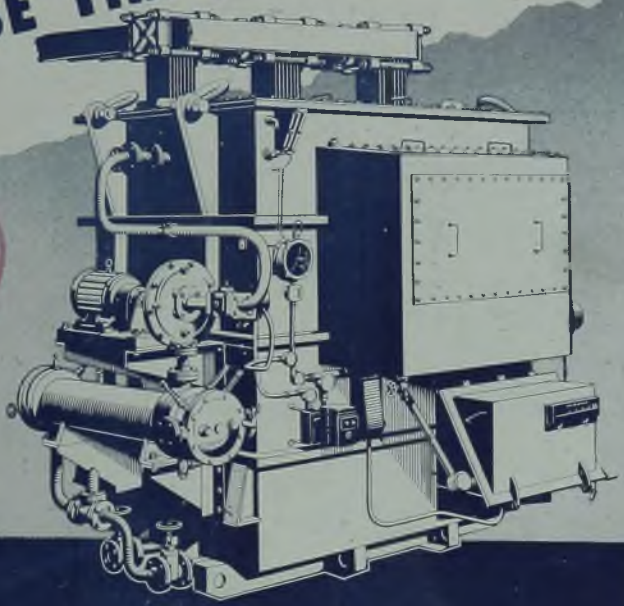
45

ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXVI. No. 3507 FEBRUARY 9, 1945 9d. WEEKLY

B.E.T.
FOR
FURNACE TRANSFORMERS



BET

The
British Electric Transformer
Company Limited
In association with CROMPTON PARKINSON LIMITED

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

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ALUMINIUM...RELEASED!

From severely restricted use, aluminium and its alloys are now flowing afresh to manifold applications. The metal is being released for all Service uses and for approved civilian purposes.

Supplies can be obtained in all recognised forms. Our Technical Service is ready with data, and we will furnish details of the conditions of release upon request.

THE BRITISH ALUMINIUM CO. LTD. SALISBURY HOUSE LONDON WALL LONDON E.C.2

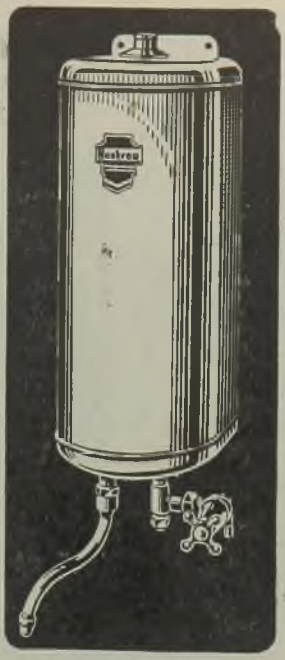
Telephone : CLErkenwell 3494 Telegrams : Cryolite, Ave. London

THE VALUE OF CONTRAST

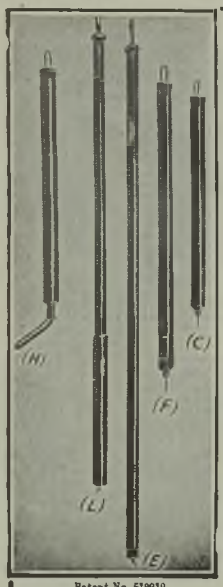
Normal Peacetime is only appreciated by comparison with the dark background of Wartime restrictions. Similarly one cannot describe Day without the contrast of Night. In the same way any superior unit of Industrial or Domestic equipment owes its prestige entirely to others with which it can be compared.

LEADERS IN ELECTRIC WATER HEATING

HEATRAE



HEATRAE LTD., NORWICH · PHONE: NORWICH 25131 · GRAMS: HEATRAE, NORWICH



IS IT ALIVE?

THE "PARTRIDGE" PRESSURE DETECTOR

(Regd. T.M. No. B.581955) will infallibly tell you, giving visible and audible indication (No earth connection required)

Type	Range up to	Length of handle
C	Volts 11,000	36"
E	60,000	84"
F	15,000	48"
H	11 000	36"
L	33,000	72"

Also makers of "Westminster" Vacuum Tube Detector and H.T. Earthing Rods

Patent No. 519919

The WESTMINSTER ENG. Co. Ltd.

Victoria Road, Willesden Junction, N.W.10

Telephone: Willesden 1700-1 *Telegrams: "Regency, Phone, London."*

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FOR WIRELESS AND SIMILAR CONNECTIONS

A WIDE RANGE OF SIZES IN STOCK

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to the specific requirements of our customers

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

M·C·L and REPETITION LTD.

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INSULATING BEADS

L R & Co. Ltd.

Resistance Wires

Lionel Robinson
& Co. Ltd.
3 Staple Inn
London, W.C.1
Telephone HOLborn 6322

FLAMEPROOF MOTORS

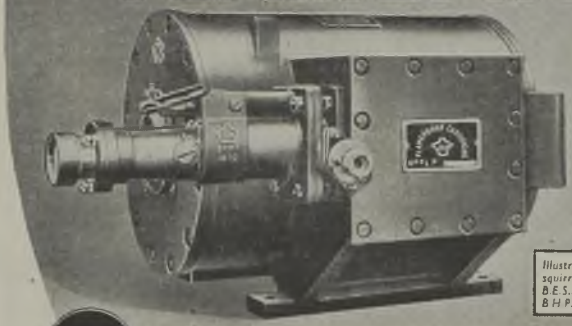


Illustration shows a typical flameproof squirrel cage induction motor fitted with B.E.S.A. plug & socket & I.P.C. adaptor. 15 B.H.P. 3-phase 50 cycle 600 volt 975 r.p.m.

FLP

BUXTON CERTIFIED

PEEBLES

• • • • Unvarying reliability and efficient performance in continuous service are watchwords in the drive for increased production to meet the needs of war.

Peebles Flameproof Motors are playing an important part in the battle for fuel in a great number of mines, and are maintaining a high standard of reliability and efficiency under the most exacting conditions.

BUILT FOR RELIABILITY
DESIGNED FOR EFFICIENCY

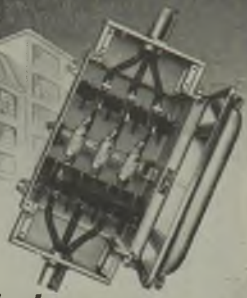
BRUCE PEEBLES & CO. LTD., ENGINEERS, EDINBURGH.

3628

MAIN CONTROL SWITCHES
for all factories

BILL

Bill "H.R.C" Fuse Switches fitted with "English Electric" "H.R.C" Cartridges.



Made for 30, 60, 100, 160, 200, 300 & 500 Amps., 600 Volts; Double, triple and four pole and with neutral links.
Fitted for Conduit, busbar chamber flange or cable glands.

Easy Wiring, minimum maintenance

LONDON: A W ZELLEY
73, GREAT PETER ST,
WESTMINSTER, S.W.1
BIRCHFIELDS · 5011 (4 LINES)

BILL SWITCHGEAR LTD
BIRMINGHAM·20

MANCHESTER GLASGOW·
BELFAST·BURTON-ON-TRENT
EXETER·SOUTHAMPTON
"AICHO" BIRMINGHAM

TO SAVE RUBBER
SIEMENS
PVC
THERMOPLASTIC
CABLES

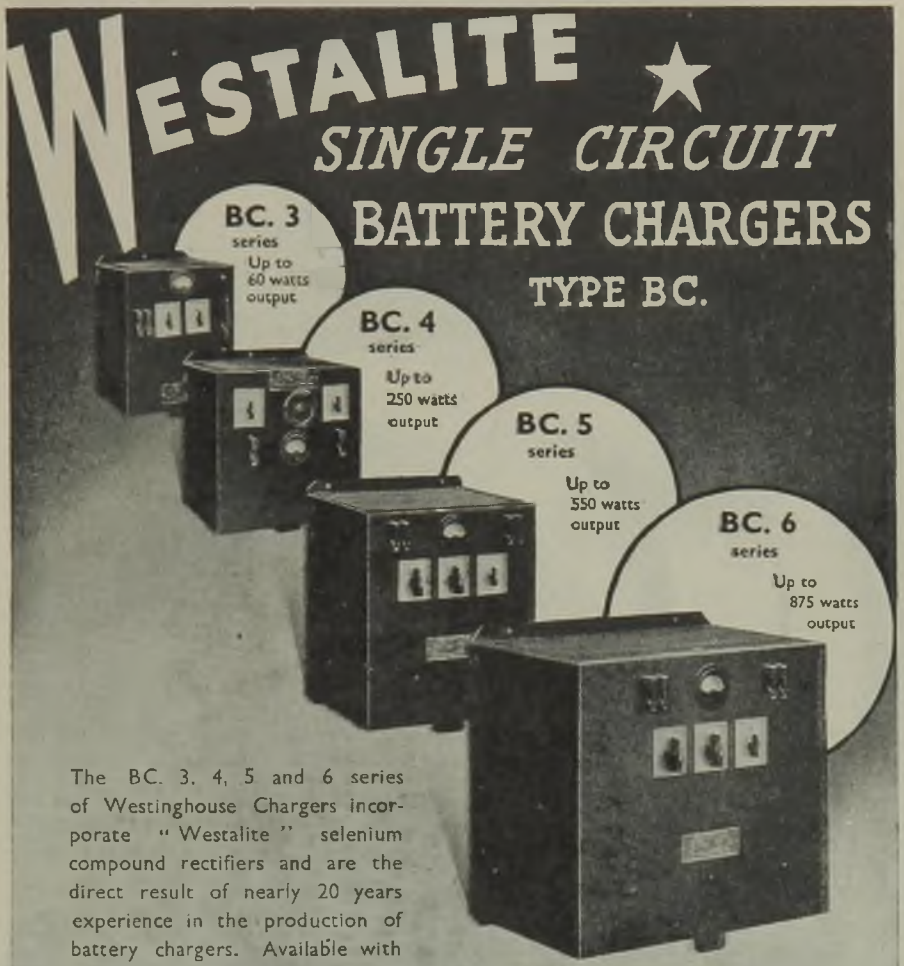
To conserve Rubber Stocks is still an essential form of National Service

A SIEMENS QUALITY PRODUCT

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

Rowlands Electrical Accessories Ltd., R.E.A.L. Works, Birmingham, 18

WESTALITE ★ *SINGLE CIRCUIT* BATTERY CHARGERS TYPE BC.



The BC. 3, 4, 5 and 6 series of Westinghouse Chargers incorporate "Westalite" selenium compound rectifiers and are the direct result of nearly 20 years experience in the production of battery chargers. Available with outputs ranging from 0.1 to 25 amperes, they are suitable for all classes of battery from small wireless accumulators up to large traction and lighting batteries.

Write for Data Sheet No. 25 (BC.3 and BC.4 chargers), No. 32 (BC.5 and BC.6) or No. 35, which covers the complete range of chargers incorporating "Westalite" rectifiers

Made in England by—

★ WESTINGHOUSE

the pioneers of reliable & efficient chargers

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T/16

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requires special cables

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CALLENDER'S CABLE & CONSTRUCTION CO. LTD., HAMILTON HOUSE, VICTORIA EMBANKMENT, LONDON, E.C.4

All over the World


In the forefront of
Cable Development
"ASHTON"
THERMOPLASTIC CABLES
Manufactured under the strictest laboratory supervision throughout and finished to A.I.D. Specification "Ashton" Thermoplastic Cables and Flexibles are of the highest quality obtainable and cannot be surpassed.
Prompt attention given to enquiries for essential purposes.
A.T.C.1
AERIALITE LTD
STALYBRIDGE · CHESHIRE

'English Electric'

DISTRIBUTION FUSEBOARDS TYPE 'SM'

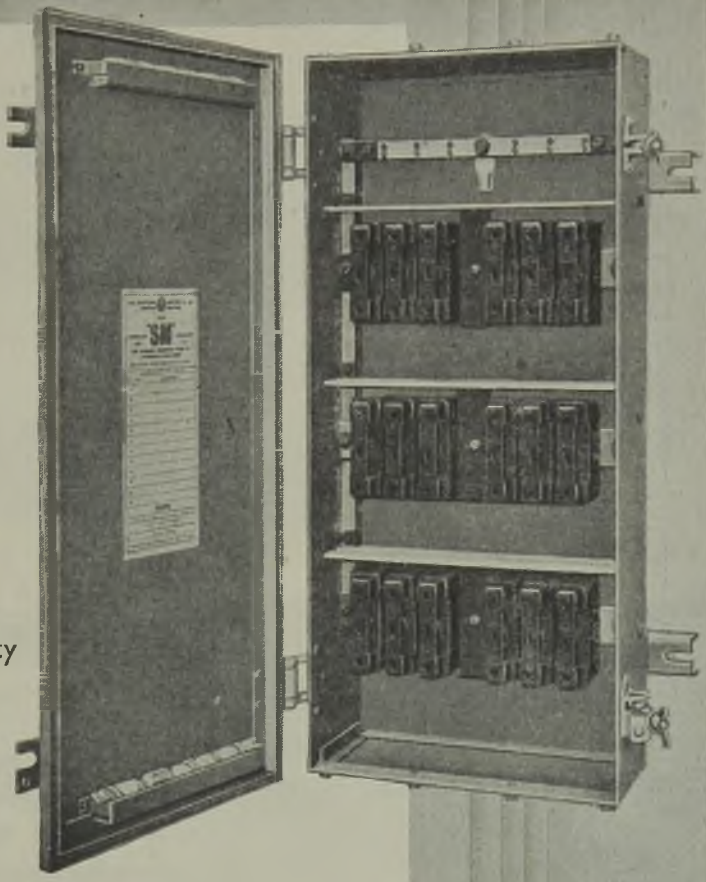
30 and 60 Amps Rating

Available up to 12 Ways

Rapid cabling facilities

Incorporating H.R.C. Fuses

Category of duty 440 A.C. 4



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A.S.C.M. Steel Conduit is manufactured only by

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ELECTRICAL CONDUITS LTD.
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SIMPLEX ELECTRIC CO. LTD. Comprising:
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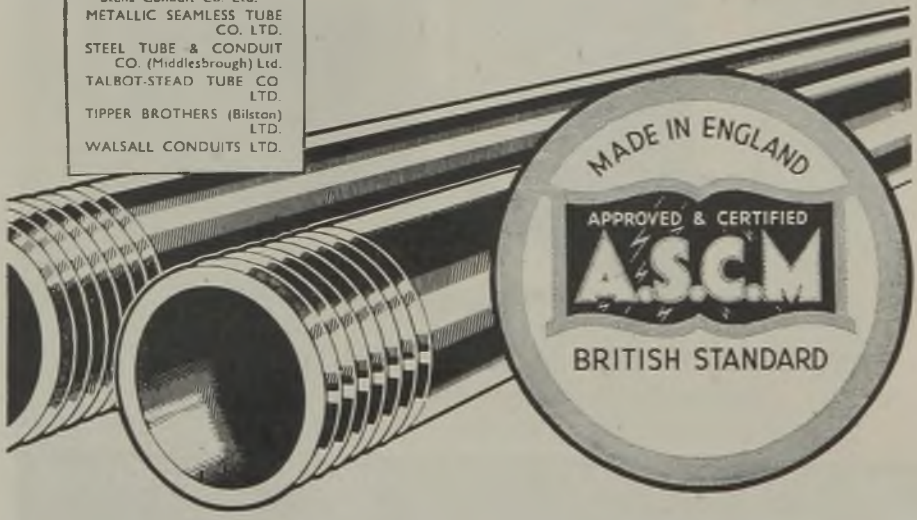
TIPPER BROTHERS (Bilston) LTD.
WALSALL CONDUITS LTD.

Accepted practice in the Lobster World is a periodical shedding of his casing. Until its renewal he is unprotected.

