class condition. Full particulars fromStewart Thomson \& Sons (Liverpool) Ltd., Fort Road, Seaforth, Liverpool, 21 (Tele. No. Bootle 2697 ) or 28. Victoria Street, Westminster, London, S.W. 1 (Tele. No.
Abbey 2101). GTOP-Watch. $1 / 100$ sec.. Swiss, \&8. Little used. -Hall, 52, Duke Street. Chelnsiord.

9545
GUPERIOR Type Builders' Ladders now in production: Shaftesbury Ladders Ltd., 453 , Katherine Road, E. 7 . Grangewaod 3363/4.

15

USED Double Flanged Bobbins, good condition, 2,000 gross approx. Measurements $37^{\prime \prime}$ overall, $3 z^{\prime \prime}$ traverse. | $3^{\prime \prime}$ diameter flange. Will sell all or part.-Joseph Harari. |
| :--- |
| 99 |
| 1. | 42. Whitworth Street. Manchester.

99
ers. Commutators, bearings, Hans, carbon brushes, driving belts, brushes, attachments and fittings for all makes. Wholesale only.-Vacuum Cleaner Suprlies, 543, Moseley Road. Birmingham, 12.
Variac Type 100, 230 volt, 10 amp., £7. Nearly new, -Hall, 52, Duke Street, Chelmsford. 9544

WATER Tube Bailers in stock. Two 25.000 lbs. evap.. 20,000 . W.F.; One $25,000 \mathrm{lbs}$. evap., 175 lbs . W.P. Two 20.000 lbs evap. 175 lbs . W.P.: 190 lbs . W.P.: One 12.000 lbs . evap. 200 lbs W.P.: One $9 / 10.000$ lbs. evap., 200 lbs. W.P. We install complete, including brickwork. Economisers, pumps, Diping valves, generating sets and motors in stock. Hease senc us your enquiries: we can give immediate delivery -Jurford, Taylor \& Co. Ltd., Boiler Specialists, Middeshrough (Telephone, Middlesbrough 2622)
and
1 h.p. Motors for immediate delivery, 200-220 and $4230-250$ volts. 50 cycles. split phase, sleeve bearing. c8 15 s . each in lots of 6 or more.-Box 9422 , c/o Ine Electrical Review.
Laurnar Sott, $15 \mathrm{~h} . \mathrm{p}, 400 / 3 / 50$. totally enclosed ithor on slide rails. complete with Leonard starter with thermisi overloads: 12 h .ancashe with Met-Vic heavy luty pin 346 with coil overloads, almost new.-Bcx 2950 , duty starter The Electrical Review.
5 to $20 \mathrm{~kW} \mathrm{DC} \mathrm{and} \mathrm{A.C} \mathrm{Petrol} \mathrm{\&} \mathrm{Diesel} \mathrm{Generating}$ Sets, some packed for shipment-Box 87, c/0 The Electrical Review.

5$-k W$ and $21-k W, 230 / 250$-volt D.C. Generating Sets, complete with 4 -cylinder, $10-\mathrm{h} . \mathrm{D}$, Austin Engines. with petrol tanks, radiators, fans and switrhboards. Large number available.-Britannia Manufacturing Co. Ltd. 22/26, Britannia Walk, London, N. 1.
15. kW Generating siel: 27-h.p. Lister Thlesel mold start 1:) ongine direct coupled 1 , uluorevs., 230-volts D.C. compound generator by Harland Engineering Co.. mounted on combination baseplate. $5-\mathrm{kW}$ Generating Set: 9-h.p. Lister Diesel cold start engine direct courled 1,000 -revs., 220 -volts D.C. compound generator by Mawdsley, mounted on combination baseplate. Scrivener, 41, Lancaster Road, North Harrow. 9518
20 kVA Met. Vick., 230-vole, I-phase, 50 -cycle Alter--1 nator with exciter, coupled on bedplate to Coventry Climax Godiva petrol engine, complete with switchboard (4 sets available).-Britannia Manufacturing Co. Itd., 22/26, Britannia Walk. London. N.I. Bellis \& 2359
100 - FW D. Steam Generating Set, Bellis \& Morcom with static engine coupled to Crompton 480 -volt generator. (Engineering) 1 ?F.amp. $460-\nabla$. Compound Interpole Protected $17^{\prime \prime} \times 9^{\prime \prime}$ Generator by Crompton, 950 -amp. $460-\mathrm{v}$. Ditto by B. F. White, 750 r.p.m.. pulley $11 \frac{1}{2}{ }^{\prime \prime}$. $\times 8^{\prime \prime}$. $65-\mathrm{amp}$., $460-\mathrm{v}$. Ditto by D. \& M.. oil ring bearings. 200-amp.. 500-v. Ditto by Crompton, oll ring bearings, half coupling--Thos. W. Ward Limited, Brettenham House, Lancaster Place, Strand. London, W.C.2. Phone, Temple Bar 9631. 2090 2)(1)-volt House Lighting Plant, 12-h.p. Petter engine, all fitments. All in bocies, switchboard, cooling tanks and all fitments. All in good working order.-Sands. Burnham, Bucks (Tel. 84)

2363
$250-\mathrm{kW}$ Rotary Converters (2), with transformers and output $420 / 210$ vear, input 6,600 volts, 3-phase. 50 cycles. gear. Generating Sets, Welders, etc.-Midland Counties Electrical Engincering Co. Ltd., Grice Street. Spon Lane, West Bromwich
350 lbs, D.S.C. 35 -gauge and 170 lbs . 35 -gauge Itd. 22 Enamelled Wire.-Britannia Manufacturing Co. 6012360 600 -amp.. $8 / 12$-volt Plating Set, motorised $400 / 3 / 50$, regulator- Electric Machinery Co., Union Street. New Islington, Manchester.
600 -w. Spiral Elements, 230 v, ex stock, surplus from Heating Pads, $15^{\prime \prime} \times 18^{\prime \prime}, 30$, each whole lots. Electric Electron Co. Ltd. Molesey 3541.

ARTICLES WANTED

A
CETATE and other thermoplastic scrap: polythene and P.V.C. in any form ; also scrap cable and insulated wire; urgently wanted.-Elton Levy \& Co, Letd.. 18. St. Thomas Street. S.E.I.

30
PPROXIMATELY 80 Thermal four-pin plug-in type Starting Switches for 80 -watt fluorescent lamp fittings. - Rox 2366, e/o The Electrical Review.
D.C. Lampholders wanted, screwed $\frac{3}{3}$ " brass or bakelite. to- Any quantities from one dozen to twelve gross. Offers to-Box 2362 , c/o The Electrical Review.
CELLULOSE Acetate Offcuts urgently wanted. Send Usmples and prices to-Boy 107. c/o The Electrical Review
E
NAMEL- or Silk-Cuvered Wire, 214. 22 and $24 \mathrm{~s} . \mathrm{w} \cdot \mathrm{g}$. In small or large quantities. Good prices paid. Runbaken Electrical Products, Manchester, 1.2420 HNAMELLED Iron Wire urgently required, any quantities, gauges 182, 21 and 24. Full particulars Equipment \& Engineering Co. Ltd., 2/3, Norfolk Street, W.C. 2.

2415
INGINEERING Technical Books (new or secondhand) wanted in any quantity. Attractive cash offers. Call -Third floor, 356. Oxford Street, W.1, or "Stoneleigh," St. George's Avenue, Weybridge.