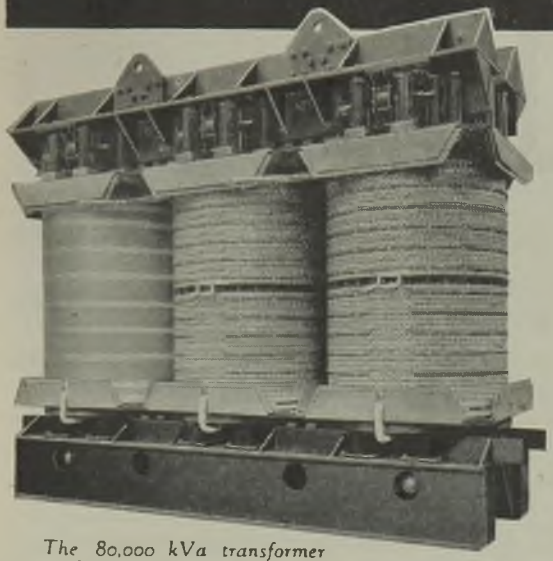
Accepted practice in the Electrical World is *permanent* protection with A.S.C.M. Steel Conduit. Worlds of difference? . . . . Yes!

SPECIFY AND USE
A.S.C.M.



Advertisement of the Association of Steel Conduit Manufacturers, 25 Bennett's Hill, Birmingham 2

Generator TRANSFORMERS

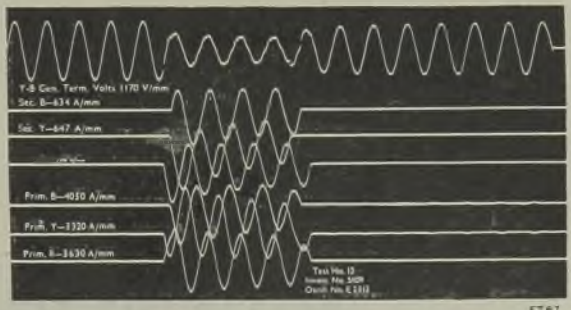


The 80,000 kVa transformer used for the test. The forerunner of 5-80,000 kVa and 2-87,000 kVa 11/66 kV generator transformers for the London Power Company (Battersea Generating Station).

Ferranti Large High Voltage Generator Transformers are designed on facts confirmed by full-scale practical tests.

In 1935 a Ferranti Generator Transformer of 80,000 kVa 66 kV was tested to destruction by a series of 14 full-scale short circuit tests.

A typical oscillogram showing 1,420,000 maximum instantaneous kVa (720,000 kVa symmetrical r.m.s. value.)



FT67

LARGE POWER TRANSFORMERS supplied by Ferranti ——

Over 9,000,000 kVa for voltages 33 kV and above
Over 6,000,000 kVa for voltages 66 kv and above

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To say that we were in existence before electrical science grew into an industry would mean little if advantage had not been taken of the opportunities offered by the succeeding years. How we grasped these opportunities can be seen in the service we render to electrical manufacturers today; a service which has grown with the increasing demands of an industry throughout its lifetime. Ampère lived through a social revolution; Thomas Bolton's have witnessed, and played a part in the greatest industrial revolution in history.

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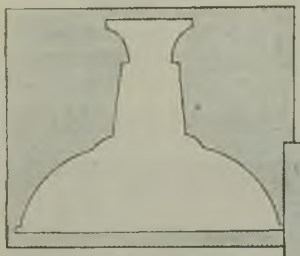
CVS-13

BLUE PRINT FOR SEEING. Make sure that you have the correct lighting equipment; enlist the help of the Crompton Lighting Service; thus will you make sure of maximum visual efficiency.



CROMPTON LIGHTING EQUIPMENT

FOR THE LATEST IN LIGHTING

CROMPTON PARKINSON LTD. ELECTRA HOUSE, LONDON, W.C.2.
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PRECISION TESTING OF INSTRUMENT TRANSFORMERS WITH . . . . . .

Petch-Elliott EQUIPMENT

DIRECT READING OF RATIO AND PHASE ANGLE ERRORS.

PRECISION MEASUREMENTS ON CURRENT AND VOLTAGE TRANSFORMERS.

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NO PHASE-SHIFTING TRANSFORMER REQUIRED.

Full particulars on request

PORTABLE

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SIMPLE TO USE

The Petch-Elliott Current Transformer Testing Set

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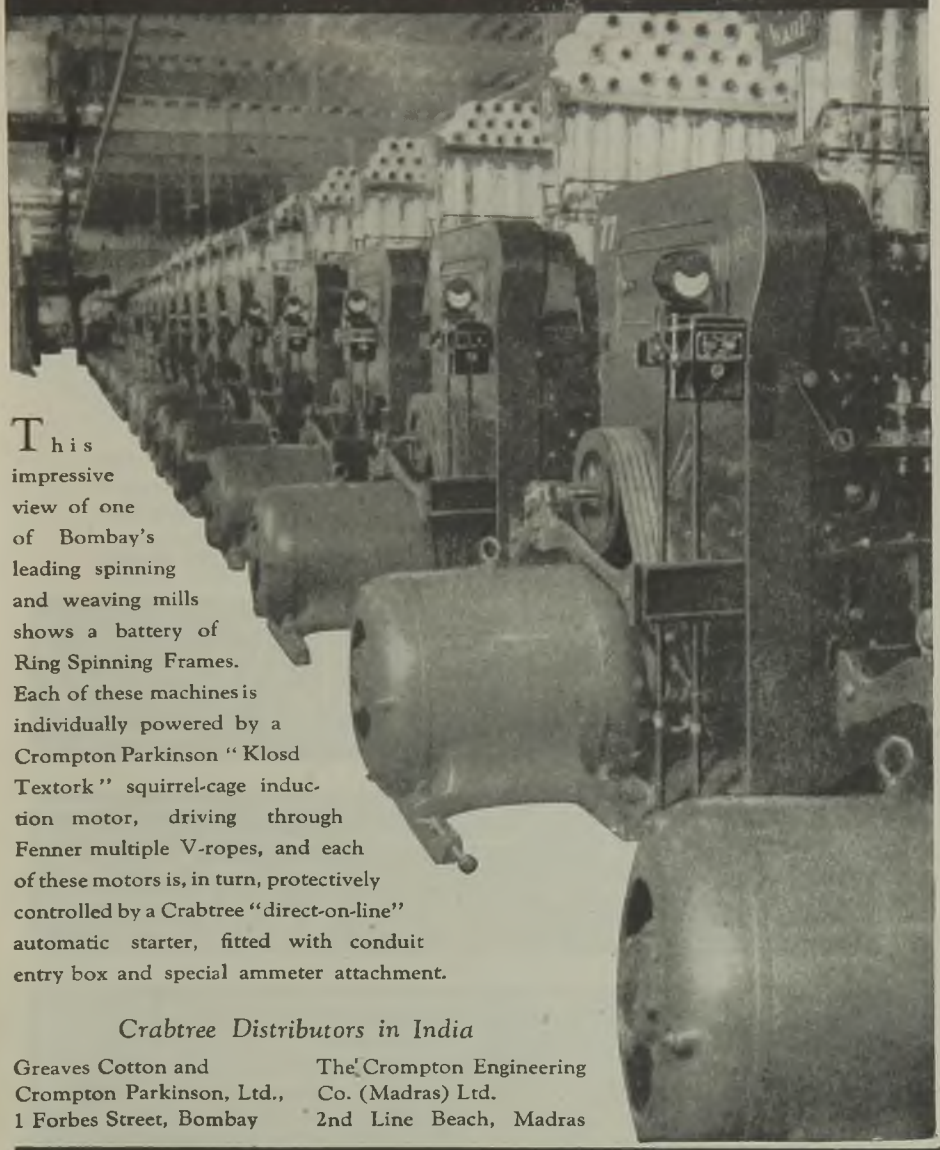
ESTABLISHED 1800 *'PHONE: TIDEWAY 3232*

CRABTREE CONTROL GEAR IN BOMBAY



This impressive view of one of Bombay's leading spinning and weaving mills shows a battery of Ring Spinning Frames. Each of these machines is individually powered by a Crompton Parkinson "Klosd Textork" squirrel-cage induction motor, driving through Fenner multiple V-ropes, and each of these motors is, in turn, protectively controlled by a Crabtree "direct-on-line" automatic starter, fitted with conduit entry box and special ammeter attachment.

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A · NAME · SYNONYMOUS · WITH · PROGRESS · IN · ACCESSORIES · AND · SWITCHGEAR

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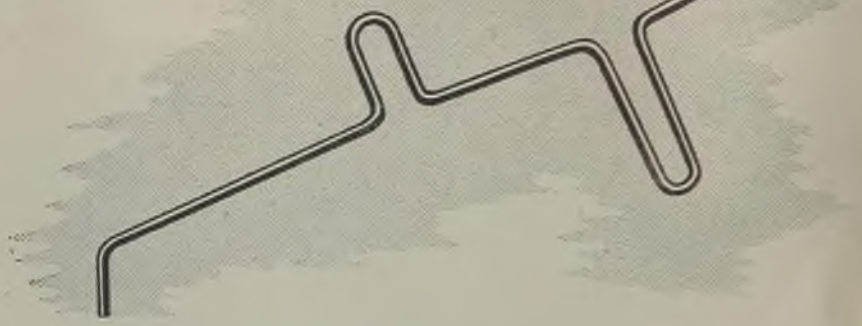
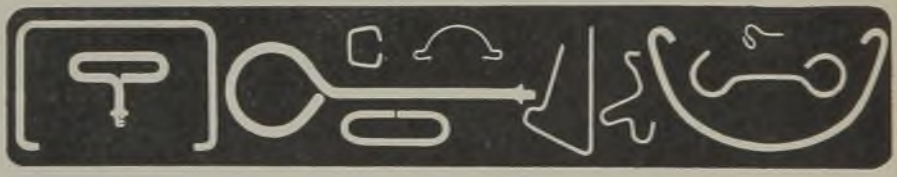
—— NOT AT ALL !



No bent-wire part is too difficult for Tonks to tackle—no job too simple to be given expert attention. Whether you have a simple need or a difficult "problem" it will pay you to "take it to Tonks."

WIRES BENT, HEADED, THREADED—IN ANY METAL AND COUNTLESS SHAPES



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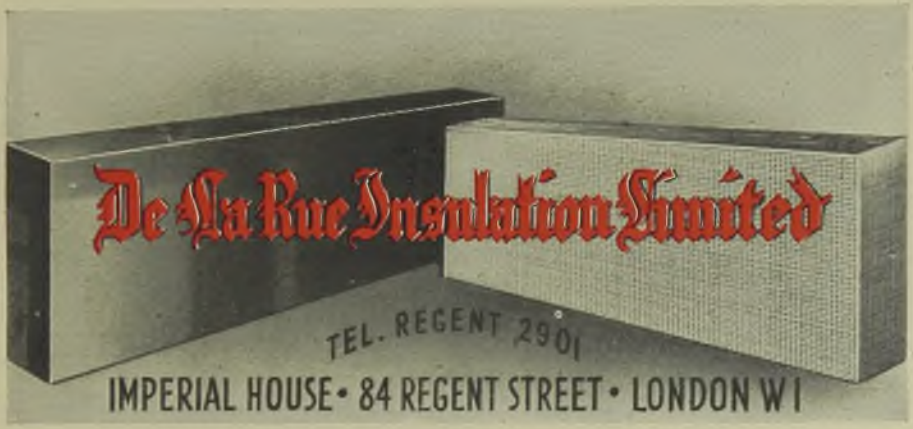
Freely at your disposal are the services of our Technical and Development Department in determining the effective application of **DELARON** to your needs. Fullest details, samples and prices will gladly be sent on request.



TRADITIONAL RELIABILITY

B T-H

ELECTRIC MOTORS

BTH MOTORS AND CONTROL GEAR
used in all industries
throughout the world.

SPECIFY BTH

BTH RUGBY

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, RUGBY, ENGLAND

A3461/2C

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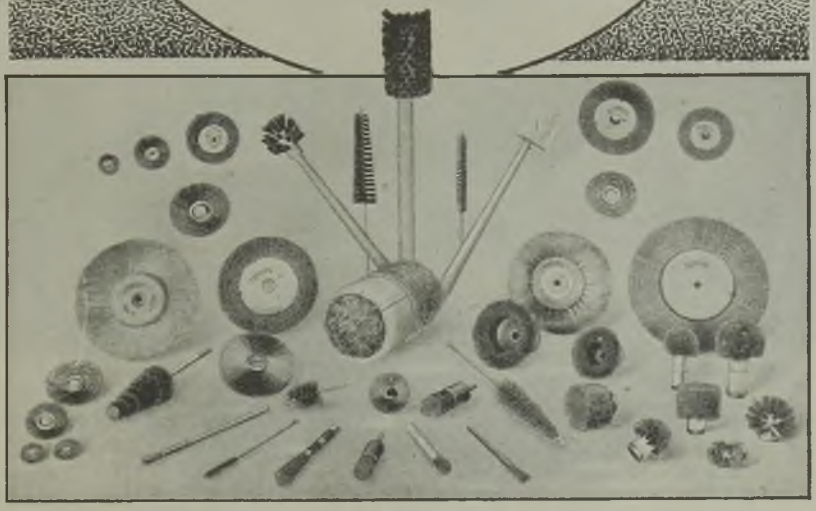
We manufacture a full range of Wire Brushing Wheels and Brushes for Munitions, and have solved many problems in brushing and cleaning shell cases, bomb castings, hand grenades, fuse parts, etc.

● *Send your Brushing or Cleaning problems to us for immediate attention*



W. CANNING & Co LTD

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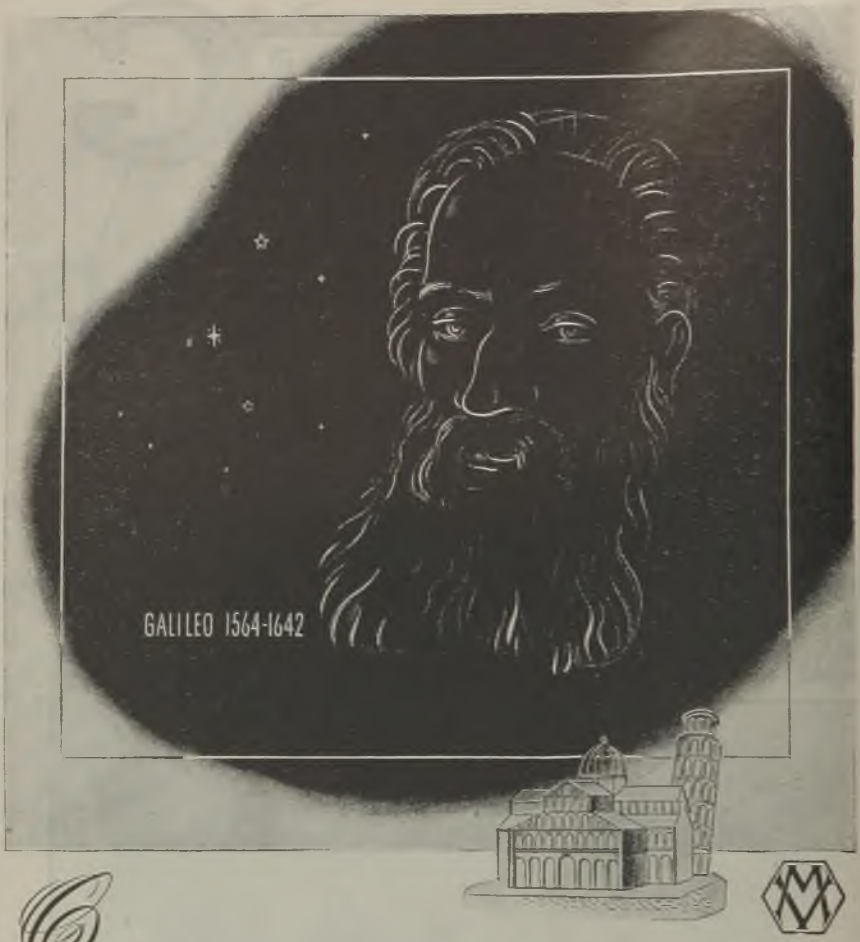