${ }^{1}$LUOR FSCENT Lamps, 5ft., urgently required, any quantity, retail prices paid. Collected London area.

MAGNETO ATmature Crical Review.
II AGNETO Armature Core Winding Machine and 9539, c/o The Electrical Review

MOTOR Generator Set. Motor 440 volts, 3-phase. 50 cycles. Generator approx. 140 volts, 300 amps. shunt wound. Direct coupled on baseplate, starter and control gear. Give detalls and price.-Tungstone Products Ltd.. Market Harborough. Leies.
TUBULAR Heating. A quantity of secondhand $230-\mathrm{F}$, required. Thermostats if possible. State lengths and prices to -The Mettoy Co. Ltd, Northampton (Phone

REQUIRED : Mica Electric Iron Elements; Toaster Elements: Spirals, nichrome wire: Cotton-covered Flexes: Brass, Cooper and Steel Sheets. min size $9^{\prime \prime} \times 6^{\prime \prime}$ tlu, Strip, $\mathbf{z}^{\prime \prime} \times y^{-}$: Machinery, new and used: Timber Glazing: Rubber Grommets: Asbestos: Switches: Iron 'ronnectors, etc. etc. Uffers to -Kritish Diamix Led.. Metrum Works, Beatty Street. N. W. 1 Euston 5951
'TRANSFORMER. 20 kVA ir near, mrimary $400 / 1 / 50$, output $230 / 1 / 50$ - G. A. Ridgeway Hinds, A.M.I.E.E.. 63. Queen Victoria St.. London. E.C.4. 9548

TWO Totaly Enclosed Slip Ring Motors. 400 volts, 3 . phase. 50 cycles; 1. 25 h.p.. 750 or 1,000 r.p.m. : 55 h.p.: 1.500 I.p.m.-Bell \& Robertson, 66, Spring Garden Aberdeen. 9546 URGENTLY required, Two Motor Generators; motor, 3 -phase, $230 / 400$ volts, 50 cycles, with automatic star delta switch: generator, single-phase, $80-220$ volts, 400 cycles, rating $10-12 \mathrm{kVA}$. Also one 115 -volt, 3 -phase, 400 -cycles, 1,000 -watts Generator, and one engine-driven generator, D.C. field, 20 volts, 3 amps., 1.200 watts. 1,600 2,400 cycles, output 80 or 115 volts, single-phase.-Box ANTED. D.C. and A.C. ball-bearing Motors. Full details to-Britannia Manufacturing Co. Ltd., $22 / 26$. nnia Walk, London, N.1. 29

WANTED Retary. Coveverters, any size-Univeral:
 ANTED Plant to light a 10 -ton sailing yacht. For Power Priant to light a c/oton Saling yacht. F ANTED to buy or hire. 50 h.p. Motor, $400 / 3 / 50 /$ 1.440.-Fyfe, Wilson \& Co. Ltd., Bishop's Stortford.

WANTED urgently for export, one $50 / 75 \cdot \mathrm{kVA}$, singlephase Alternator, 220 volt, 50 cycle, 1,500 r.p.m... with exciter and voltage regulator. State price and particulars to-Box 2358, c/o The Electrical Review.

WANTED. $4013 / 50$ sauiriel cage Motors. 3 h.p. (3). at 720 r.p.m., 7 it h.D. at 720 r.p.m., $10 \mathrm{~h} . \mathrm{p}$. at 960 r.p.m. New or good secondhand. Fyfe. Wilson \& Co. W Bishop ${ }^{\text {E }}$ stortford.

2410

WE are immediate buyers for electrical machinery and heavy power plant of all descriptions. Good prices offered for A1 vlant.-G.P.U. Lid.. Wembley, Middx. 2429 1
 C.s. That stafa Road. E. Elo.

2426
1 h. p., $230-\mathrm{v}$. A.C. or D.C. Motor.-Universal Electrical. -h. City Road, London, E.C.

25
olts. 12 -h.p. and 3.h.p. Motors required, two-phase, 200 volts. Hylton Street, Birmingham, 18.

2946
$5^{\text {-h.p., } 3-h . D . ~ a n d ~ 4-h . p ., ~} 400$-volt, 3 -phase, 50 -cycle 5 Motors-Britannia Manufacturing Co. Ltd., $22 / 26$,
Britannia Walk, London. N. 1
2321
15 -h.p. and 20 -h.p. (or nearest). 3-phase, 400 -volt. facturing Co. Ltd., $22 / 26$, Britannia Walk, London, N. 1 .

## WORK WANTED AND OFFERED

CAPACITY available for light Electrical Assembly work. Small section of large engineering factory. South-West London, previously engaged on M.A.P. contracts.-Box 2377, c/a The Electrical Review.
C MOIL Winding.-I O.G. Industries Ltri., 476. High Road. Leytonstone, London, E.11. Telephone, Leytonstone 3877.

2105 HLECTRIC Motor Repairs. We specialise in the rewinding and repair of fractional h.p. motors, induction, repulsion and capacitor for refrigerators, washing machines, etc. Also D.C. Good deliveries at reasonable prices. The Johnsan Engineering Company. 319. Kennington Road. Iondon, S.E.11. RELiance 1412/3.

EECTRICAL Mechanical Engineer, 25 years' experience in design, development and production of electric heaters and heat-control, is willing to spend up to 20 hours weekly. assisting firms in development of new devices or ideas. Strictly conflent-Box 9531, c/o The Electrical Review.
WNGINEERS. Precision, South England, seek manufacture of electrical, mechanical or domestic assemblies or components. Press tools, qauges, small stampings, capstan turning, also Internal and External Grinding. Write-Box 74.c/o The Electrical Review.

MACEINING Work, for Centre Lathes up to $6 \frac{1}{\frac{1}{3}} \mathrm{in}$. centres and medium-sized milling (good grade work preferred). The London Electric Firm, Choydon. Up. lands 4871.

58
N OON Sign Glassware. Trade service. repairs, repurnping. re-electroding, bell glasses and accessories. Prompt service, -Neon Illumination Service, 26. Welford Road, Leicester.

9482

NICKEI, and Chrome Plating, large capacity output. Bulk quantity inquiries invited. Send full requirements and, if possible, samples to-1.E.1. (N.I.) Itd.. Lower J.odge Factory. Flax street. Belfast. Northern Ireland
PAINT and Metal Spraying, Large capacity avalable rar efficient and prompt, handling of all goods sent for treatment, Encuiries to Sales Dept., C.S. Ltd., Staffa Works, Staffa Road, Leyton, E. 10. 2237
con-
ERSPEX articles dyed in any colour, which adds con are specialising in this and invite trade enquiries.-The Dorland Electric Co. Ltd., 38a, Brompton Road, London, S. W. 3 . 2361
DORTSMOUTH. Electric Motor repairs, rewinds and conversions, to 15 h.D.. all types. Good deliveries. all work tested to relevant clauses of British Specifleations. -Motronics Limited, Havant Road, Farlington. 9514
TTRANSFORMEK, 5 VA/5 KVA, coil winding, light assembly, immediate deliveries. -The Transformer is Elentriral Co. Ltd., Eastern Road. London, E. 17. WINDING. All types of stators, rotors, armatures rewnund and repaired. 1-phase and 3-phase, to $10 \mathrm{~h} . \mathrm{p}$. All work guaranteed. -Bright Bros, 50, Orford Road, Walthamstow.