Cosmology

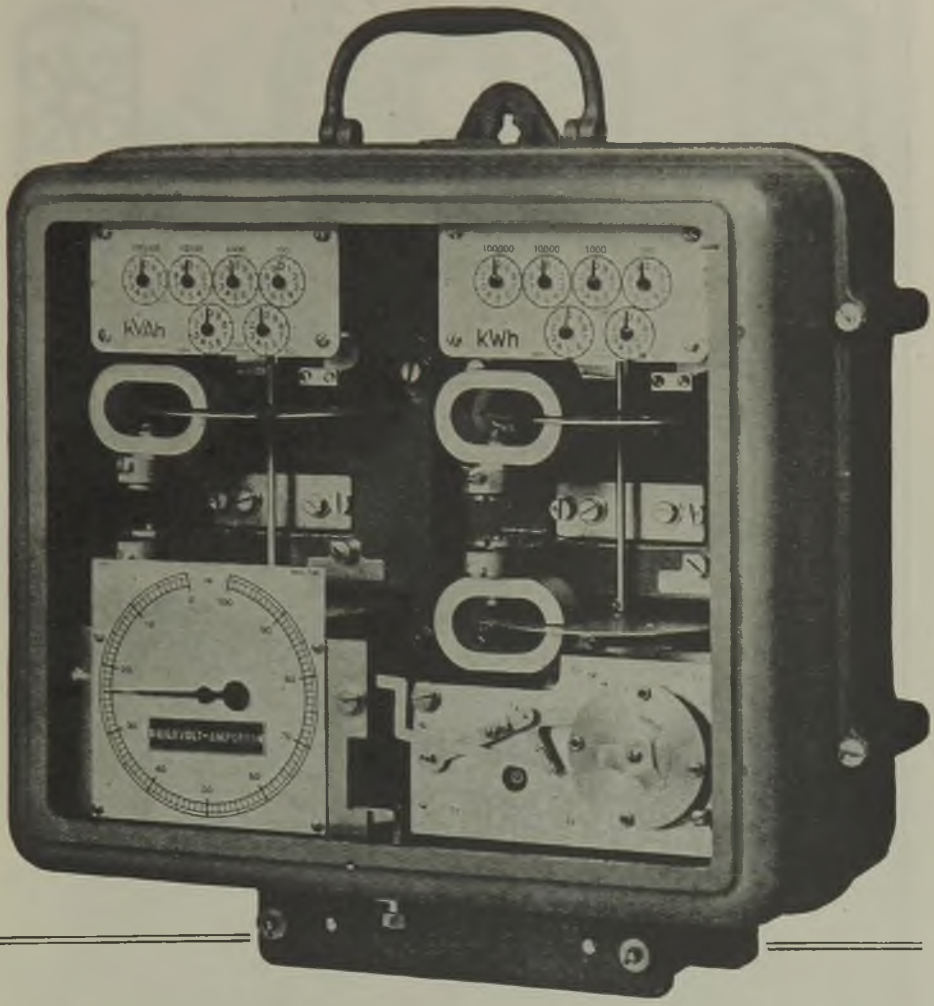
Galileo, with his brilliant experimental genius illumined many ancient beliefs and showed them to be false. He demonstrated from his observation of a swinging lamp in Pisa cathedral and his famous "leaning tower" experiments, the true laws of falling bodies and mechanics.
He invented the telescope; he verified and clarified the newly discovered laws governing the solar system and added much to cosmic science
Though reactionary forces strove, by edict and imprisonment, to maintain the beliefs of the Dark Ages, Galileo and men like him fought to let the light of knowledge shine out before all men

COSMOS AND METROVICK LAMPS

METROPOLITAN—VICKERS ELECTRICAL CO. LTD.
NUMBER ONE KINGSWAY . . . . . LONDON W.C. 2

C & H

A SYMBOL OF RELIABLE METERING



POLYPHASE kWh METER WITH kVA DEMAND INDICATOR

SIMPLICITY—always a feature of C. & H. design—is strongly evident in this combination meter. One set of terminals and connections ensures correct installation. The testing and adjusting of the meters is simplicity itself.

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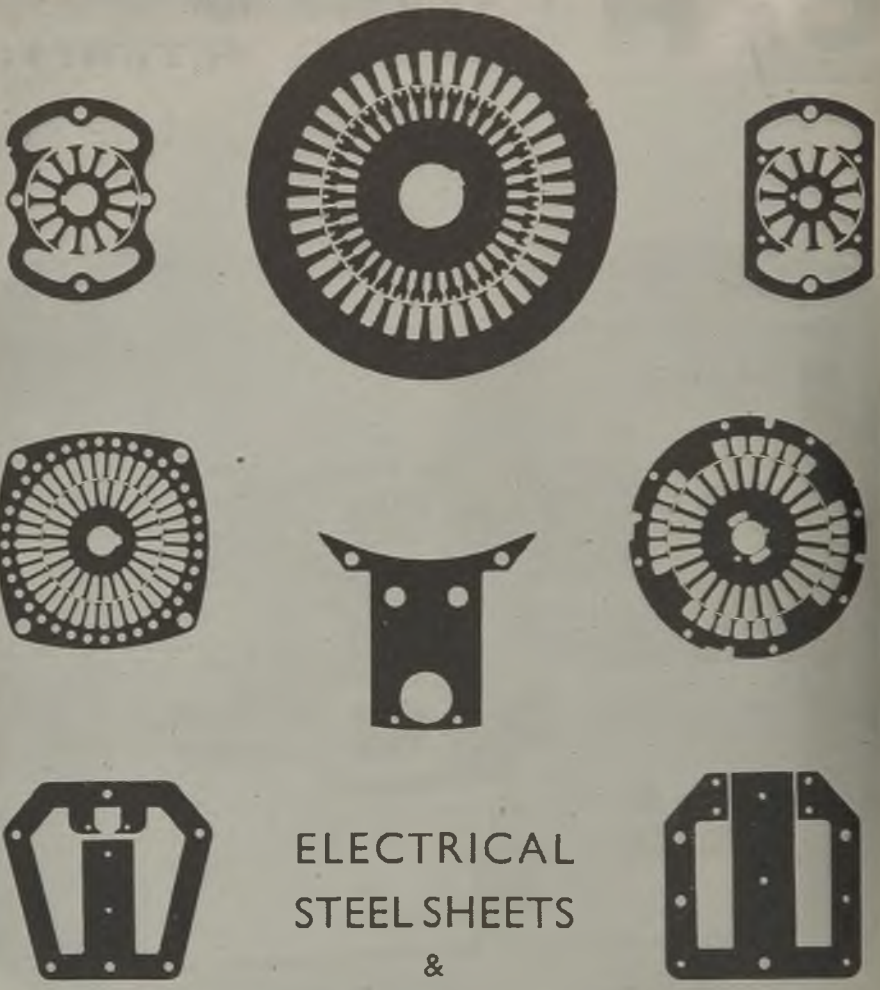


ELECTRICAL
STEEL SHEETS
&
LAMINATIONS

Brands :

"STALLOY," "MEDIUM RESISTANCE." "SPECIAL LOHYS," "LOHYS"

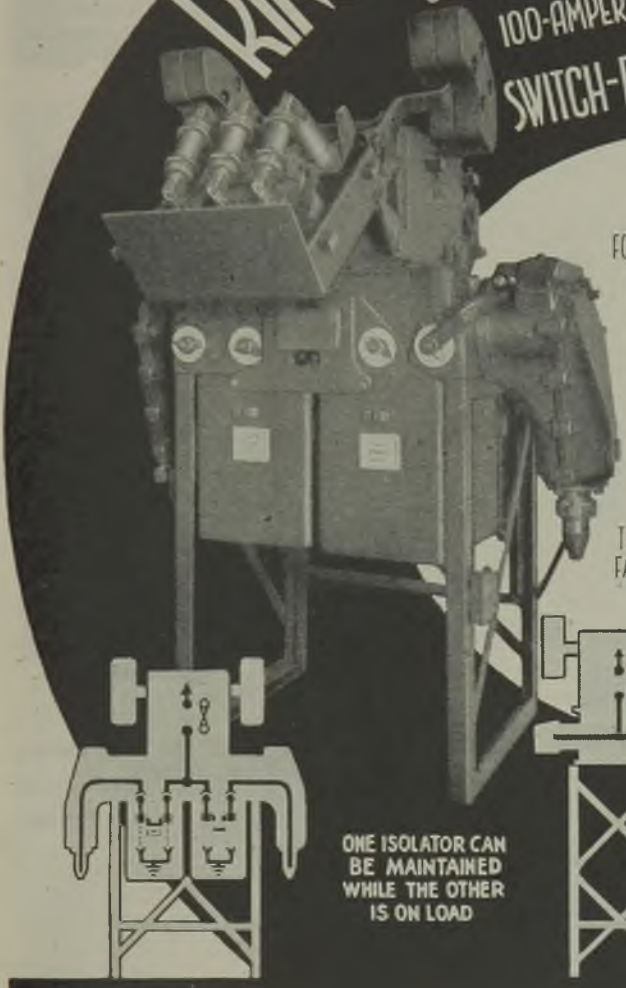
JOSEPH SANKEY & SONS LTD., BILSTON

LONDON : 168 Regent Street, W.1

OUTDOOR METAL-CLAD

RING-MAIN ISOLATORS

300 AMPERES AT 11kV. WITH
100-AMPERE 3-PHASE-TRIPPING
SWITCH-FUSE TEE-OFF



FOR RURAL AREAS
LOW COST
NO BUILDINGS REQUIRED
EASY TO INSTALL AND EXTEND
EARTHING AND TESTING FACILITIES AVAILABLE IF REQUIRED IN BOTH ISOLATORS AND SWITCH-FUSE TEE-OFF
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ONE ISOLATOR CAN BE MAINTAINED WHILE THE OTHER IS ON LOAD

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Cone Type Mid-span Tension Joint for Steel Cored Aluminium Conductors of ·15-·175 sq. in. copper equivalent section.

Cone Type Tension Clamps for Steel Cored Copper Conductors of ·025-·075 sq. in. copper equivalent section.

Aluminium Repair Sleeve for Steel Cored Aluminium Conductors up to ·175 sq. in. copper equivalent section.

Non Tension Joint for Steel Cored Aluminium Conductors from ·1 up to ·175 sq. in. copper equivalent section.

A small selection from the range of Overhead Line fittings of the well-known British Ropes design, which are now manufactured in our own shops. Quick deliveries of many types can be offered from components in stock. Prompt quotations for standard or special designs.

Our experience is at your disposal.

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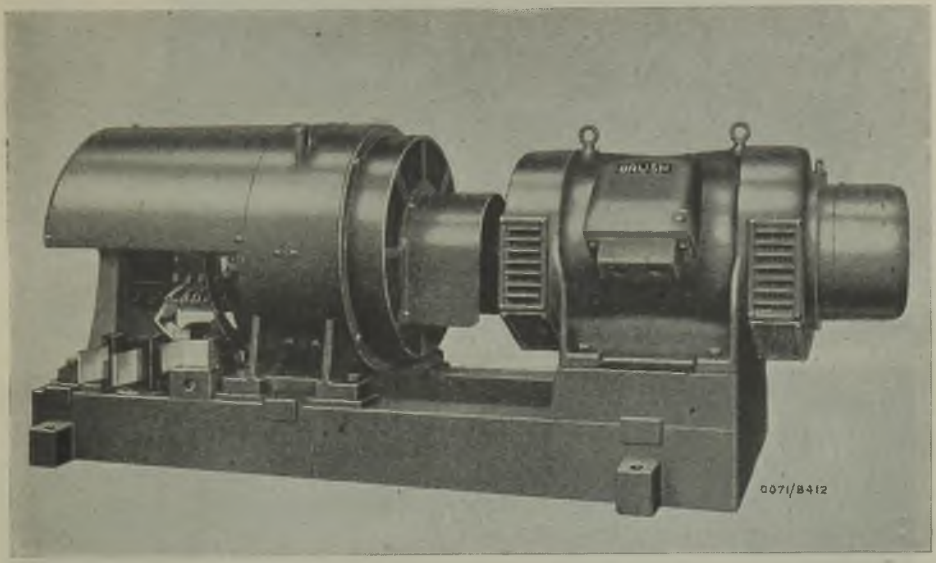
CABLE WORKS, Ltd., SOUTHAMPTON.

TELEGRAMS "PIGEKAYBEL" SOUTHAMPTON

BRUSH

ELECTROLYTIC GENERATORS



BRUSH Electrolytic Generators have been standardised for current ratings of 1,000, 1,500, 2,000, 3,000 and 5,000 amperes, and are suitable for coupling to any type of driving motor.

Brush generators embody the highest standard of modern design, manufacture, and the unique experience gained in the production of heavy current generators extending from the early days of the electrical power industry.

Send your enquiries to

8-46

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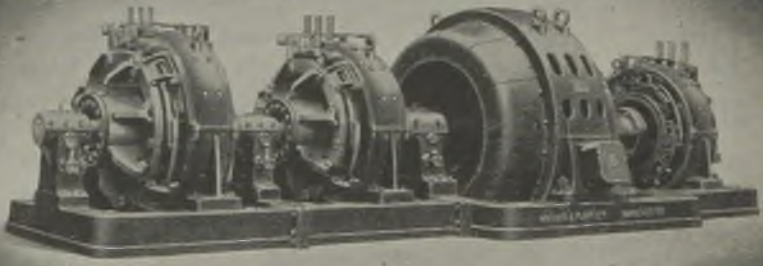

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CLARKE'S "ATLAS"
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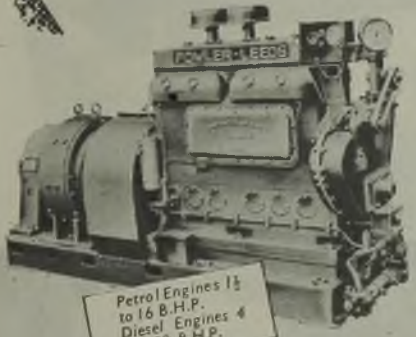

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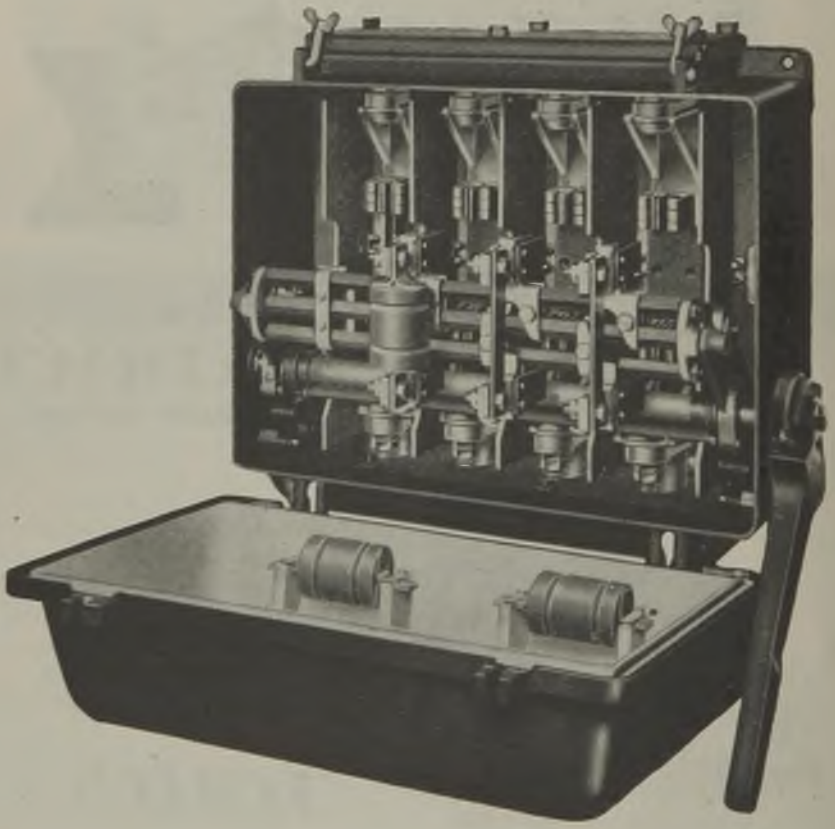

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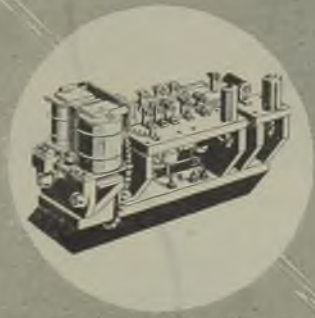

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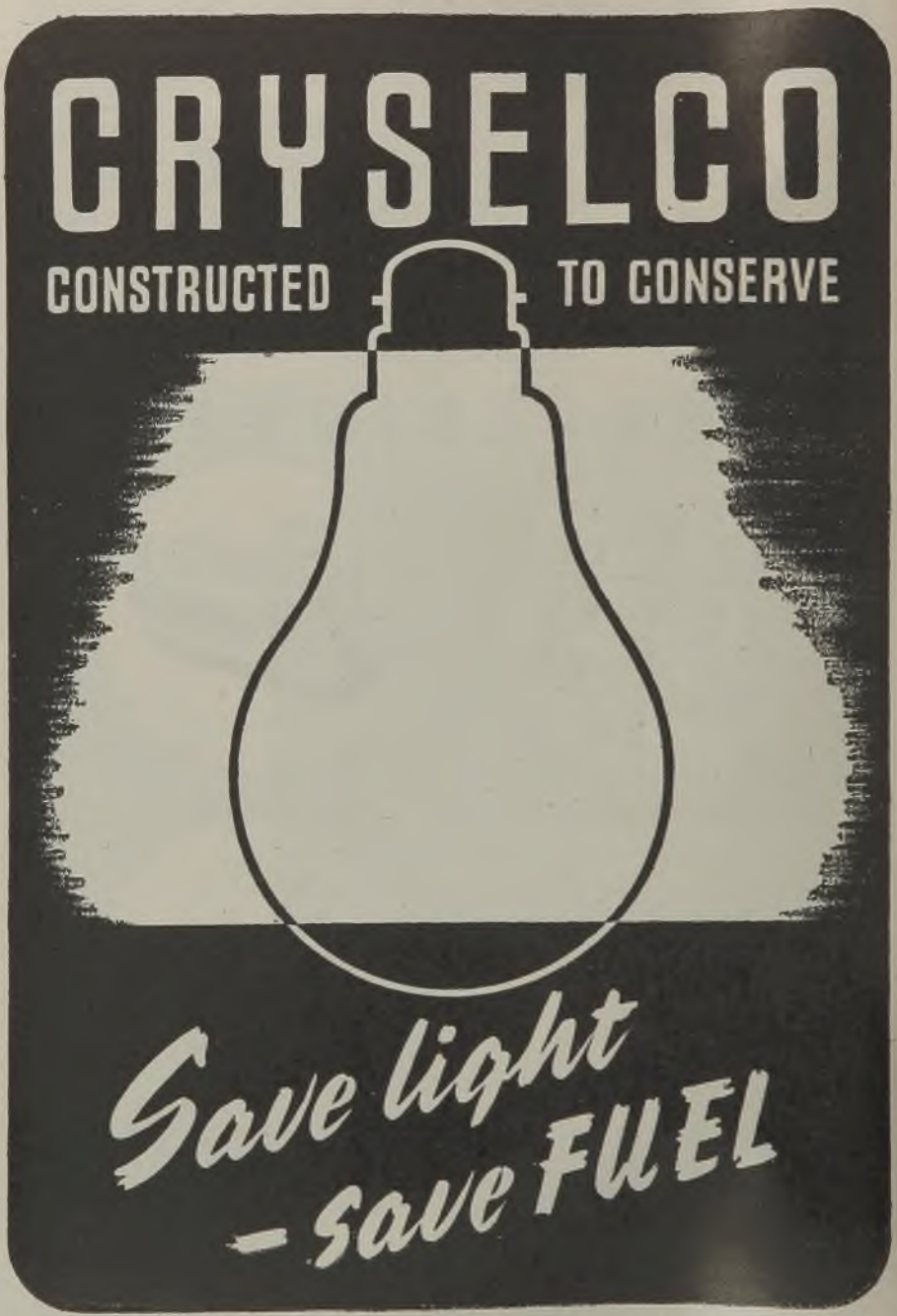
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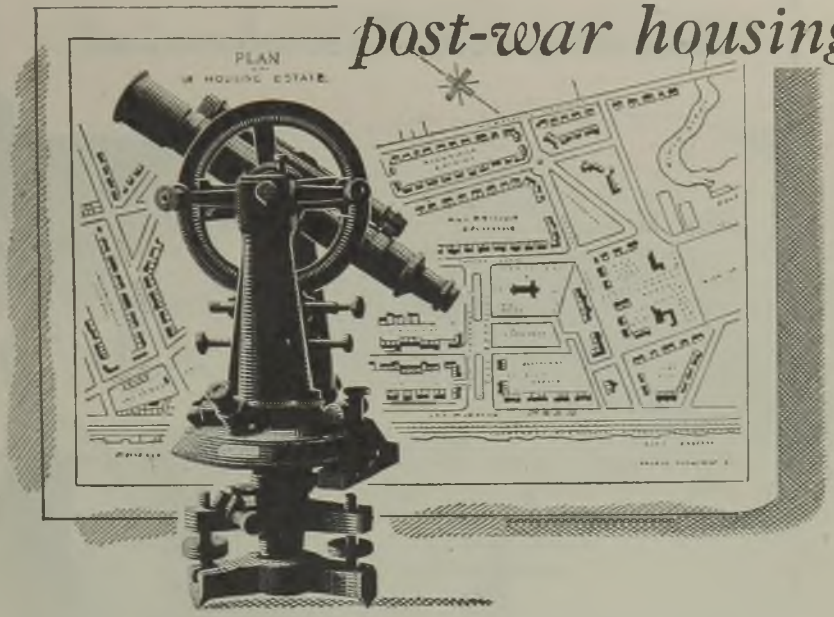

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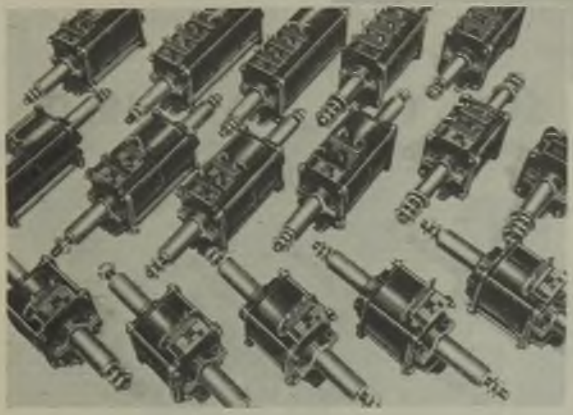

Above
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Illustrations show examples of ring and bushing type current transformers, the latter with one, two and three secondary windings. Typical of those used in J. & P. Switchgear.

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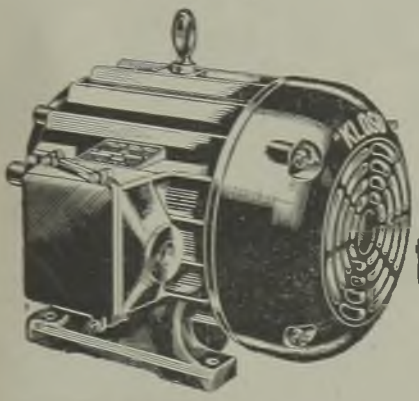

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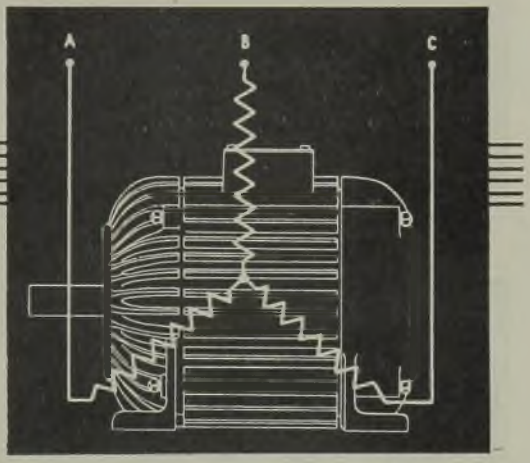

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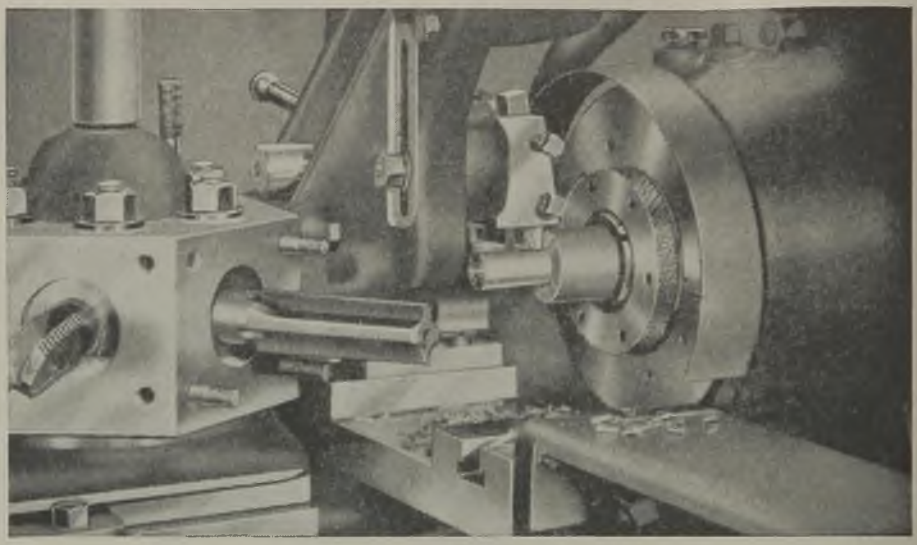

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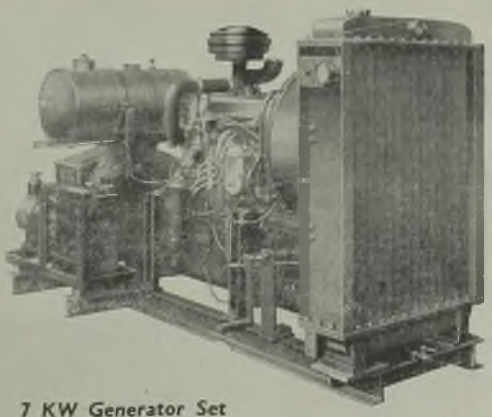

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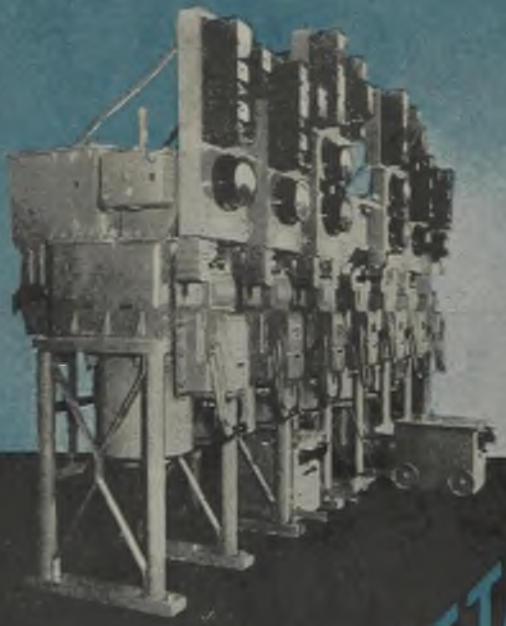

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February 9, 1945

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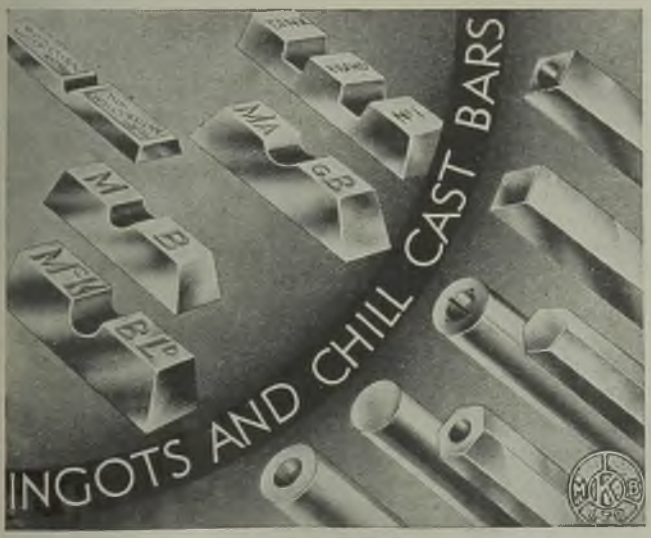

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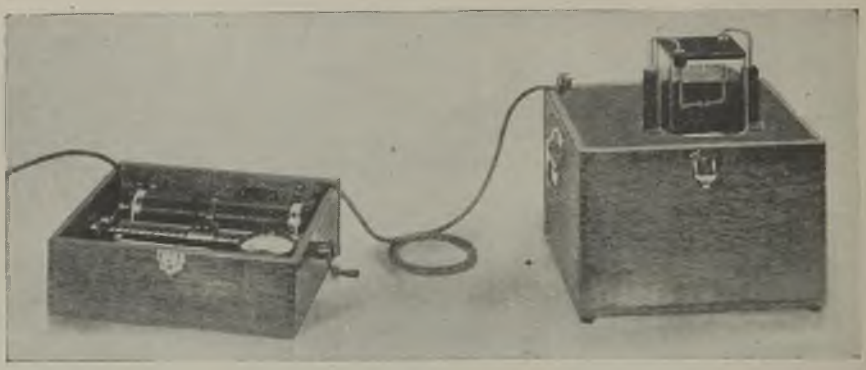

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXVI. No. 3507. FEBRUARY 9, 1945 9d. WEEKLY

Fair Trading Policy

Emphasis on Its Voluntary Character

THE Electrical Fair Trading Council has statutory ancestry; it arose out of Committee "D," formed under Clause 48 of the Electricity (Supply) Act, 1926, to consider methods of regulating trading between the various branches of the electrical industry and the public. This Committee was of an advisory character; it apparently had no mandatory powers and eventually handed over the operation of a scheme which it outlined to the expressly-formed Fair Trading Council.

The objects of the Council, as enunciated at its inception, are:—

> "The regulation of business between all sections of the electrical industry so as to ensure that the function of each is defined and understood, and that each receives the fair reward of his labour, to the end that equity and fair dealing prevail throughout the industry, that the public be well served, and the cause of electricity advanced."

Regulation or Persuasion

The use of the word "regulation" in this statement hints at some means of securing adherence to the Policy apart from mere persuasion. Yet in all the documents issued by the Council from its beginning we can find no definition of the method proposed to enforce the Policy.

It has never been suggested that legislation should be sought; and indeed any attempt to secure it would have been hopeless from the start. At a Press meeting last week it was said that the arrangements originally proposed were based on a conception of agreements signed by adherents to the Fair Trading Policy, such agreements having compulsory aspects and the Council having mandatory powers to enforce adherence to its Policy. Just before the war there was a proposal to exercise something more than moral suasion, but it was not proceeded with.

Thus in actuality the whole scheme has been operated on a voluntary basis and yet in the background there has been that shadow of possible attempts at compulsion which may have deterred some members of the industry from participating in the Council's work.

Revision of Constitution

Now, therefore, the Council has formally abandoned any idea of assuming or acquiring mandatory powers to secure the adoption of its Fair Trading Policy and proposes to revise its constitution and the Policy in such a way as to make clear the voluntary nature of its operations. It visualises consultations between all interested sections of the electrical industry and the promotion of good trading practice among all engaged in the industry, whether members of a trade association or not. It is intended that the Policy shall form the general basis on which negotiations on trading between various sections of the industry can take place, leading to agreements between the trade associations concerned.