## AGENCIES

AGENCIES required by Rex Lighting \& Radio Co. at 246a. King Street. Hammersmith. W.6. Tel. Nos. Riverside 2283-4. New show ooms affer excellent opportunity to display first-class domestic, electrical and radio products of every description.

2195
GENCIES required for London, South of England, for the following: (1) Domestic electrical appliances: (2) Brass electrical accessories, switch olugs, etc. : (3) Conduit. Advertisers have clientele with every wholesaler in the territory mentioned. Immediate turnover can be guaranteed. Either commission or buying basis. Hozt war arrangements considered.-Box 64, e/o The Lilet trical Review.

AGENCIES required, South of England, including the London area: (a) Cables; (b) Small Switchgear: (c) Transformers; or any lines suitable for distribution for wholesalers' business.- $\operatorname{Box} 40, \mathrm{c} / 0$ The Electrical Review.

AGENT required. calling on architects and owners of large buildings and factories in the four Northern Counties, for manufacturers of Lifts and Hoists. Liberal commission, no salary or erpenses.-Ror 2386. c/o The Flectrical Review.

$A^{G}$GENT, with first-class Scottish connection. wholesale. elpetrical contraptors, corborations, etc.. wishes repre-

AGEion.-Box 9524, c/o The Electrical Review.
GENTS wanted every where to sell direct to the retail trades Electrical Floor Standards, Pendants and Sbad
$\qquad$ TANUFACTURERS' Agents, covering the whole of Great Britain and Colonies, are desirous of contacting manufacturers with a view to sole selling rights (either commission or buying). post-war arrangements considered. - Bax 23. c/o The Electrical Review

MANUFACTURERS' Agents, with offlees London and South Coast, wish to hear of additional lines, including Cables and Domestic Apoliances, for sale to corporations, wholesalers, retailers.-Box 9376.c/oThe Electrical Review. LD-established Manufacturers Agent calling on the wholesale in the North of England is open for an additional agency in household and domestic electrical appliances. Central showroom in Manchester. Fither commission or buying basis.-Box 9514, c/o The Electrical Review:
REPRESENTATIVE, Agent, Engineer, M.Inst.E.I. A.M.Inst.B.E., sales, Surrey and Kent, London, S.E. area, connection electrical contractors, supply companies retail stores, own car. requires lines radio. fluorescent. appliances, equipment. Commission basis. - Box 9541, c/o The Electrical Review
$R$ EPRESENTATIVE with large clientele, covering South of Figland in own car, is open for additional lines in Elec. Dom. Appliances, Radio Accessories, or other lines which are of interest to elec. soc.. co-oD. and retail shops. -Box 9523. c/o The Electrical Review.
बOUTH Africa and Rhodesia. Engineer Representative
(Chartered Elect, and Mech. Eng.), proceeding to S.A., wishes to contact manufacturers as agent: 15 years oversess sales exp.-Box 9528, c/o The Electrical Review.

## BUSINESSES FOR SALE AND WANTED

$\mathbf{U}^{+}$
NIQUE oppartunity for energetic qualified Electrical Engineer with $\{4,000$ capital to acquire old-established London business from owner wishing to retire. Good prospects for further development. Reply by letter (in conflence) for interview to discuss details.-Boz 2348 . $\mathrm{c} / \mathrm{n}$ The Electrical Review.
 tors with ras Well-established frm of electrical contrac. known sole arpabies alibd branch business. Nationally tenance work, hicinas rit-dass connection, plenty of mainwell staffed hicinass rapidly expandiag, no jobbing work, Members of National ripped and good stocks available. and on Corporation wipotra' Contractors' Trading Asscn. ings on Cental ings on rental. Present owner, on medical advice, is reluctantly compelled to oder has business for sale. Price for ings, garage, Austin fan fires and oftings, additional buildand book debts of valuan sonfwill. 54,500 . plus stock cies, Business Consultants, 15, Korkshıre Busiaess AgenTelephone 27223.

## MISCELLANEOUS

BATTERY Chrrris Modirnised. Your oid Charger made like new by specialists. Conven ion from ralv to metal rectification Send for initeresting leaflet "a N ". on thik service. Ruabaken Electrical Products. Manchester, 1. 45 .

## PARTNERSMIPS

FLECTRICAL Research Engineer. A.M.I.E.E. MIRE., or light electrical manufacturers, 53 ship, radio, electronic 9543, c $/ 0$ The Electrical Review $£ 3.000$ available.-Box Fersa Engineer a neview
trieal or electronic Arm. Wholesale / 7.paland, 1947 . Fntirrising partner required - Box 9559 c/o The Electrical Review

## PATENT NOTICES

PNTENT Asents. - A. E. Hill, Chartered Patent Agent. 27. Chancery Lane, London, W.c.2. Tele. Chancery 8444.
$\Gamma \mathrm{H}$ E proprietors of the Patent No. 488773 for " Method of and Apparatus for the Reproduction of ThreeDimensional Objects " are desirous of entering into arrangements by way of licence and otherwise on reasonable terms for the purpose of exploiting the same and ensuring its full development and practical working in this country. All communications should be addressed in the first instance to-Haseltine Lake \& Co., 28, Southampton Buildinas, Chancery Lane, London, W.C. 2.

2383

## EDUCATIONAL NOTICES

WNGINEERING Careers and Qualifications. Both - Government and industry have announced and emphasised that young men with technical knowledge and qualifications must receive every chance of rising to the highest posts within their capacity in post War engineering and allied industry. Write to-day for
The Engineer's Guide to Success" 200 courses-free which gives particulars of the first-class training supplied Dy the T.I.G.B. for the A.M.I.E.E., A.M. Inst.C.E.. A.M.I Mech.E. A.F.R.Ae.S., A.M.I.P.E. B.Sc.(Eng.), $\therefore$ i. G etc., examinations in which T.I.G.B. home-study students have gained 44 flrst places and over 1.000 passes. The Gude covers careers in all hranches, Eiectrical. Mechanical. Radio. Aeronautical, etc.-The Technological Institute of Great Britain, 85, Temple Bar House. London. E.C. 4. E.C.4. ATEST A.M.I.E.E. Results. In the recent examina- 77 H thons held by the Institution of Electrical Engineers 477 candidates sat who had taken B.I.E.T. courses, of these 457 were successful in passing the examinations. We believe this record of 457 successes out of 477 entrants has never before been approached by any oral or correspondence tutorial organisation, and indicates the very high efficiency of the modern system of technical training which we have laid down. The B.I.E.T, tutorial creanisation is waiting to ascist you cither with a short specialist course or complete training for a recognised examination. We have available a large full-time staff of instructors. while the efficiency of our extensive organisation is a byword among engineers. We guarantee "No pass-no fee." May we send a copy of " Engineering Opportunities "? Containing a great deal of useful advice and detailed information on over 200 home-study courses and examinations, this handbook is of very real value to the ambitious engineer. Dur highly informative handbook will be sent free and without obligation on request.-British Institute of Engineering Technology (established 1927 -over 200.000 students). 12. Shakespeare House. 17. 18 \& 19 , Stratford Place. Oxford Street, I.ondon. W.1.
DLASTICS offers particularly good prospects to experienced Engineers with a sound knowledge of Plastics Technology, Authoritative borne-study courses are bow available in General Plastics and specialised branches of the science. Full details of these courses and the prospects in the rapidly expanding plastics industry will be found in our handbook, "Opportunities in Plastics," sent free on request. - British Institute of Plastics Technology (Dept. 301). 1?, Stratford Place, London, W.1.