It is hoped by this means to remove difficulties which, in the past, have prevented the Council from being fully representative of the whole of the industry. Up to the present a very important section of the industry—electricity supply—has

not felt able to join the Council although local authority undertakings were represented on Committee "D" whose scheme visualised their participation. Will the proposed changes enable the supply authorities to reconsider their position?

Generating Plant Capacity

In the early days of the war, before full mobilisation of industry for armaments production had been attained, we expressed the view that the drop in electrical output experienced might be temporary and that plant capacity should be provided to meet all the possibilities we then envisaged—in short that the generation of electricity should be treated as one of the Services. A little later we protested against what appeared to be ill-considered attempts to transfer power-station maintenance staffs to other work. Some justification for this attitude is found in a letter from a manufacturer in this issue. After electricity supply had demonstrated its reliability in the face of the worst the enemy could do, it is indeed sad that the forces of Nature should have unmasked a shortage of effective plant.

Meeting Future Demands

Deficiencies revealed by the cold spell are largely the result of what was or rather what was not done three or four years ago. What matters to-day is that plans have to be prepared to meet demands the same number of years ahead. In commenting on the C.E.B. programme last November, we contended that three million kW of new plant was by no means an excessive allowance to tide over until the winter of 1948. Even so, however, the manufacture of no less than 876,000 kW of the 2·4 million kW actually listed was held up pending receipt of Government authority. We urge that the manufacture of generating plant should be regarded as a priority post-war need; otherwise there appears to be a grave risk that our correspondent's apprehensions will prove to be only too well founded.

Employees and Development

It is not to be doubted that a good deal of private unofficial "promotional" work for the industry is done by employees of all electrical concerns, whether engineers, electricians, fitters or clerical staff. In some localities this may be recognised and the assistance of the men may be enlisted in a cause which is as much theirs as anybody's. A prosperous expanding industry means full employment for them and others. Is there not scope for greater general appreciation of this fact? Everyday relations between employers and employees in most branches of the industry have been cordial on the whole, but their contacts have been mainly on matters of wages and conditions. Because of their great number and close contact with the public (being members of it) employees may have valuable ideas and advice to offer. Works councils have been set up in many undertakings. Do they ever discuss electrical development?

Export Credits

Some members questioned the adequacy of the amount when Mr. Dalton moved the second reading last week of the Export Guarantees Bill raising the maximum liability for export credit guarantees from £75 million to £200 million. Replying to these criticisms, Mr. Dalton said that even though prices were double those of the pre-war period this still represented an increase of 33⅓ per cent. Moreover the Government did not regard it as a final figure. In winding up the debate Mr. Harcourt Johnstone, Secretary to the Department of Overseas Trade, promised some improvements in the scheme, the principal one being the separation from an exporter's total of such risks as he was prepared to bear himself, provided that there was otherwise a reasonable spread of business. The scheme has been very successful and its extension is welcome.

Utilities and Taxation

The *Electrical World* (New York) has again recently discussed the propriety of relieving publicly-owned utilities from the obligation of paying taxes. It rightly contends that, as taxation is ultimately paid by the customers, those served by privately-owned utilities are discriminated against in this matter; that is, they are made to pay more than their fair share to the State or Federal Governments. This discrimination does not operate here; in a way the boot is on the other foot. Publicly-owned utilities are frequently "milked" to bolster up the local rate fund and thereby their customers pay more rates than those who do not use the service.

Castle Meads

The New Generating Station at Gloucester

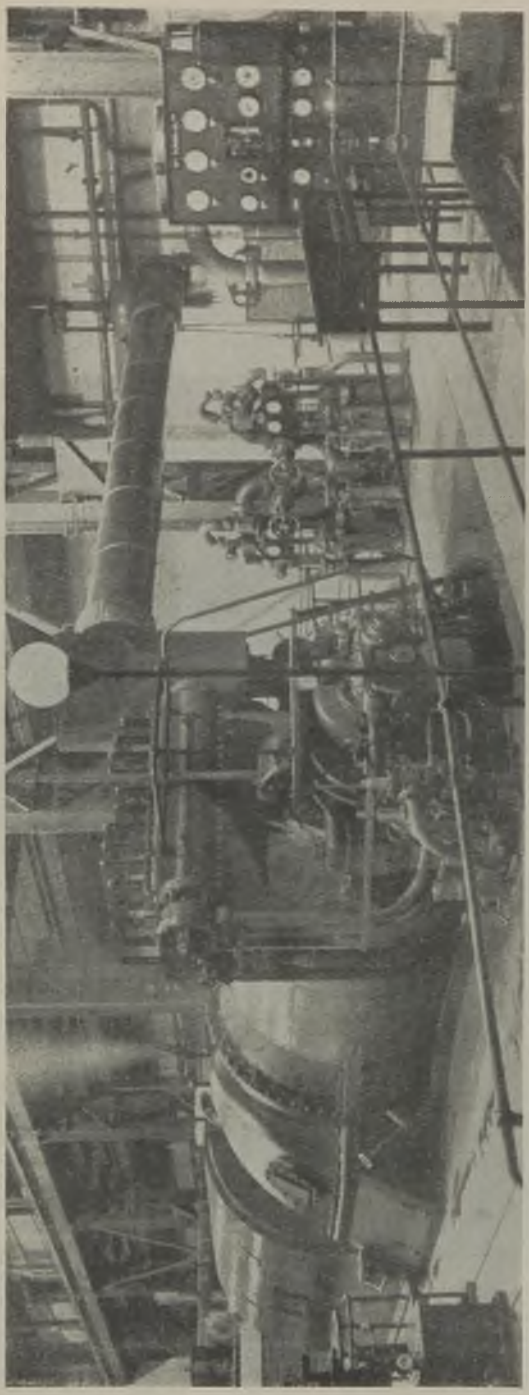
ONE of the four new generating stations which have been put into commission during the war years is the Castle Meads station of the City of Gloucester Electricity Department. It now has a plant capacity of 40,000 kW and its weekly output, all direct to the grid, is about 3½ million kWh. One 20,000-kW turbo-alternator and two 100,000-lb. per hr. boilers were put into commission in December, 1942, and a second turbo-alternator of the same size and three additional boilers similar to the others were put into commission in July, 1944. It is a fully riverside operated station, and its coal is both rail and water borne, although the tendency is mainly to use rail-borne coal in consequence of the high water freightage charges which are peculiar to the locality.

Unlike the Little Barford power station, described in the *Electrical Review* of January 19th, Castle Meads was conceived, designed and constructed entirely under the war emergency programme, and this fact has governed the design and operation of the station throughout. An example of this influence is to be found in the station steaming conditions which include a boiler steam pressure of 425 lb. per sq. in., which nowadays is rather a low figure for a completely new station, and is attributable to the fact that the boiler plant was produced from specifications and drawings already in existence for other purposes. All the same, for this pressure a somewhat high steam temperature is used, namely, 825 deg. F., at the boiler, and this has resulted in a station thermal efficiency of about 22 per cent. on an output basis. The coal consumption is about 1·27 lb. per kWh sent out. Another fact which influences the thermal efficiency is that the station is sometimes operated on two shifts and sometimes on three.

Above: The five 100,000-lb. per hour boilers are disposed in one line side by side

Left: Each grit arrestor is integral with the i.d. fan serving the same boiler; ash basement level

Castle Meads is situated on Alney Island on the eastern arm of the River Severn, on the western outskirts of Gloucester. The site is a difficult one, because it is subject to flooding, and the ground level in the immediate vicinity of the station had to be raised from 29 ft. OD to 37 ft. OD, while the boiler house and turbine room basements have been enclosed in a water-tight coffer dam. The building basement constitutes a reinforced-concrete tank from which the walls are of brick to about boiler-drum level, above which they are of Trafford tiles backed with expanded metal.



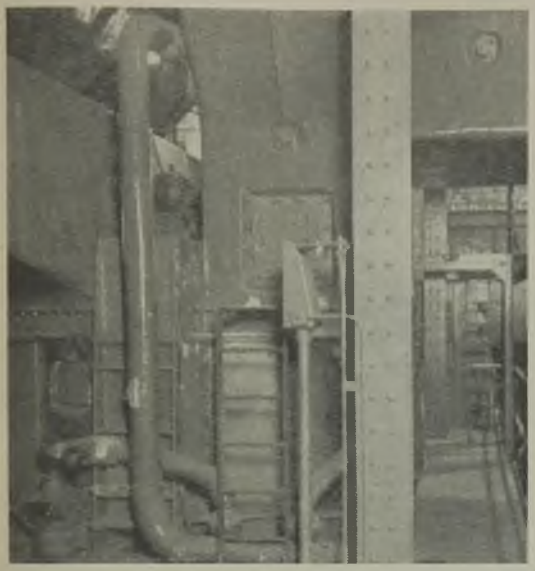
Castle Meads now has a main plant capacity of 40,000 kW ; one of the two 20,000-kW sets

The south end of the station is about 70 ft. from and roughly parallel to the river bank, and at the north end, between the main buildings and a triangular coal-storage ground which will accommodate 14,000 tons and is served by a drag-scraper equipment, are railway sidings which are extended westwards to a coal wharf on the river bank. On the south side is the boiler house, with its five boilers all side by side in a single row ; outside of this is a fan bay beyond which in the same direction are the station flue, which is common to all five boilers, and the chimney which is 262 ft. high and 14 ft. in internal diameter at the top. Between the boiler house and the turbine room are two bays, one for the boiler-house bunkers and one for the feed heaters and surge tanks, etc.

The two turbo-alternator sets are disposed at right angles to the boilers end to end in a straight line. The west-most bay of the building accommodates the circulating pumps, switchgear, control room, etc., while a few feet in the same direction from the outer wall are the main station transformers. A few hundred feet from the west and east ends of the station are situated the circulating water intake and outfall, respectively, in the bank of the river.

The boilers are of the five-drum Yarrow type, *i.e.*, one steam and water drum, three water drums and one superheater drum. Each boiler is served by a Green's "Premier Diamond" gilled-tube economiser at the back of the boiler at a level of about 22 ft. from the firing floor to the bottom of the economiser, a Babcock and Wilcox chain-grate stoker having a firing area totalling 350 sq. ft. equipped with eight regulating valves, and a Howden-Ljungstrom air heater which is also at the back of the boiler but at the firing-floor level. The boiler has "Detrick" front and rear arches, and exposed water tubes at the side walls. Clyde retractable-nozzle soot blowers are fitted. The f.d., i.d. and secondary-air fans are all housed in the ash

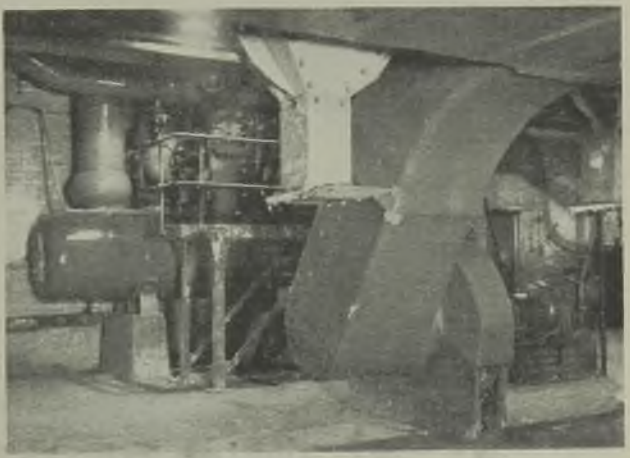
basement, as are two steam receivers which are common to all five boilers, and five grit arrestors, each of which is integral with the i.d. fan serving the same boiler. The boilers



Each of the rotary air heaters is situated at the back of the boiler which it serves at the firing-floor level

are all hand operated, each from its own Electroflo central control board at the firing-floor level. In addition to the usual pressure and temperature instruments, flow meters, etc., each boiler control board is equipped with start and stop buttons for the fan, air heater and stoker motors.

Running right across the firing aisle overhead, so that it can be seen from any point on either side, is



The secondary air fans, in the ash basement, feed nozzles at the front and rear of the combustion chambers; one of the steam receivers is shown in the background

a horizontal panel with large-scale essential instruments, including a critical-pressure gauge and a Synchro-Dial load transmitter which is served from the station control room and which has two pointers which indicate, when they are both in line, that the station is generating its stipulated output. The turbo-alternators are B.T.H. machines running at 3,000 RPM. The turbine in each case is a single-cylinder machine with three stages, and the steam conditions are 400 lb. per sq. in. and 800 deg. F., with a vacuum of 28·71 Hg. The condenser for each set is a Hick Hargreaves single-pass surface equipment with a cooling area of 10,400 sq. ft. We believe that the single-pass feature is unusual for a condenser of this size, but it was adopted as the result of a condition laid down by the river authorities, that the discharge temperature should not exceed 75 deg. F., thus considerably limiting the temperature rise across the condenser in the summer months.

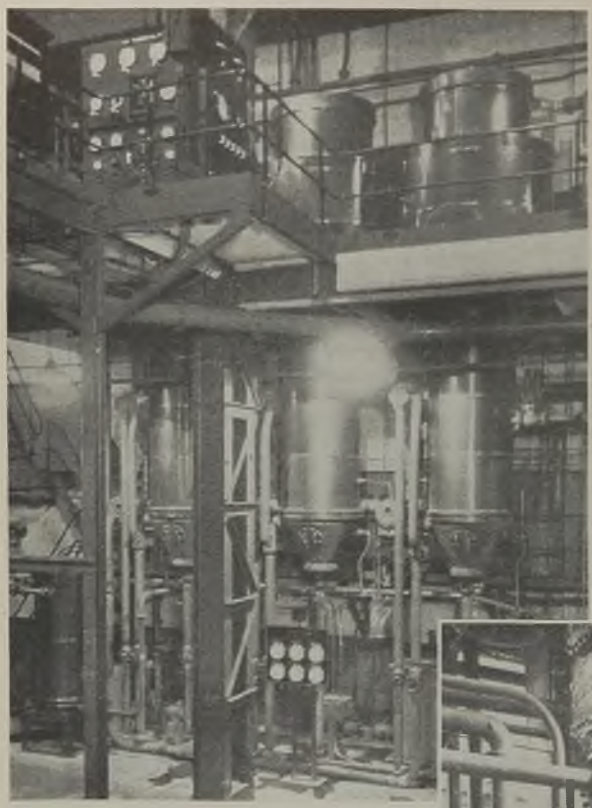
Having outlined the station and the main plant, it will now be more interesting to refer to the station in terms of "production flow." Coal is received mainly from the Forest of Dean, and whether it is rail or water borne, it is all delivered in 20-ton wagons *via* an Ashworth weighbridge and a Mitchell wagon tippler to a receiving hopper which discharges it into a gravity bucket elevator. This, in turn, discharges coal on to a belt conveyor which serves the coal bunkers or, alternatively, through a small hopper and chute to the storage ground. The coal from the bunkers is delivered to the boiler hoppers serving the stoker grates by way of traversing chutes. The ash from the grates of the stoker falls into hoppers from which it is fed on to a John Thompson submerged-belt ash conveyor serving a skip hoist which delivers the ash to an elevated reinforced-concrete bunker and from this

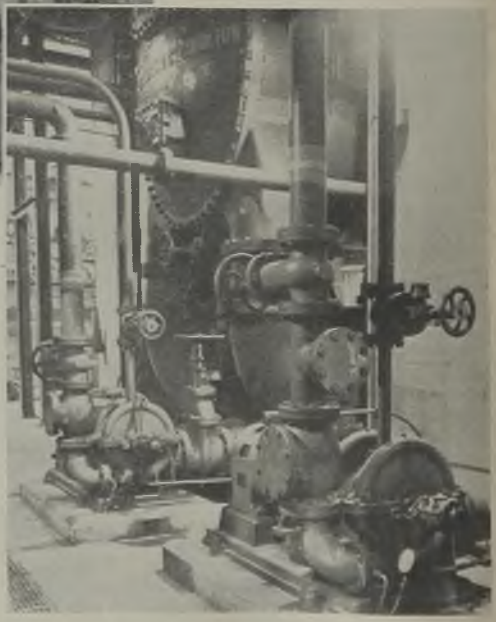
railway wagons and road lorries are fed for carting away the ash for disposal.