## BUSINESS OPPORTUNITIES

Awell-established Rewinding Specialist in West of England desires to contact an engineering firm with view to becoming a subsidiary.-Box 9511, c/o The Electrical Review.
CCEMCO Ltd., Fluorescent Lighting Specialists, wish to A) contact manufacturers of electrical equipment and accessories, including "Novelty" and "Improved appliances. Domestic fuorescent fittings and components of particular interest. When possible complete output will be taken. and full co-operation given in exchange for sole distribution rights. Replies will be treated with strictest confidence. Man. Director, Scemeo Ltd., Scemeo Housp. 6/7, Soho Street, London. W.1.

2243

## GUSINESS PREMISES

FACTORY Extensions, Warehouses, Canteens, etc. erected complete. Plans and licence applications prepared. Consult-The Universal Housing Co. Ltd., Rickmansworth

109

## THE LARGEST BUYERS OF HEATING ELEMENTS BUY FROM

Wiveohms Ltd.

# PEASHILL ROAD NOTTINGHAM 

WHO SUPPLY ALL TYPES OF ELECTRIC ELEMENTS FOR MANUFACTURERS

## LITHOLITE INSULATORS \&

 ST. ALBANS MOULDINGS LTD WATFORD PHONE: WATFORD 4494

## THE

 MODERN NOTE . . . Another idea for Household Electrical Fittings, this wall light gives a soft reflected light : supplied in cream. misted any other colour. Strongly made, yet light in weight... beaut ful pastel shades that will tone with any interior decoration... made of light metal-such is Duracraft, the new metalcraft that is fast becoming popular throughout the Electrical Trade.Increase your sales by displaying Duracratt Electricai Accessories-they are real sellers.

Sole Designers and Manufacturers :-
L. F, PEATY \&e CO. LTD. COOMBE BRIDEE, KIMGSTON BY-PASS, LONOON, S.W.20

For Reliable Products


Write for illustrated leafletlo:-
EASCO ELECTRICAL G-8 BRIGHTON TERRACE, LONDON, S.W. 9

## EARTHING CLIPS

Tecol or Standard. All sizes from five-eighths to two inches. Brass wiring saddles. Galvanized iron toe clips, Bonding Bars, etc.

THE EARTHING CLIP CO. 2 \& 4 DERBY ROAD, BOOTLE LIVERPOOL 20


## REGISTEAED OFFICES

38 WELL ST., BRADFORD, England

ANOTHER RRE PRODUCT


3 amp. Car Battery Charger-compact metal case, 100250 volts A.C. input-charging 6 or 12 volt at 3 amp . (0-5 ammeters). Pilot light and fuse. One way plug and socket for dashboard mounting and pair of crocodile clips supplied. MANUFACTURERS OF ELECTRICAL ACCESSORIES IN PLASTIC - inir Eudiz. Fimited WHOLESALE AND EXPORT ONLY Welbeck 9356. 37b. New Cavendish St., London, W.1


FFHER \& LUDLOW LTD GRIDWAY DIVISION DFPT 8. ROLFE STREET. SMETHWICK, 40, STAFFS Iandon Office: Phone: SMEchwick 0607. Iandon Offce: W.C. 2 Shone: TEMple Bar 2755


The
MACIFARILANIE
ENGINEIEIRING CO. LTD.
CATHCART • GLASGOW
ARE YOU AWARE that COMPENSATED D.C. MOTORS
give level speeds irrespective of load?

That speed ranges of 8 to 1 are normal ?

That constant power drives are possible using them ?

That they
COST NO MORE ?

Sole Agents for England
STELMAR LTD., New North Rd., London, N.I


## G.G.C. DEVELOPMENT CO.

INDUSTRIAL ELECTRONIC ENGINEERS.
Designers of Process and Delay Timing Apparatus, Precision Measurement of Time Intervals, Electronic Relays and Photocell Units, Machine Tool Control by Electrical and Electronic means.
All enquiries to sole Manufacturers and Distributors :-
W. H. SANDERS

Bedwell Lane, Stevenage, Herts Phone: Stevenage 517/8/9



## YORKS ELFCTRE TRANSNORNER CO LD THORNHILL



We have generations of experience in woodworking; up to the minute machinery for every part of the job, and a properly organised production line for every part of the job. Small wonder then, that many of the largest Cable makers in the country come to us for their drums.

$$
\text { AU OF } \int_{\substack{\text { BST } \\ \text { LMTED }}} \operatorname{TIT}_{\text {HAM }} \mathbb{N} S
$$

LONDON, E.6. GRAngewood 3444


Enquiries to:
JOHN ISMAY \& SONS LTD. 10 Bedford Street, London, W.C. 2

Telephone: Temple Bar 7347

## W/ Don't play blind man's buff <br> <br> Quick identification of cables and com-

 <br> <br> Quick identification of cables and com-} ponents saves labour, time and error. Lasso Identification Tapes provide neat, legible markers that are quickly applied at any point. They also make neat permanent name tabs for marking furniture, containers, plastics and tools.
Lasso Tapes are supplied in 10 yard rolls, printed with your own inscriptions at intervals spaced to suit diameters and other measurements. Inscriptions cannot be erased. Lasso Tapes are self-adhesive, resistant to water, oil, petrol and solvents, and are tested for tensile strength, durability and electrical resistance. An interesting booklet is free on request.

LASSOVIC • LASSOTHENE • LASSOBAND • LASSOFIBRE LASSOTHYL , LASSOPHANE • LASSOLASTIC _ASS 3 PRODUCTS

Pressure Sensitive Tapes
FOR SEALING, LABELLING \& IDENTIFICATION


## ARCOLECTRIG

 TOGGLE SWITCH
## On-Off or Change Over

Write for Catalogue Acolectric (Switches) LId.

## CONTROL CHOKES for fluorescent tubes

NOW IN PRODUCTION ENQUIRIES INVITED SIMMONDS BROS.
BEDCOTE MILL, STOURBRIDGE Telephone: STOURBRIDGE 57730
LONDON: R. B. Whittick, A.M.I.E.E. Abford House, Wilton Road, S.W.I. Telephone: VICTORIA 5957-8

## Counters that really Count with

 the Coil winding industry.The exacting demands of coil winding has led to the production of E.N.M. precision counters. They are designed to give accurate recordings and unfailing service at high speeds over very long periods. There is an E.N.M. counter for every purpose where reliable checking is needed.


## ENGLISH NUMBERING MACHINES, LTD., 38 BARBETS GROVE, LONDON, N. 16



## JOINTERS

 MELTING EQUIPMENTPortable Oil Furnace, Melting Pot, Bucket Rest, Bitumen Bucket, Compound Kettle and Metal Ladle.
The PORTABLE FURNACE \& PATENTS CO. CARRINGTON, NOTTINGHAM Telephone: NOTTINGHAM 64887 Members of : OIL BURNINg APParatus ASSJCIATIOH

## PIRTOID col wiome BOBBNS



Our extensive range covers all requirements for Bobbins used in the manufacture of Transformers, Chokes, Relays, Solenoids, No-Volt Coils, etc.
The Bobbins are manufactured by us in both "Pirtoid," which is a Laminated Bakelite Product, and Presspahn. They possess both high Electrical and Mechanical strength.
Ask for "ATLAS" Bobbin Card M.12391, which covers all the requirements of the Small Mains Transformer Industry.