In regard to the combustion circuit, cold air is drawn from the boiler house roof and passed by the f.d. fan through one "side" of the air heater which it leaves at 285 deg. F. From the air heater the air is passed on to the wind box under the stoker through ducting from which is taken the supply for the secondary air fan which feeds nozzles at the front and rear of the combustion chamber. From this chamber the gases pass through the banks of water and superheater tubes and leave the boiler at 640 deg. F. The next stage is the economiser where the outlet temperature is 425 deg. F., and from which the gases pass through the other "side" of the air heater, to be drawn by the i.d. fan through the grit arrestor and passed on to the station chimney *via* the common flue. In the grit arrestor the grit and dust produced by the combustion of the coal is extracted from the flue gases by cyclone separators. Provision has been made for the installation of gas-washing plant or electrostatic precipitators, should further gas cleaning be required in the future.

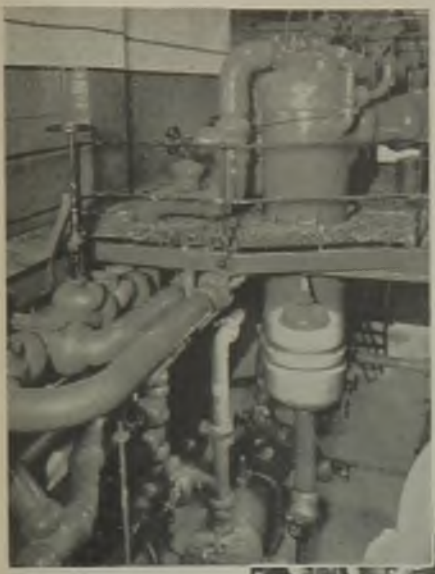
To trace the heat cycle, the steam leaves the superheater at 825 deg. F., and passes through the steam receivers on to the turbine stop valve where the steam conditions are 400 lb. per sq. in. and 800 deg. F. Bleeding is effected at the turbine stages Nos. 11, 16 and 19, to serve two h.p. and one l.p. feed-water heaters, while the exhaust is passed to the condenser from which it is extracted as condensate by twin pumps and passed on to the steam-ejector air extractors and then *via* a drain-cooler heater to the l.p. feed - water heater. Between this l.p. heater and the first h.p. heater the water is picked up by the feed-water pumps, and after passing through the h.p. heaters it enters the economiser at 280 deg. F.

Make-up is provided from the public

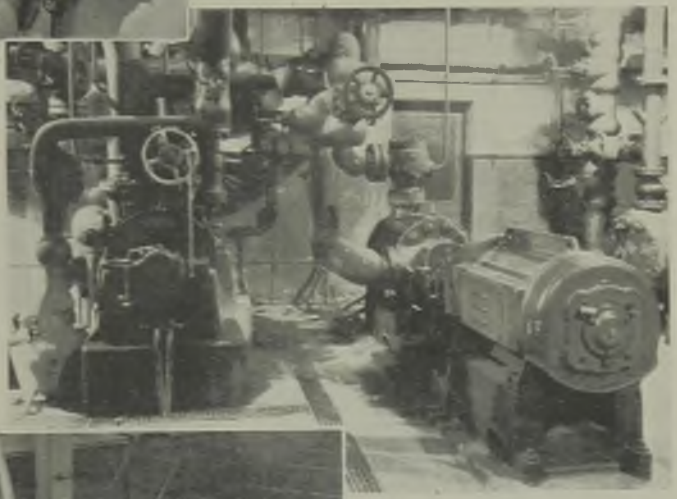




Above: Make-up from the public water supply is fed for distillation through h.p. triple-effect evaporating plant
Right: The condensate is extracted from the single-pass condenser by twin 100-per-cent. duty extraction pumps



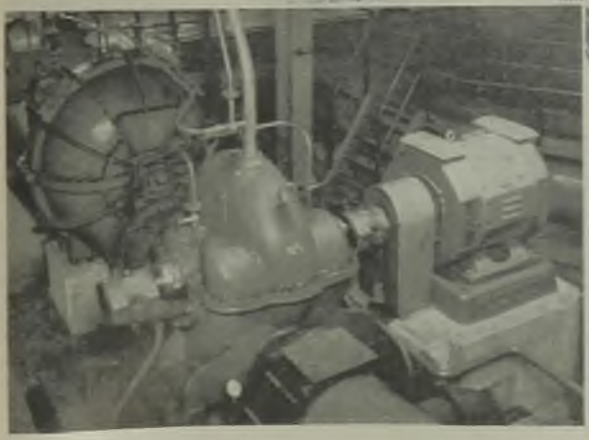
The turbine is bled at stages Nos. 11, 16 and 19 for feeding two h.p. and one l.p. feed-water heaters. Right: Between the l.p. heater and the first h.p. heater the water is picked up by the feed pumps of which one motor-driven and one steam-driven sets are shown



water supply and is first passed through a Paterson base-exchange water softener and then fed for distillation through Aiton evaporators and passed on to the feed-pipe suction line *via* the surge tanks through a shunt-type de-aerator and a storage vessel. Feeding the evaporators with steam direct from the boilers and not with bled steam from the turbines is due to the fact that the power station was designed for two-shift operation and that the evaporators are required during the shut-down period.

All auxiliary steam supplies are drawn directly from the steam receivers quite independently of the main plant, and the auxiliaries thus fed include air extractors, auxiliary oil pumps, circulating-water priming ejectors and evaporators. There are, in all, four Weir feed-water pumps, each with a capacity of 250,000 lb. of water per hour. Two of the pumps are steam-turbine driven, and two are motor driven. The evaporating plant is of the h.p. steam triple-effect type, with a capacity of 20,000 lb. of distilled water per hour, which is sufficient for the complete station.

The circulating water is drawn from the River Severn through coarse screens at the intake at the river bank and *via* steel-lined concrete pipes to rotary strainers which are immediately on the suction sides of the circulating-water pumps which pass the water through the condenser and *via* similar pipes to the outfall chamber at the other side of the station. The circulating



Circulating water from the river passes direct to rotary strainers immediately on the suction sides of the circulating-water pumps. One of the 13,000-gal. per hour pumping equipments for one set

system is partly syphonic in operation. The two circulating-water pumps provided for each turbo-alternator set are Mather & Platt " Lonovane " equipments, each with a capacity of 13,500 gal. per min. At normal river temperatures only one pump is required.

Cross sections between the circulating-water pumps are so arranged that the water can be drawn up one suction pipe and forced back down the other so as to wash out any of the sediment with which the river is highly charged. At the pump inlets there are connections for chlorination plant which so far has not proved necessary. Serious trouble was anticipated as a result of the dirty river conditions, but actually the fears have not been realised, probably because of the scouring properties of the river sediment.

The alternators are of B.T.H. standard design and construction, and they employ the closed-circuit method of ventilation, with water-cooled air coolers in the foundation blocks. They gene-

The main switchgear for each set is independent of and separately housed from that of the other set

rate at 11 kV, three-phase, 50 cycles, and each machine is connected independently to a separate set of busbars through a B.T.H. 500-MVA oil circuit-breaker which, with two other similar circuit-breakers—one for a main transformer and one for a works auxiliaries transformer — is housed quite separately from the similar switchgear for the other turbo-alternator. This main switchgear is solenoid operated and remotely controlled from a central control room in which there are a separate four-panel board for each set (one panel for each switch and one serving the automatic voltage-regulation equipment) and a C.E.B. metering board. Each main transformer is a 25-MVA, 11/132-kV B.T.H. equipment with off-load tapping voltage control, and it is connected directly to the nearby grid substation at 132 kV.

All the motors for works auxiliaries are run at 400 V and the supplies for these are obtained from 11-kV 400-V auxiliary transformers served from the 11-kV main switches referred to. For emergency lighting and small power supplies there is a 75-kW Ruston and Hornsby-B.T.H. Diesel-engine alternator set, and an alternative emergency supply is available from the Gloucester network.

The station has an " Ediswan " 350-Ah battery for emergency lighting, protective and tripping gear and the fire pump on the " Mulsifyre " installation. There is an internal automatic exchange and communications between control room, turbine room and boiler house are provided for by an " O design " system.

The main switchgear is remotely controlled from a central control room in which there are a separate four-panel board for each set and a grid metering board

We are indebted to Emil Braathen, chief engineer and general manager, for permission to visit the power station and to publish this article, and to R. H. Bent, the station superintendent, for his assistance.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Council of the Institution of Electrical Engineers has elected **Mr. J. S. Highfield,** a past-president of the Institution, to be an honorary member. This distinction has been conferred upon him in appreciation of his distinguished work in the development of the science of the supply and application of electricity.

Mr. Highfield held positions as chief engineer of the Stafford and St. Helens undertakings, after which he was appointed chief engineer and manager of the Metropolitan Electric Supply Co., Ltd. As senior partner in the firm of Highfield & Roger Smith he later acted as consulting engineer for the Central Electricity Board and several large electricity undertakings and industries in this country and abroad. He also became a director of the London Power Co., Ltd., London Associated Electricity Undertakings, Ltd., Central London Electricity, Ltd., etc.

Mr. J. S. Highfield

Dr. C. C. Paterson

Mr. Highfield originated the closed-bar system for switchgear, discovered the reason for the failure of high-voltage alternator windings, and introduced to England the Thury system of high-voltage DC constant current generation and distribution. During the last war he demonstrated at sea the use of shrouded hydroplanes for submarine detection. He is a vice-president of the Royal Society of Arts, a member of the Société des Ingénieurs Civil de France, past-president of the Junior Institution of Engineers and of the Association of Supervising Engineers and a past manager and vice-president of the Royal Institution of Great Britain.

Another past-president of the Institution, **Dr. C. C. Paterson,** O.B.E., F.R.S., receives the twenty-third award of the Faraday Medal for the conspicuous services rendered by him in the advancement of electrical science, particularly in the field of electrical research. On the staff of the National Physical Laboratory from 1903 to 1919 he took charge of the electro-technical and photometric departments and was largely responsible for building up this Section of the Laboratory. In the last war he participated in the inception and development of the Paterson-Walsh electrical height finder which provided an automatic record of the heights of aircraft. He has been director of the research laboratory of the General Electric Co., Ltd., at Wembley, from its inception, guiding the whole of its activities which range from the heavy engineering field to electronics. His contribution to investigations into new methods of artificial lighting and into electronic developments has been outstanding. During the present war he has collaborated with the armed forces and with the Supply Departments on many matters of outstanding national importance.

Dr. Paterson was elected a Fellow of the Royal Society in 1942. He is a past-president of the Electrical Research Association, the Illuminating Engineering Society, the International Commission on Illumination, Institute of Physics and the Junior Institution of Engineers. He is the present chairman of the Engineering Divisional Council of the British Standards Institution.

Mr. A. E. Marson, who as reported last week has just been appointed secretary to the Electricity Commission on the retirement of **Mr. R. T. G. French,** was educated at King Edward VI Grammar School, Stafford. He entered the Civil Service in 1908 and after serving in various departments of the Board of Trade was transferred to the Electricity Commission on its establishment in 1919, becoming assistant secretary in 1942. He acted as secretary to the McGowan Committee on Electricity Distribution in 1936-37, and was awarded the M.B.E. in 1937. In the last war he held a commission in the South Staffordshire Regiment serving in Gallipoli, where he was severely wounded, and later in France.

Mr. R. T. G. French

Mr. A. E. Marson

Mr. C. J. Hornsby

Mr. C. J. Hornsby, who succeeds Mr. Marson as assistant secretary, was a student of the Essex County High School, Ilford, and King's College, London. From 1908 to 1914 he held an appointment in the Secretary's Office of the General Post Office, London. After service from 1914 to 1919 in the H.A.C. and the Royal Field Artillery, Mr. Hornsby joined the Electricity Commission in 1920. He has served as secretary

to the National Committee on Air Raid Precautions for the Electricity Supply Industry and joint secretary to the Man Power Consultative Committee for the Electricity Supply Industry.

Owing to pressure of work **Mr. J. W. J. Townley** has been unable to accede to the unanimous wish of the Joint Committee of Electricity Supply Organisations that he should continue as chairman for another year and **Mr. A. J. Fippard** has succeeded him. **Mr. Leslie Gordon** (London J.E.A.) has been appointed vice-chairman.

A team from the English Electric Co.'s Bradford works won the men's fire guard drill event in the national finals of the Industrial Fire Brigade, Fire Guard and Civil Defence championships held in London. The event was won in the remarkable time of 1 min. 25 sec. against the 1 min. 41 sec. of the runners-up.

English Electric Company's winning Fire Guard team in the national competitions

The team, consisting of Messrs. M. S. Thompson, F. Gardner and J. Spensley, with Mr. N. Newsome as reserve and Mr. C. R. Bisby as A.R.P. Supervising Officer, was congratulated by Sir George H. Nelson, the chairman and managing director of the company, who presented each with a replica of the national finals cup.

Following a request from the War Office, Finchley Council has replied that it cannot agree to **Mr. C. R. Westlake,** general manager and electrical engineer of the Electricity Department, again being released. He was given leave in January, 1943, for a year to undertake special military duties and held the rank of lieutenant-colonel. The War Office now wants him in connection with the supervision and direction of electricity and gas supplies on the Continent.

Mr. D. M. Fraser, A.M.I.E.E., who in August last year completed twenty-one years' service with the Sun Electrical Co., Ltd., as manager of the Leeds branch, has been appointed a director of the company. After preliminary experience in Edinburgh Mr. Fraser joined a London firm before the last war and was engaged on export engineering work. Joining the Forces in 1914 he went to France in the following year with the first Electrical and Mechanical Company, Royal Engineers.

Mr. G. Keith Drew, after nearly eighteen years' service, has resigned his appointment as sales director of Delco-Remy & Hyatt, Ltd., to take up a similar position with Frigidaire, Ltd. Following his resignation **Mr. G. E. Wright,** for many years secretary of Delco-Remy & Hyatt, has been elected to the board.

Another appointment to the board is **Mr. S. H. Blazey,** chief designer, who becomes director and chief engineer. Mr. Blazey has many developments to his credit, including the range of Delco electric motors for aircraft. **Mr. C. H. Charles,** who has held sales executive positions with the company for many years, is appointed general sales manager.

On the occasion of his seventieth birthday on February 1st **Mr. C. Mancha Bennett,** chief control engineer to the London Power Co., Ltd., was presented by his staff with a handsome silver salver.

In this issue we describe the new Castle Meads generating station of the City of Gloucester Electricity Department. The chief engineer and general manager of the department, **Emil Braathen,** A.M.I.E.E., was educated at Parmiters Foundation School, London, Palmers College, Grays, Essex, and the School of Engineering and Navigation, London. Before the last war, during which he served in the Royal Flying Corps, he was for a number of years senior evening class lecturer in electrical technology, thermodynamics and electricity supply economics at Hackney Polytechnic. From 1919 to 1922 he held the position of assistant in charge of substations with the Stepney Electricity Department and for the following five years he was constructional assistant and engineering clerk of works. Joining the Hackney Corporation Electricity Department in 1927 as technical assistant, he became chief technical assistant in 1936. In 1940 he was appointed deputy chief engineer of the Stretford & District Electricity Board, Lancs, retaining this position until his appointment to Gloucester last year.

Mr. Leonard Raven, B.Sc. (Eng.), A.M.I.E.E., consumers' engineer with the Harrogate Electricity Department, has been appointed deputy borough electrical engineer of Brentford and Chiswick and will take up his new duties on March 1st. Mr. Raven, who is thirty-six, is a native of Salford and was educated at Manchester University (Engineering Department), receiving his practical training with the Automatic Telephone Manufacturing Co., Ltd., and the Manchester Corporation Electricity Department. From 1932 to 1934 he acted as assistant to the power sales engineer at Manchester. After two years with the Wallasey Electricity Department, he went to the Cardiff undertaking in 1936 as technical assistant, later becoming sales engineer. He joined the Harrogate staff in 1941.