## TUNGSTEA MOIYBDENUM

 PRGDUCTSELECTRODES IN ALL DIAMETERS PLAIM AND SHAPED

CONTACTS $X$ - RAY TARGETS

SPARK GAPS
PLATES DISCS AND RINGS

## ELECTRO-ALLOYS LTD

12 BAUNEL AOAD LONOON WS TELEPHONE: SHEPHEROS BUSH 3480


## Flexibles

in T.R.S. and P.V.C. (Plastics) METAL, SILK OR COTTON BRAIDED

## MADE BY: <br> AERIALITE LID <br> CASTLE WORKS-STALYBRIDGE.CHESHIRE.ENG:



## REGENERATIVE CONDENSERS

give highest possible vacuum; maximum thermal efficiency; de-aerated condensate. Condensate leaves condenser under all loads at temperature of entering steam and, containing no air in solution, is non-corrosive and ideal for feed for high-pressure boilers. Write for Publication No. GI. 33 "Weir Regenerative Condensers."

REPAIRING

## REGONDITIONING

REWINDING

OYNAMO \& MOTOR REPAIRS LTD. Wembley Park Works WEMBLEY, MDDX.
Phanix Wks., Soho Rd. BIRMINGHAM

78 (Supplentent)
Index to Advertisers
Aberdare Cables Ltd. Aerialite Ltd
Agro Electrical Co. Itd
Allen, W. H., Sons \& Co. Lid.
Alton Battery Co. Lid
Arcolectric (Switches) Lid..
Arrow Electric Switches Ltd,
Sij.fotrical
page
Cover iv

Aston Chain \& Hook Co. Ltd.
Lid
Austins of East Ham Ltd
Avery, W. \& T., Lid.
Barlow-Whitney Ltd
Belling \& Lee Ltd
B.E.N. Patents Lid.
B. \& H. (Nottingham) Ltd

Bill Switchgear Lid.
Braithwaite \& Co. Engineers Lid.
Britannic Electric Cable \& Construction Co. Ltd.
British Electric Resistance Co. Ltd.
British Insulated Callender's Cables Ltd.
British Mica Co. Ltd.
British Ropes Ltd.............................
British Thomson-Houston Co. td. .
British Vacuum Cleaner \& Engineering Co. Ltd
Bruce Peebles \& Co. Ltd.
Brush Electrical Enginecring Co. Ltd.
Bryterlite Electrical Co. (Glasgow) Lid
Burn, George, Lid.
City \& Provincial Stores Ltd.
92
Clarke, Chapman \& Co. Ltd.
01
Clarke, H., \& Co. (Manchester) Ltd... . . . . . . . . . . . . . . . 76
Clayton, Lewis \& Miller Ltd............ . . . . . . . . . . . . 93
Connollys (Blackley) Ltd. .
95
Consolidated Pneumatic Tool Co. Litd.
Constructors Ltd.
7
. 72
Crompton Parkinson Ltd. .............. Cover ii, 35 \& 85
Croydon Engineering Co. Ltd,
Cryselco Ltd.
4
Davis \& Timmins Ltd... ...................................... . . . . . . . . . . 104
Dawe Instruments Lid
86
Dennis, G. P., Lid 46
De Renzi, Holmes \& Co. Lid.
Donovan Electrical Co. Ltd.... .. . . . . . . . . . . . . . . . . . . . . . . . . 102
Dowler, F., \& Sons.
Drake \& Gorham Wholesale Ltd.
DS Plugs Ltd.
72
98

Dynamo \& Motor Repairs Ltd. . . . . . . . . . . . . . . . . . . 77
Earthirg Clip Co. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 70
Easco Electrical. 70
Electricity Services Litd . . . . . . . . . . . . . . . . . . . . . . . . . . 90
Electro-Alloys Ltd. . ............................ . . . . . . . . . . 76

Elexcel Itd.
Enfield Cables Ltd 91
Engel \& Gibbs Ltd. . . . . . . . . . . . . . . . . . . . . . . . . . 82
Engineering \& Lighting Equipment Co. Ltd. . . . . . . . . . 16
English Electric Co. Ltd. . . . . . . . . . . . . . . . . . . . . . . . . 23
English Numbering Machines Lid. . . . . . . . . . . . . . . . 75
Enthoven, H. J., \& Sons Ltd. . . . . . . . . . . . . . . . . . . . . . 72
Evans, F. W., Ltd. . . . . . . . . . 104
Everett Edgcumbe \& Co. Ltd. . . . . . . . . . . . . . . . . . . . . 54
Evershed \& Vignoles Ltd...
Falco Electrical Appliances Ltd. .

Ferranti Ltd.

Finlayson Bousfield \& Co. Ltd............................ 99
Fisher \& Ludlow Ltd. 99
71
Fitter \& Poulton Ltd....................................... . . . . 96
Flather \& Co. Ltd. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 76
Fluxite I.td.
Geipel, William, Ltd.
49 \& 58
General Electric Co. Ltd ..... 88
Gibson, Todd \& Co. Ltd.

Gibson, Todd \& Co. Ltd. ..... | 88 |
| :--- |
| 92 |

Girdex Engineering Co. Ltd.
102
102
Green, Horace, \& Co, Ltd. ..... 93
Green, Horace, ..... 86
Harland Engineering Co. Lid. ..... 33
Heatrae Ltd ..... 13
Henley's, W. T., Telegraph
Herts Pharmaceuticals Lid. ..... 74
Heys, Leonard ..... 96
103
Hick Hargreaves \& Co. Lid. ..... ,
Higgs Motors Ltd.
Higgs Motors Ltd. ..... 15 ..... 15
Howden, James, \& Co. (Land) Lid. ..... 30
Hutchinson's.
Hyde, J. B., \& Co. Itd. . ..... 44
Igranic Electric Co. Ltd. ..... 79
mp Radio Ltd. ..... 71


## Applications

Power Pack to amplifier
Amplifier to microphone
Amplifier to loudspeaker
Amplifier to record player
H/T and L/T inter-chassis connection
Anywhere, when mains output and other connections have to be carried in a multicore lead
Calculating machine connections
Fluorescent lighting fittings
Ballast to Trough unit connections

## Specification

5-Pin Flex plug with cord grip-2 mains Pins -up to 5 amps . Bakelite body and cover-non-reversible-self locating
LIST NO. L. 1258
Price each 3/5
5 -way Chassis socket-high grade bakelite wafer panels
LIST NO. L. 331
Price each $1 / 4$
Plugs and sockets have silver plated and tin dipped soldering spigots

Delivery from Stock


Equip your electrically driven machines with the "right" control gear IGRANIC, which will give positive protection to motor and machine and keep them working to secure maximum production.

Mustration shows IGRANIC Contactor Panel for control of Travel motion of 6-ton Slab Charger for Steel Mill.

## IGRANIC ELECTRIC CO.TD. BEDFORD \& LONDON



Index to Advertisers (Coninued from page 78) PAG
International Combustion Ltd.
Ioco Ltd.
Isenthal \& Co. Ltd.
Ismay, John, \& Sons Ltd
Johnson \& Phillips Ltd.
Kent Bros. Flectric Wire Co. \& E. IH Phillips Lid Key Engineering Co. Ltd.
Kirolite (Sales) Lid.
Klaxon Ltd.
Lancashire Dynamo \& Crypto Ltd
Langley Alloys Lid.
Linread Ltd..
Lister, R. A., \& Co. Ltd.
Litholite Insulators \& St. Albans Mouldings Ltd. Londex Lid.
London Electric Wire Co. \& Smiths Lid
Lyons, Claude, Ltd.
Macfarlane Engineering Co. Ltd
Macrome Ltd.
Marconi Lnstruments Ltd.
Matterson Ltd
McGeoch, William, \& Co. L1d.
McKechnie Bros. Ltd
M.C.L. \& Repetition Ltd.

Mercury Switch Mfg. Co. Lid
Metropolitan-Vickers Electrical Co. Ltd.
Metway Electrical Industries Ltd.
Midland Dynamo Co. Ltd.
Midland Electric Mfg. Co. Ltd
Mirrlees Watson Co. Ltd.
Nalder Bros. \& Thompson Ltd.
Neville's (Liverpaol) Ltd.
Newman Industries Ltd.
Oliver Pell Control Ltd.
Parmeko Ltd.
Parmiter, Hope \& Sugden Lid.
Partridge Wilson, E., \& Co. Lid.
Peaty, L. F., \& Co. Ltd.
Permutit Co. Ltd.
Phosphor Bronze Co. Ltd..
Pinchin, Johnson \& Co. Ltd.
Portable Furnace \& Patents Co.
Presspahn Ltd.
Pyrotenax Ltd
Rejafix Ltd..
Revo Electric Co. Ltd.
Reyrolle, A., \& Co. Ltd.
Rix G. A.
Robinson, Lionel, \& Co. Ltd
Rass Courtney \& Co. Ltd.
Rowlands Elecirical Accessories Ltd.
Runbaken Electrical Products
Salter, George, \& Co. Itd.
Sanders, W. H.
Saxon Components Ltd.
Scholes, George H., \& Co. Lid.
Siemens Electric Lamps \& Supplies Ltd
Simmonds Bros.
Small Electric Motors Ltd.
Sparklets Ltd
Speriyn \& Co
Spicers Ltd.
Standard Telephones \& Cables Lid.
Stephens Belting Co. Ltd. .
Sterling Varnish Co. Ltd.
Sternaw Co. Ltd.
Steward, Wm., \& Co. Ltd
Suflex Ltd.
Symonds, R. H., Ltd
Thermovent Heating
Thorpe, F, W., Ltd.
Tok Switches Ltd.
Trumeter Co. Ltd. .
Tudor Accumulator Co. Ltd.
Tufnol Ltd.
Universal Boilers \& Engineering Co. Ltd
Universal Tools Ltd
Vactric Lid.
Veritys Lid.
Viscose Development Co. I.td
Walsall Conduits Ltd.
Ward \& Goldstone Ltd..
Weir, G. \& J., Ltd
Welding Industries Itd.
Westminster Engineering Co. Ltd.
Westool Ltd.
Wilcox, Edward, \& Co. Ltd.
Wingrove \& Rogers Ltd
Wireohms Ltd.
Yorkshire Electric Transformer Co. Ltd.45 0


CHAPELEALL, ATRDEIE, GCOTLAND


90



## Aeroflex

## UNIT TYPE BOARDS

PARMITER, HOPE \& SUGDEN LTD.
Fluvent Electrical Works
Longsight, Manchester 12


## RESISTANCES

Although. present circumstances render it difficult for us to give our pre-war service to all customers we are still working in their interests.

New materials and manufacturing processes which we are now using to increase output also contribute in large measure to improved performance and reliability of our products. Thus, when normal times return, all users of Berco Resistances will benefit by our work to-day.

THE BRITISH ELECTRIC RESISTANCE CO. ITD. OUEENSWAY, PONDERS END, MIDDEESEX

ARE YOUR METHODS OF

## Hardness Testing

## UP-TO-DATE?



## FOR ROCKWELL TESTS No. 641412

Booklet T.20.55
The Diamond Cone or Ball Penetrator gives direct precision readings up to 300 tests per hour, in the production line or on finished or hardened surfaces. It needs only unskilled operation and gives minimum disfigurement of work.

FOR BRINELL TESTS No. 64/1416
Bookitet T. 2057
Ball Penetrator, $3,000 \mathrm{~kg}$. max. load used on raw materials or components in laboratory or workshops. Hydraulic powered with finger-tip control and adjustable rate of loading.

FOR BRINELL AND DIAMOND PYRAMID TESTS No. 64/1414 Booklpt T. 20.5A Diamond Pyramid or Ball Penetrator, 187.5 kg . max. load. Built-in projector giving magnified image of impression. Up to 300 tests per hour on production.

W.\&T.AVERY,LTD.

SOHO FOUNDRY
BIRMINGHAM 40

## EARTHING IN SAFETY



## with

 NEON INDICATION(1) N the new J. \& P. oil immersed isolator gear an operator is given positive information-by three neon indication lamps-whether cables are alive from remote points or not. While the lamps glow, the cables are alive and it is unsafe to earth. When the lamps do not glow, the operator knows that he may safely open
 the gate interlock and switch over to earth, as shown in the second illustration.
The neon lamps are operated by condenser elements wound into the three bakelised paper bushings on the cable side of the switch.
The equipment illustrated is a ring main unit comprising Type "A" incoming isolators, with a Type "AG.16" air insulated, metalclad, vertical isolation circuit breaker unit.




## FROM WHICH WE LEARN

The picture shows a deliberate test-to-destruction at the Crompton Parkinson Short-Circuit Testing Station.
 From such tests come practical data that could be obtained in no other way-information that is used to make Crompton switchgear safe and sure in operation.

Crompton Parkinson Ltd. are members of the Association of Short-Circuit Testing Authorities.

CIIOMPTON SWITCHGEAR DESIGN日EGINS IN THE TEST STATION

# CROMPTOI 

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

## fit by the Preference fol' GOBLIN Products

Owing to the demands of the Export Market, supplies are at present limited, but Dealers are agsured of fair distribution through the usual channels.

The famous name of GOBLIN-for so many years the synonym of quality in the Vacuum Cleaner marketis your assurance of a ready sale for GOBLIN'S increasing range ${ }^{\text {er }}$ of Domestic Electric Appliances. Electric Alarm Clocks and Heat Controlled Irons follow GOBLIN Electric Cleaners, with Automatic Tea-makers to be added to the list in the near future.


The BRITISH VACUUM CLEANER \& ENG.C? LPP DEPT. $4 / \mathrm{U}$ Goblin Works. Leatherhead. Surrey.


FOR INDUSTRY

- FLASH UNITS
- STROBOSCOPES
- SOUND AND VIERATION METERS

MND ANALYSERS

- MOISTURE METERS
- TEST GEAR FOR MASS-PRODUCTION TESTING
FOR LABORATORIES
- PRECISION RESISTORSAND CONDENSERS
- a.c. arioges and oscillators
- INSTRUMENTS FOR MEASURING FREQUENCY AND WAVEFORM
- Valve voltmeters and power METERS

DAWE INSTMRUMENTS LTB HARLEQUIN AVENUE, GREAT WEST ROAD. BRENTFORD, MIDDX. Telephone: EALING 1850


## FOR YOUR NEW TRANSFORMER



FERRANTI LTD., Hollinwood, Lanes. London Offlee: Kern House, Kingsway w.c.z.
sets a stamp
on your product


A component that starts life as a hot brass stamping has the greater probability of survival. The higher tensile, the smoother, sharper finish and absence of imperfections in the finished part are some of the more obvious advantages.
The best results are obtained if you consult us at the blue print stage.