A short talk recorded by **Mr. T. O. Freeth,** of the Lighting Service Bureau, was broadcast in the European Service of the B.B.C. on February 2nd. He said that out-of-doors lighting—holiday resorts, historic buildings, parks and playing fields—was expected to be a big feature of post-war Britain. Floodlighted playing fields might become the rule rather than the exception for it was realised that children must be kept off the streets after dark and this was one way of doing it. When things were once more organised on a peacetime basis Britain would become one of the best lighted countries in the world.

Mr. A. G. Jackson, for many years senior representative of Ward & Goldstone, Ltd., has been appointed sales manager of the company. Mr. Jackson has been associated with Ward & Goldstone for over twenty-five years and has covered a very extensive area, including Northern Ireland and Eire.

Mr. J. B. MacKenzie, whose nomination as a member of Edinburgh City Council was confirmed by the Council last week, is president of the Electrical Contractors' Association of Scotland and has been in business as an electrical contractor since 1924.

Mr. J. G. Arnott, foundry manager of the Clyde Alloy Steel Co., Ltd., and well known in marine engineering circles, has joined G. & J. Weir, Ltd., as general manager of the Holm foundry, Cathcart, and Argus foundry, Thornliebank, in succession to the late Mr. Norman McManus.

The Institution of Mechanical Engineers has awarded the Hele Shaw medal and prize for 1945 to **Mr. G. German,** a student at Preston Technical College. He is on the staff of the English Electric Co., Ltd.

Mr. James Wright, meter superintendent to Blackburn Corporation Electricity Department, is retiring after forty years' service.

Mr. H. W. Knight, A.M.I.E.E., has been appointed technical assistant to the chief electrical engineer of the Southern Railway at Deepdene. Mr. Knight has been in charge of the electrical control stations for the company's Woking area.

Bingley Urban District Council has decided to increase the salary of **Mr. O. G. Cook,** chief electrical engineer and manager, by £100 per annum. The chairman of the Lighting and Tramways Committee (Councillor J. W. Minnikin) paid a tribute to the services rendered by Mr. Cook during the past difficult year.

The 1945 New Year's dance of the Coventry Electric Club was held at the Masonic Hall on January 23rd. A special feature was the show of a film photographed in colour by Messrs. G. S. Nott and R. A. Bill during the Club's summer golf tournament, with a running commentary spoken by Mr. Leslie Thorne. Later in the evening there was a surprise visit by the Mayor, Alderman G. E. Hodgkinson, and the Mayoress. One of the many handsome "spot" prizes was presented to the Mayoress by Mr. F. Godden, the city electrical engineer and manager. The proceeds of the evening are to be given to the Electrical Industries Benevolent Association.

The Barnsley Education Committee is advertising in this issue for a head of the Electrical Engineering Department of the Mining and Technical College at a salary of £500 rising to £600.

Obituary

Mr. L. A. Lewis.—As announced in our issue of January 26th, Mr. L. A. Lewis, M.I.E.E., Director of Inspection, India Store Department, died suddenly on January 20th. Mr. Lewis joined Crompton & Co., Ltd., as a pupil in 1899, receiving his technical training at the City and Guilds College. After completing his pupilage he remained at the Crompton works until 1904 and then spent a short period in the company's London contract department. Following a year in the estimating department of the Lancashire Dynamo & Motor Co., Ltd., he joined the India Store Department, London, as Assistant Inspector of Scientific Stores in 1906, and was appointed Electrical Engineer in 1917. He remained in charge of the Electrical Department until his appointment as Deputy Director of Inspection in 1936, and he became Director of Inspection in 1939.

Alderman W. H. Bickham.—We regret to report the death on January 30th of Alderman W. H. Bickham, O.B.E., at the age of sixty-two. Alderman Bickham, who was Mayor of Swindon in 1943-44, was particularly interested in the development of electricity in the borough, being chairman of the Electricity Committee from 1924 to 1927 and again from 1934 to the time of his death. For many years he represented the Swindon undertaking on the No. 6 District Council, No. 6 District Joint Committee and the No. 6 District Joint Board for the Electricity Supply Industry.

Mr. P. Pritchard.—The death occurred on February 2nd, at the age of fifty-two, of Mr. Percy Pritchard, managing director of Birmid Industries, Ltd.

Mr. J. Ruler West, who was a director of the West Insulating Co., Ltd., died at Welwyn on January 15th.

Cathode-ray Oscillography

Industrial Uses Described

THE I.E.E. Students' Lecture on "The Cathode-ray Tube and its Applications," by Dr. W. Wilson (G.E.C.), which is now being presented to I.E.E. Students' Sections at various Centres, was delivered last week in Manchester to the North-Western Students.

The lecturer commenced with references to successive methods that have been employed for measuring transient phenomena as requirements became stringent. The basic principle of cathode-ray oscillography was described, indicating the relative advantages of various component parts that have been responsible for the continued refinement of the instrument, the industrial uses of which were considered under the six following headings:—Readings requiring a single pair of deflectors, in which the instrument functions as a dead-beat voltmeter or ammeter. Differential tests, in which two similar quantities are compared during their cycle of changes. Repeating time-base tests, in which the curve of change against time is registered on the screen as often as desired, for continuous observation or photography. Single sweep tests, in which the curve is traced once only, as in lightning surges. Tests in which curves are traced connecting two quantities other than time, such as hysteresis loops. The recording of transient mechanical pressures, as in pile-driving and engine indicators.

The application to television was briefly discussed, including both receiving and viewing units. Finally, a description was given of the electron-diffraction camera and the electron microscope with examples of their work in connection with surface films, and micrographs showing magnifications up to and exceeding 50,000 diameters.

Motor Control Gear

Present Practice and Some Suggested Improvements

THE development of motor control gear is outlined in a paper which was to be read yesterday (Thursday) by MR. D. RUDD (Engineering Service Installations, Ltd.) before the Installations Section of the Institution of Electrical Engineers.

The paper reviews, in general terms, present practice in design. Its author limits his observations to principles, approaching the subject from the point of view of the industrial user rather than the designer, their outlooks not necessarily being the same. The scope of the first part of the paper is confined to the principles on which what may be described as standard motor starters have been established. Types are not catalogued, but mentioned to indicate the wide choice available to-day, the author considering that such divergence needs to be restricted. The later sections are concerned with some of the many factors that may be expected to influence future design, suggestions being made for general simplification. Qualities desirable in materials forming contacts are briefly referred to; radical change from the established principle of "line" contact does not appear to be probable.

Rupturing Capacity Limits

It is considered doubtful whether the rupturing capacity limits contained in B.S. 587 are a sound basis for the design of commercial starters. In the author's opinion they must in future be based on the principle of restricted rupturing capacity, the function of clearing faults being left to the distribution gear, which is designed for that purpose. Much more use will be made of direct methods of temperature control in motor protection.

Although "single-phasing" is perhaps the most prolific cause of failure of polyphase motors, protection against it is usually left to the over-current releases. That is unwise; a fuse rating should be chosen that is sufficiently high to prevent the possibility of a single fuse blowing while the machine is starting. Although it would then be without overload protection, the much reduced risk of "single-phasing" is, on balance, to be preferred. There is a real need for an inexpensive phase-failure relay that is reliable for large motors, which the author believes to be more essential than conventional over-current protection. The need for protecting small motors is becoming less pressing; their windings are now made more resistant to high temperature and the degree of standardisation that has already been achieved will make it cheaper to replace a complete stator, or armature, than to have a damaged machine repaired.

There is still considerable divergence of view about duty cycles; the author hopes manufacturers will adopt standard ratings, those of the B.S.S. being open to criticism because more emphasis is placed on ability to dissipate heat than on capacity to store it. The tendency will be towards air-cooled resistors and auto-transformers with resistor elements perhaps embedded in a ceramic mass to raise the heat storage capacity; oil immersion will probably be adopted for totally enclosed models to assist rapid heat transfer from the coils to the walls of the enclosure.

It is suggested that for normal industrial duty, ability to make at least three successive starts is necessary, while regular starting once per hour would suffice for the majority of motors needing rheostatic starters. With so many variables to contend with it is virtually impossible to standardise starting conditions; in the author's opinion there is much to commend the direct method of stating thermal capacity used in B.S. 140 for liquid starters.

The number of steps in the average starter could be reduced by half if theoretical peak currents were permitted above the B.S. 587 values for faceplate and drum starters. Thus a considerable saving in cost would result while the design could be simplified by eliminating unnecessary resistance tappings and contacts; the HP of any given size of casing would also be correspondingly increased.

There has been less standardisation of motor starters than of any other industrial equipment. Unification would help to lessen the confusion at present experienced when selecting control gear and the author feels that a more direct lead could be given in B.S. Specifications. There is also need to review restrictions on starting current peaks at present permissible. and to unify supply authorities' requirements in this respect.

Accelerated Study and Training

IN view of the magnitude of the post-war building programme and the need for sufficient numbers of trained men of the supervisory and professional grades, the Incorporated Association of Architects and Surveyors, 73, Eaton Place, Westminster, is interesting itself not only in the matter of release but also in accelerated study and training courses. In connection with the latter the secretary, Mr. G. B. J. Athoe, is anxious to obtain information as to the use of the film or film strip for training in engineering, electrical and other industries.

CORRESPONDENCE

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

Universal Domestic Tariff

MR. CROWSLEY'S comments on my article in your issue of January 5th are perplexing. It is difficult to know whether they are intended to be severely practical, highly technical or just satirical.

In the first place, Mr. Crowsley has overlooked my remarks to the effect that Fig. 1 was only intended to be explanatory. I should have thought it was clear to him that it is beyond the powers of any individual to give a final numerical expression for a proposed universal tariff.

Secondly, although I fully appreciate Mr. Crowsley's reasons for fearing high demands from individual domestic consumers, I feel that he is clutching the shadow for the substance. He has overlooked the following essential factors:—(*a*) In order to combat the rising cost of coal and plant, it is absolutely imperative to sell more kWh and improve load factor, if one intends to avoid tariff increases; (*b*) if we desire diversity, then the universal tariff must be a *salesman's* tariff as well as a simple one; and (*c*) that the kW of m.d. of the domestic consumer constitutes only a fraction of his capital liabilities.

Finally, in my search for a universal tariff, I am not tempted to ask grandfather, much as I respect the efforts of John Hopkinson and other stalwarts. Mr. Crowsley might cast his mind back to the period when our present forms of domestic two-part tariffs were introduced and then ponder over his statements again.

Wolverhampton. J. L. FERNS.

Generating Plant Shortage

IN answer to a question by Mr. W. F. Higgs on January 16th, the Minister of Fuel and Power said that the new plant which had been brought into commission in selected generating stations between January 1st, 1940, and December 31st, 1944, was approximately 2,650,000 kW and that this plant was about equal to the increased demand since the war. The inference to be drawn is that the authorities had procured sufficient generating plant to deal with the war demand but that for other reasons this was not all available, with the result that interruptions of the supply were taking place all over the country. I do not think the Minister should get away with this. The chairman of the Central Electricity Board said on January 18th that there had been more than 2,000,000 kW of new plant installed since 1939. The Board's chief engineer stated recently that the maximum demand of 8,400,000 kW was "just about the breaking point." The last report published by the Board said that the maximum demand at the end of 1938 was 8,000,000 kW. These figures mean that the increase in the maximum demand between 1938 and 1944 was 400,000 kW or 5 per cent.

Sir William Beveridge states ("Full Employment," p. 120) that physical output in Britain rose between 1938 and 1942 by 31 per cent. It is clear that this would not have been possible with an increase in the maximum demand of under 5 per cent. Probably private power houses supplied the deficiency. At the works in the Midlands with which I have something to do, that part which depends wholly on the grid supply (*via* the Corporation) was shut down twice last week, owing to the electric supply being cut off, while that part which has, in addition, its own power house, managed to keep going thanks to the private plant and the public supply which was not switched off there. Before the war, however, we were urged to dismantle our power house. I am glad we did not do so.

In my mind there is no doubt we are suffering to-day from the inadequate provision for new plant arranged in the "phoney" period early in the war. From such figures as I have been able to find, it appears to me that a similar mistake is likely as regards post-war requirements. Private persons learn from their mistakes. It would appear that Government Departments do not. MANUFACTURER.

Force Between Parallel Conductors

IN a letter from Professor G. W. O. Howe in your issue dated January 19th a proof is given for the validity of the expression $F = \frac{2I_1I_2}{100D}$ for the force between parallel current-carrying conductors of finite size. This proof depends on the assumption that there is uniform current distribution in each conductor. Surely the difficult part of the proof of the expression lies in the justification of this very assumption, for each element of charge moving in each conductor is subject to forces on it not only due to the other elements of charge in the same conductor, but also due to the charge in the other conductor. Further, there will surely be electromagnetic forces tending to upset the distribution.

The electrostatic forces tending to upset the distribution will obviously be minute, for, as one ampere $= 3 \times 10^9$ E.S.U./second $3 \times 10^9 = qv$, where q is charge per

ampere per cm. length of wire and v the velocity of current, which is very nearly 3×10^{10} cms. per second. Thus, $q = \frac{3 \times 10^9}{3 \times 10^{10}} = 0{\cdot}1$ E.S.U. per ampere. Nevertheless, the force due to this charge must be equated with the electromagnetic forces tending to displace, and to maintain, the distribution of the current in the wires, and the result shown to be negligible. Would not the discussion of this be most obtuse?

It can readily be proved that the error due to want of uniformity cannot exceed $\frac{100\,(R_1 + R_2)}{D - (R_1 + R_2)}$ where R_1 and R_2 are the radii of the two wires, for this is the error that would occur if all the current in each conductor could be concentrated in the part of it nearest the other conductor; the actual error, however, would almost certainly be far less. Further information as to the accuracy of the law with finite conductors would be interesting, as there must be many cases in engineering practice in which the force between thick conductors close together carrying heavy currents is required to be known.

Sanderstead. JOHN EVENDEN.

[Professor Howe's comments on the above are as follows:—"This question of the uniform distribution of steady currents was recently raised in a private letter and will form the subject of the editorial article in the March *Wireless Engineer*. The departure from uniformity is absolutely negligible. Mr. Evenden has evidently some strange conception of the nature of the electronic movements which constitute the current in a conductor when he talks about the velocity of the current being nearly 3×10^{10} cm. per sec. Surely 3 mm. per sec. would be much nearer the mark with ordinary current densities in copper. A piece of copper wire is not a vacuous gun barrel along which electrons move at the velocity of light, but a closely packed structure in which they jog or drift along at less than a walking pace—but there is an awful lot of them."—Editors, *Electrical Review*.]

Earth Electrodes

I REGRET to see the publicity given in the *Electrical Review* of January 5th to the obsolete method of earthing by means of coils of tape buried in beds of coke.

In the first place, corrosion of the copper in the coke will be practically complete in a comparatively short period; yet this will not be apparent from any test either for continuity or resistance to earth and a highly dangerous condition will thus ensue. According to the arrangements shown in the illustration, a satisfactory continuity test through the earth coil is obviously impossible as both "tails" are run together up the walls and are making probable contact below ground, hence any test will tend to be short-circuited just below ground level.

In the second place, the use of this type of earth electrode is discouraged by British Standard Code of Practice C.P.I./1943 which deals with lightning protection and earthing. I was a member of the Committee responsible for the preparation of this code and would refer you to Clauses 13 and 17 and appendix notes thereon. This lays down principles intended to be taken as mandatory where structures containing explosives are concerned.

*London, S.W.*1. RALPH A. PRICE.

Education for Engineers

THE report in your issue of February 2nd of my remarks at the I.E.E. discussion on education for engineers might give a completely wrong impression possibly due to the confusion which has been caused, particularly in the London area, by calling colleges for further education "institutes."

As published, my remarks might appear to suggest that technical colleges should only concern themselves with professional courses, whilst the City and Guilds of London Institute would be responsible for craft and technician courses. This, of course, is entirely contrary to my view. What I did suggest was that there had been a tendency in recent years for various bodies to put forward training and examination schemes and I considered that the *examining bodies* should be limited to two, namely the professional institutions in conjunction with the technical colleges for all professional examinations, and the City and Guilds of London Institute for all craft and technician examinations.