## MCKechnie BROS. LTD.

ROTTEN PARK ST., BIRMINGHAM, 16
-Phone: Edgbaston 3581 ( 7 lines) Branches: London - 62, Brook Street, W. 1. 'Phone: May fair 6182,3:4. Leeds - Prudential Buildings, Park Row. - Phone: Leeds 23044. Manchester -509-513, Corn Exchange Buildings, 4. -Phone: Blackfriars 5094. Newcastle-on-Tyne-90, Pilgrim Street. 'Phone: Newcastle 22718.

## WE MANUFACTURE

coucerd bare.
machined party,
tubes round


## GIBSON,TODD \& CO, LTD

ALBERT MILLS-HOLLINWOOD-LANCASHIRE
TEL: FAILS WORTH 1520 ELECTRICAL
FOR THE HOME FOR FACTORY
AND
Irons: Kettles; Toasters: Fires; Convectors: Vacuum Cleaners: Fans: Lamps: Fluorescent Firings and Control Gear: Public Address Equipment: Wireless Accessories: Square Hollow-ware for Electric Cookers.
BRYTERLITE ELECTRICAL -CO. - LONDON LTD.

41-43 ROBERTSON STREET, GLASGOW, C. 2
II COLLEGE SQUARE NORTH, BELFAST
66 CARTER LANE, LONDON, E.C. 4
2 YOUNG STREET. ABERDEEN BRYTERLITE ELECTRICAL SUPPLIES LTD. 59 DAME STREET, DUBLIN

# AGRO ELECTRICAL со. Іtd. 

## Please note our NEW address

## 7 MADDOX STREET, REGENT STREET LONDON, W.I

Telephone: MAYFAIR 4068/9


## The "MOORHOUSE"

One-piece cable connector Manufactured by SPERRYN \& CO.
Moorsom Street, Birmingham Established over 50 years

Also Manufacturers of General Electrical Accessories

## DAY AND NIGHT ELECTRIC SERVICE

FOR
QUICK RELIABLE REPAIRS
AND
REWINDS

## THE MIDLAND DYNAMO Co. Ltd.

 LEICESTERPhone 20172 (3 lines)


IRI

"B-W" OVENS for Drying, Baking etc. Also impregnating Plants, Wax, Tanks. Glue and Compound Pots, Furnaces, etc. Ask for list ER/O

BARLOW-WHITNEY LTD



## YOU CAN RELY UPON

 SIEWASD
## Motor Repair Service

URGENT REWINDS
COMPLETED AT SHORT NOTICE EVERY JOB GUARANTEED
Repalrers to Admiralty, Air MInlstry, Ministry of Supply, War Department, L.C.C., B. B.C., etc.

WM, STEWARD \& CO. LTD.
154 ALBANY ST. LONDON, N.W.I
Telephone: EUS. $376{ }^{\prime}$

## SCIODACAIYXX WARSSZEWICZIII



This plant was discovered in the mountains of Colombia, South America by the collector whose name it bears. Sent to the Botanical Gardens at Zurich, It was brought to flower and from there distributed to gardens throughour England and the Continent. Its prolonged period of flowering, from July until almost the end of winter, and its colourful blossoms, make it appreciated for its great ornamental value. Height 3 to 4 feet, flowers searlet with five yellow lobes speckled red.

We ars indebted to the Royal Horticuleural Society for access to their Librory.
but it's easier to say


FOR ALL CABLES UP TO 132 kV . PAPER - RUBEER • PVC.

From raw material ENFIELD CABLES LTD
to Perfection
gRIMSDOWN, MIDDLESEX.

FOR ALL TYPES OF Commercial and Industrial WOODWORK

contact

City and Provincial Stores, Lid. Queen's Road, Ashton-under-Lyne, Lancashire Phone: Ashton 1941

> BOXES, CASES, CONTAINERS, INDUSTRILL AND SCHOLASTIC FURNITURE,
> CABLE DRUMS, INSTRUMENT CASES, CABINETS, ETC.

SPECIALISTS IN QUANTITY PRODUCTION
$\vdots$
$\vdots$
$\vdots$
$\vdots$
$\vdots$
$\vdots$
$\vdots$


HIGH EFFICIENCY INDUCTION MOTORS Surface Cooled type from $\frac{1}{2}$ to 150 H.P.


## The Modern Flat "They dramt

 not of a perishable home who thus could build." How aptly do these pleasant lines of Wordsworth describe some of our fine modern flats. For, designed as they are for comfort and convenience, safety measures exceeding official requirements are also incorporated-by the use, for example, of Pyrotenax M.I. Cables for all internal wiring.FIRERESISTANT* UNAFFECTED BYOIL, WATER, CONDENSATION, ACCIDENTALOVERLOADORGROSS LL-USAGE EASY TO INSTAL*

For Lighting and Power
Pyforpenax
PYROTENAX LTD.,HEBBURN, Co.DURHAM Telephone: Hebburn 32244/5
LONDON OFFICE : 7 Victoria Street, S.W.I Telephone: ABBey 16.54
BIRMINGHAM OFFICE : 2 Moor Street, Birmingham 4 Telephone : Midland 1265


## ROTARY QUICK MAKE \& BREAK

BRITISH MADE THROUGHOUT. For all purposes - fully tested Switches to customers' requirements.

Let us use our long experience to solve your Switching probloms.
TOK SWITCHES LTD. CAMERIDGE ROW, BURRAGE RDAD WOOLWI'G, S.E. 18
SWITCHES



A remarkable new type of Insulated Wire
Extreme toughness and resistance to mechanical damage . Perfect flexibility • High space factor High dielectric strength . Freedom from pinholes Excellent ageing properties - Non-hygroscopic High resistance to solvents and acids

## EQUIPPING A LABORATORY?

 Time and time again experience has shown that a considerable saving of time and money could have been made if Marconi Instruments had been called in at the very earliest stages of equipping or re-equipping a scientific laboratory. All too often it is found that vital instruments have to be installed almost as an afterthought when it is too late to site them in the most logical and convenient place. All too often it is found after several measuring instruments have been installed that a single piece of Marconi apparatus could have done the work of them all.Consult Marconi Instruments from the start - it costs nothing and may save a great deal of time and money.

# MARCONI INSTRUMENTS LTD. 

ST. ALBANS, MERTS. Telephone : ST. ALBANS 4323/6. Rorthern Office: 30 ALBION STREET, HULL. Teledhone: HULL I6144 Western Office: 10 PORTVIEW ROAD, AVONMOUTH, GRISTOL.

Telephone: AVONMOUTH 438


## 430 M A D D ت~T

(ESTABLISHED 1930 • WHOLESALE ONLY)

- RADIO SERVICING COMPONENTS
- BATTERIES, CHARGERS
- DOMESTIC ELECTRICAL APPLIANCES
- NON-CMA CABLE, WIRES \& FLEXIBLES

Comprehensive Stocks
Prompt and Personal Service
Faraday House, HenrySt., BLACKPOOL



HORIZONTAL SPLIT-CASING TYPE


VERTICAL SUBMERGED TYPE

150 Tons of water per min. for Land Drainage


Design simple, modern, compact.
Finish white or light grey mottled vitreous enamel.
Corners rounded for easy cleaning. No protruding nuts or bolts.
Oven Heating automatice by dial.
Oven door of the 'drop-down' type. Utility drawer beneath oven for holding cooking appliances.
Standardisation Boiling plate and grill boiler to latest interchangeability specification.


## No. 15 ELECTRIC COOKER

FALCO ELECTRICAL APPLIANGES LTD.
(Proprietors: Allied Ironfounders Lid.) COALBROOKDALE, SHROPSHIRE.


universal application of
Totally Enclosed Motors


FINLAYSON BOUSFIELD \& CO.LTD. JOHNSTONE • SCOTLAND
 an electric clock to a $3-\mathrm{kW}$ load.


## Engine and Electrically driven

FREE ADVICE. Lister's Pump Service Dept. will co-operate with you and advise free on the most suitable method of raising water.

## Tositit to-R.A.LISTER \& CO. LTD. DURSLEY. GLOS. oi Telephone. Dursley. 2371.

Branches : LONDON • STAMFORD • GLASGOW • BELFAST • DUBLIN


Telegrams: "Patella، Sediss, London"


$\square$
V.I.R., BRAIDED, LEAD COVERED \& TOUGH RUBBER SHEATHED


The invention of the RIVNUT constitutes an entirely new and ingenious approach to fastening problems. The RIVNUT is an in-ternally-threaded and counterbored rivet which can be installed from one side of the workpiece. The RIVNUT is not only a perfectly balanced blind rivet when upset, but the threaded portion provides a permanently fixed nut as well, so that further attachments can be made from the work-face, with a screw or bolt.

## Rivnut

The New<br>Blind Screw<br>Fastening<br>Method many details anc enabling you to study its many uses, has just been published. Linread' (Advisory Service) will also gladly advise you on any fastening problems you would like to discuss. Please write for this booklet to:-

IINREEDIIMITED Department RL, Sterling Works, 26-33 Cox Street, Birmingham, 2


Arrangement of one of two Clarke, Chapman Tri-drum Watertube Boilers.
Evaporation - $120,000 \mathrm{lbs}$. hr
Working Pressure 300 lbs . sq. in
Heating Surface - 12,000 sq. ft.

CLARKE, CHAPMAN \& CO. LTD. VICTORIA WORK8, GATESHEAD 8, Ce. DURHAM TEL. : 72271 (6. UNES) - GRAMS: 'CYCLOPS' GATESHEAD London Office: $112 / 113$ Fenchurch Sereet, London, E.C. 3 Tel. : Royal 2737/8. Tel. Address: 'Cyclops,' Fes, Londom


There's a moral in the ECHINOCACTUS NAPINUS CHILE . .

- . a moral in so far that if you don't know anything about cacti and start messing about with them you are liable to get stung rather badly.

Now apply the same thought to Transformers; some people want few Transformers and think the order is not large enough to bother us with (nonsense of course, as you know, but some people do think thet) so they knock a few up themselves from odds and ends that are lying about.

Of course, the so called Transformers are just not quite perfect and don't just do the job they should. The same thought applies also to very cheap quality mransformers which some people buy and attempt to use.

The moral is when buying Transformers - go to an expert and get the right article - it may cost you a iittle more but, in the long run, you are saving money.

PARMEKO Of LEICESTER. Makers of Transformers.


TYPE O.H.P. AUTOMATIC WATER SYSTEM
For Fistate and Farm Water supplies aud Domentic and Induatrial purposes. Suppljed in capacities irom570,4,240 Imp. G.P. H. for Meximum Suction Lifts up to 22 '. Write for lists of complete range of GODWIN PUMPS and ACTOMATIC WATER SYSTEMS for Deep and Sballow Wells, to SOLE MANUFACTURERS.

## H. J. GODWIN LTD.

QUENINGTON Telephone:
Coln St. Aldwyn 36 ( 3 jnes)
glos.

## DONOVANS

CARTHIMG GLIPS WITH SPECIAL BITE AND GRIP INTO TUEE OR ARMOURIUG Note the tongue $u$ hich ensures perfect and permanent contact. Easy to fix. Nuts cannot turn. All sizes from half to two inches.

## THE

DONOVAN ELECTRICAL CO. BIRMINGHAM 9.

## A <br> VICTORY WORKS, KEIGHLEY



5,000 H.P. and TRANSSomene SPECIALISTS

PRICE LIST ON APPLICATION


## 66 ASTON about CODDED D D DES

"Aston " Copper Tubes are produced to British Standard Specifications and actually manufactured in the Aston Works at Erdington. They can be supplied in small quantities, ex stock, and in large quantities to schedule. Your enquiries will receive prompt and careful attention.

## ASN N N <br> CHAIN AND HOOK (O. LID.

Bromlord Lane, Erdington. Birmingham, 24 Phone: ERDinglon 2235-6-7 Grams: Chainwork. Erdinglon

## CONDENSING PLANT

## Surface and Jet

 Types
and all
AUXILIARY EQUIPMENT from
Turbine Flange to Boiler Check Valves

The illustration shows a Hicl Hargreaves Low Level let type Condensing Plant with "Hivac " Ejector and splic casing Extractlan Pump working in conjunction with a $5,000 \mathrm{~kW}$. TurboAlternator.


TURNED PARTS
\& INSERTS

## CTW DUAL TESTOSCOP:

Ideal for High and Low Voltage Testing ; $1 / 30$ 100/8 ~ A.C. and D.C. Allowance made on old models. Send for interesting leaflet (Q 4) on Electrical and Radio Testing. from all Dealers or direct. RUNEAKKN MANC HESTER


## BAKELITE <br> mouloings

## ERINOID

TO ANY
TURNINGS SPECIFICATION
FREDERICK W. EVAMS LTD. PLASTIC WORKS
LONG ACRE, BIRMINGHAM 7
TELEPHONE: EAS: 1286 \& 1287




An ideal material that can be specified with confidence for any job requiring an insulator combining mechanical strength with high dielectrical properties.
Manufactured to B.S.S. 972,668 and II37, etc.
Our technical staff can help you with your problems
SPICERS LTD.

19 NEW BRIDGE STREET, LONDON, E.C.4. CENTRAL 42II Ext.
 heating element is housed inside the bit in the Solon Electric Soldering Iron. Soldering is easier; you get a neater, cleaner job in less time. All internal connections are housed at end of handle, away from heat. A robust cord grip prevents sharp bending of the flexible lead.


Made in England
W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., Engineering Dept. 51-53 Hatton Garden, London, E.C. 1


## HOW IT IS DONE

Watch Aberdare cable emerging from lead presses which are capable of covering cable up to 4 ins. diameter with pure lead, free from dross or impurities of any kind.
Just one of the many processes at the Aberdare Works, where advanced methods ensure the consistently high quality and reasonable prices of Aberdare Cables.

# Clberelecre Cerbles 

ABERDARE CABLES LTD., NINETEEN WOBURN PLACE, W.C.1. Tele.: Terminus 2777 Works: aberdare, glam., south wales<br>Tele.: Aberdare 416-7<br>Specialists in paper-insulated cable for power purposes up to 33,000 volts


[^0]:    * I.E.E. Journal, Vol. 92, Pt. 2, No. 26. "The Design and Installation of Electrical Accessories for Domestic Purposes." F. C. Fuke.

[^1]:    'I.E.E. Journal, Vol. 80, No. 485. "The Micro-Gap Switch." Prof. W. M. Thornton, O.B.E., D.Sc., D.Eng.