I also suggested that the City and Guilds Institute might reconsider its existing regulations and award craft and technician certificates under regulations similar to those governing the award of National Certificates, where the number of candidates is not likely to justify the holding of their ordinary type of examination.

*London, S.E.*4. C. W. ROBSON,
Acting Principal,
South-East London Technical Institute.

An Educational Inquiry

MY son is at present at school studying for the Higher School Certificate, having gained distinctions in mathematics and physics in his School Certificate. He will be seventeen years of age in May and wishes to become an electrical engineer. The head master suggests a further year at school if he passes his examination, as he is young for a university; he could take a scholarship examination and then go on to Cambridge, with or without the scholarship. I favour this, but my son wants to go to Manchester University this year, if he can at his age, and does not want to stay at school.

I would be very grateful for any advice your readers can give me. The cost of any course does not enter into the matter—just the best education to the end in view.

J.H.

Supply Industry Unification

Criticisms of Recent Proposals

By "Buscome"

IN an article on "Electricity Supply Unification" in your issue of December 15th, Mr. J. L. Ferns stated that he was seeking to fill the gap in the nine major reports on electricity supply by calculating the effect upon the kWh charge which would result from unification of the industry. It may first be asked, however, whether any indeed of the responsible reports have advocated unified ownership. Certainly not the McGowan Report, or the power companies or the I.M.E.A. reports, and the London and Home Counties J.E.A. report is much more anxious than any company to extend its own sphere of influence. Unification of voltages and frequency is agreed upon by all. This may lead to economies but does not necessitate any extensive change in ownership, far less unification of ownership. If it did, at least as many people believe that any hope of economies would require to be abandoned as believe that economies and price reductions would result.

Would it Mean Price Reduction?

Even if unification as envisaged by Mr. Ferns were achieved and even if his calculations are correct does it follow that the price per kWh would be reduced? There was once a penny post and at that time the authorised cost of electricity was in the region of 1s. per kWh. Electricity now averages about 1d. per kWh, and the "penny" post is 2½d. Let consumers ponder before agreeing to unification and single ownership. The distinction between State monopoly and taxation is scarcely recognisable.

Such reports as have recommended complete unification of the industry were presented by political or semi-political organisations which approach all problems with the conviction that nationalisation is the panacea for all ills real or imagined, and in their case the omission to calculate the result of their proposals is exactly what one would expect. Has Mr. Ferns not yet realised that so soon as advocates of nationalisation leave the relatively safe realms of generalisation and doctrinaire dogma and come down to hard facts and figures they find themselves in trouble?

At the same time, the point is indeed sound that advocates of unification should try to see what the effect upon the kWh price would be. Unfortunately, however, Mr. Ferns reaches his target figure of savings of £9 million per annum only after making some startling assumptions, and since in these days failure to challenge any unjustifiable conclusions or statements may be quoted as proof of their accuracy, it is necessary to point out a few of the many errors into which Mr. Ferns has fallen.

The article asked the reader to dwell upon the method of approach rather than upon details, but surely that is rather a curious request from one who is presenting a budget. If the Chancellor of the Exchequer asked Members of the House of Commons to refrain from criticising any details of the nation's expenditure or proposed taxation and to dwell on the method of approach only, it would be rather difficult for the faithful Commons to fulfil their Parliamentary duties.

Mr. Ferns has assumed in his table that neither revenue nor costs would show any increase in the years 1946 to 1948 when compared with pre-war years. Working costs of all undertakings have increased by an amount far exceeding revenue from any tariff increases or the operation of coal clauses. It follows therefore that any calculations of a budget for 1948 based on pre-war prices requires radical revision before it can be of value. Calculations are surely misleading, too, if they omit to make allowance for the strain which will undoubtedly be put on the industry as a result of future extensions of supply into the less remunerative areas. These are but two of the criticisms which arise as to the method of approach. Let us now turn to what Mr. Ferns would doubtless describe as questions of detail: but detailed study of his figures is unfortunately necessary.

Extended Depreciation

We are not told how the figure of £172 million is reached as being the "then value" of company-owned undertakings, and therefore it is not possible to criticise favourably or otherwise the method of approach to that question, but as "then values" require to be ascertained as at the date of service of notice of purchase, it is clearly impossible to do anything now save to guess at a figure. We are, however, informed that overall depreciation on capital assets which originally cost £223 million amounted in 1938 to £100 million. It is a fair assumption, therefore, that about half the life of the assets has expired. How then could the unified body properly provide for depreciation of these assets on a thirty years' life just as if they were new? On this account alone the figures cease to be of any value.

Mr. Ferns proposes to save on income tax; but unless the new body made a loss, income tax would require to be paid on any surplus, and of the overall balance in the three years of £5 to £6 million shown in his table at

least half would be claimed by the Exchequer. Unless, however, the new body is the State itself or the income tax laws are to be altered to suit these so-called non-profit-making concerns, even more serious income tax difficulties would face it. Does Mr. Ferns really think that even supposing his proposed new body were able in any year to balance exactly its revenue and expenditure *ipso facto* it would have no income tax liability? If so his experience of the operation of the Finance Acts is indeed unique!

It is proposed that a sum for compensation should be paid to companies for the loss of their future profits during the unexpired period of their franchise; the figure suggested may be right or wrong, but he proposes no similar compensation for municipalities even when they have, in the past, been contributing out of the electricity supply profits to relieve rates. Surely such inequitable treatment cannot be assumed for the purposes of a budget.

The arguments in regard to "a hidden reserve of about £4 million" and to there being "no further vital purpose" in making further allocations to reserve, are faulty. According to the article the £4 million represents appropriations from revenue in aid of capital expenditure, and it is said that this could be employed for tiding over any temporary difficulties. That is rather like eating one's cake and having it. If the £4 million has to be sunk in capital expenditure, how can it be available for "tiding over any temporary difficulties"—unless it is made liquid by raising a like amount of capital, in which case the capital costs must be correspondingly increased.

Surely the necessity for a reserve fund is even greater in the case of a body whose capital entirely consists of fixed interest stock than in the case of a company whose dividends may fluctuate—unless the consumer is to carry the burden of risks like the telephone users whose charges were increased by 15 per cent. on the outbreak of war. Happy indeed have been those electricity consumers who were served during this war by undertakings which had reserves and were prohibited from increasing prices till they had exhausted those reserves which anyhow probably were book reserves and have been ploughed back into the business.

Mr. Ferns never reaches the target he aims at and seeks to bridge the gap of £2 million (left even by his own figures) by saying that that sum is doubtless the amount of the savings which would be reached by rationalisation. How can such an estimate be made? The ease with which that convenient figure is reached, makes one believe that the method of approach has been to produce figures which would somehow or another prove that the target figure of £9 million could be attained.

And that brings us to this last point. Mr. Ferns said his target figure of £9 million was arrived at by the application of simple if tedious mathematics. It would appear that such mathematics merely consists of finding the amount which would be required to lower the average price per kWh of every undertaking above that average to the average. Could any such system ever be justified? Surely Mr. Ferns does not advocate a total absence of any relationship between costs of a commodity and its selling price, or has he been bitten so badly by the pernicious "average" bug that that is what he wants to do? If so and his views find any support, there is a grim outlook for industry and the urban consumer.

Advance Orders for Equipment

Commissioners' Request to Supply Authorities

IN a memorandum to supply undertakings the Electricity Commissioners say that most undertakings will probably require quantities of equipment such as meters, switchgear and transformers within the first twelve or eighteen months after the end of the war. In this connection it has been represented to the Commissioners that it would be of great assistance in maintaining employment at the highest possible level on the conclusion of hostilities or as and when war contracts are terminated, if electricity supply authorities could now proceed to place advance orders for such equipment as they will require.

The availability of production capacity varies in different districts according to the nature of outstanding war production requirements, but the Commissioners are advised that firms in the following areas are more likely to be in a position to give deliveries within a reasonable time, *viz.*: the main industrial belt of Scotland; Dundee; Tyneside, Tees-side and County Durham; West Cumberland; and South Wales, including Monmouthshire.

The Commissioners will be prepared favourably to consider authorising the acquisition of any controlled materials that may be necessary, but they emphasise that the suggestion that such advance orders should be placed is not intended to imply that there can be any relaxation for the time being of the present restrictions on new development or the connecting up of new consumers; this latter aspect of the matter is, however, continually being kept under review.

The Commissioners are prepared to consider applications by public authority undertakings for consent either to the borrowing of money or the use of surplus revenue for the above-mentioned purposes, but such undertakings should not enter into any commitments for which they would require such consent until it has been obtained.

Electrical Fair Trading

Basis of Council's Policy

At a press gathering last week the chairman of the Electrical Fair Trading Council, Mr. V. Watlington, M.B.E., introduced the Council's reasons for a radical change in the basic conception of the Fair Trading Policy. Before doing this he explained that he had become chairman at the request of Mr. Walter Finlay, W.S. (chairman of the Council since the death of the original chairman, Mr. D. N. Dunlop) who had found the difficulties of travelling between Edinburgh and London so great that he could not give sufficient attention to the Council's affairs.

Mr. Felix A. Rogers, the secretary, then read a statement in which the history of the the Council was briefly reviewed and mention was made of its wartime services. The Council's work had benefited both the industry and the public; it had provided a stable structure within the industry which had defined and given protection to its component sections and had reduced distributing margins.

During the war such measures as the control of distribution had been achieved in an easier and better way because of the existence of the Policy and discussions with the Board of Trade, the Customs and Excise authorities and the Central Price Regulation Committee had been facilitated.

Freewill, Not Compulsion

In the past year long and careful consideration had been given to the question of changes shown to be desirable in the light of over eight years practical experience and of post-war problems. It was originally intended that the Council should operate on the basis of agreements signed by adherents to the Policy such agreement having compulsory aspects and the Council having mandatory powers to enforce adherence to the Policy. Actually this had never materialised as it was found that the establishment of a voluntary code by friendly agreement was a much more satisfactory arrangement.

Consequently the Council had decided formally to abandon the original conception in favour of a method by which the Council would establish the principles of good trading practice by consultation between all the interested parties and promote the acceptance of the Policy by all engaged in the electrical industry whether any individual firm or company or person was s member of a trade association or not. The Policy would form a general basis for negotiations in trading between various sections as a result of which agreements might be entered into between the trade associations concerned.

One outcome of this decision was the necessity for reviewing the constitution of the Council and the existing Fair Trading Policy to make any necessary changes. The Council had already commenced this work and it was hoped that a new constitution would be adopted and a new edition of the Policy issued within the next few months.

It was hoped that as a result of these changes the difficulties which had prevented the Council from being fully representative of the industry would be removed and in this way the Council would be strengthened, making its future work even more effective.

Commenting on the statement Mr. Watlington said that his own view was that the Council was aiming at the creation of an "inner consciousness" in the industry which would guide its members aright without any form of compulsion.

Under the Policy it had been possible to specify the margins for distribution. It had been said that distribution costs were too high but if the distributors were not there manufacturers would have to set up their own organisations. The distributors carried varied stocks, gauged the requirements and performed a real service to the public. The margin allowed to them must bear some proportion to the amount of work which they did for it. The Council had endeavoured to get people to believe in the idea of fair trading and he thought that success was being achieved.

Aircraft Aerials

FIXED and trailing aerials for use on aircraft are compared in a paper prepared by FLIGHT-LIEUT. C. B. BOVILL (formerly with Marconi's Wireless Telegraph Co., Ltd.) for the Radio Section of the Institution of Electrical Engineers.

It is pointed out that the increasing speed of flight has caused trailing aerials to be discarded, and the paper describes an investigation conducted to provide data on which to base the design of radio equipment for operation on the 900-metre waveband with fixed aerials. Measurements which are typical of both types are discussed and the values of effective height, radiation resistance, loss resistance and capacitance are compared. The increased transmitter power needed to obtain the same performance with a fixed aerial as that formerly available with trailing wire is calculated. Some particulars are included of equipment which goes some way towards meeting this requirement and an estimate is made of its performance.

The author gives reasons for his opinion that the use of medium frequencies for transmission from aircraft, except for special requirements, is becoming out of date.

Industry and University

Discussion at the Imperial Institute

LAST December the Vacation Work Committee of the Imperial College Union convened a conference in London of industrial representatives to discuss "Industry and University Education." These representatives numbered 184, the electrical industry being very prominent, and in addition to 129 members of teaching staff and senior students several governors of the Imperial College were present.

Professor H. Levy, M.A., D.Sc., presided and at the first session on "Post-War Technical Requirements in Industry" Viscount Falmouth (a governor) welcomed the delegates and stressed the importance of the relationship between industry and the universities.

Dealing with "Industry's Requirements in Personality," Dr. P. Dunsheath (director and chief engineer of Henley's) commenced by asserting that modern university education in science and technology laid too much emphasis on the working of *things* and paid too little attention to human relationships and the working of the mind. The universities should aim at producing leaders with an appreciation of human personal relationships which formed such a vital component of industrial life.

Dr. Dunsheath quoted some electrical examples to indicate how the study of human needs was essential to satisfactory operation. Simplicity in this direction and in the expression of ideas was considered by the speaker to be an indispensable quality. He also showed the need for ability to secure the loyalty and enthusiasm of other people and willingness to accept responsibility.

Most university engineers and science students ultimately specialised in research, design, production or teaching. Too much emphasis was placed on research. While British industry required good brains in this department it also needed them in design and production. In the latter lay great scope for the best students but it required a broad human outlook and a co-operative spirit.

Undue Emphasis on Research

Dr. Dunsheath considered teaching the highest of the four callings but teachers required some knowledge of industry. Until there was an increase in the number of men on university staffs who had been in industry we could not reduce the number of university graduates employed at low rates by men who never had the benefit of a university training. He concluded by saying that all administrative posts in scientific industry should be filled by those who had a scientific and technical knowledge of the industry. Students equipped in science and technology only, with no flair for leadership, although useful should be looked upon as by-products only.

The next speaker was Mr. E. R. Davis (Kodak, Ltd.) who said that in an industry such as the photographic industry they asked the universities for men who were scientists first, with a real flair for research. They considered that they were best able to teach the men the technology which they needed for their work. Mr. Davis's remarks were followed by a general discussion.

At the second session, which was opened by Professor L. Bairstow, C.B.E., "Post-War Requirements in Scientific Education" were discussed, the opener being Professor H. V. A. Briscoe, D.Sc. with contributions by a number of speakers including Mr. D. A. Bell (A. C. Cossor, Ltd.) and Mr. W. S. Flight (E.R.A.).

Damage at Southampton

THE extent of the disruption of the services of the Southampton Corporation Electricity Department during the heavy air-raids in 1940 is shown by some notes we have received from the borough electrical engineer (Mr. W. G. Turner). The first raid was on June 20th, 1940, and after a period of daylight attacks there were severe night "blitzes" in November and December, when the town area was devastated. Altogether, 2,763 h.e. bombs and parachute mines were dropped on Southampton and Eastleigh, apart from those which fell in the rural part of the undertaking's area.

Damage to the transmission and distribution system involved 4,000 street openings up to the end of 1943. The Department's showrooms at Above Bar Street and the fittings store at Salisbury Street were completely burnt out.

Fortunately there were no direct hits on the generating station and only slight structural and plant damage was suffered due to bomb and shell fragments. Most of the glass, to the extent of about 19,000 sq. ft., was destroyed by blast, the greater part being in the new glass-walled boiler house. The flexible asbestos panels and other materials which replaced the glass were destroyed by blast from a parachute mine in the following June. An indirect result of bomb damage to a feeder at Millbrook was a serious fire which occurred the next day in the cable trench at the generating station, due to a short-circuit.

A large number of electrical appliances were recovered from houses rendered uninhabitable, and 5,160 of these were re-issued after renovation. Considerable assistance was rendered to the local hospitals by the immediate provision of electric cooking apparatus as an emergency measure, the normal cooking equipment having been made unusable by enemy action.

COMMERCE and INDUSTRY

Liverpool Transport Canteens. Meter Staffs' Salaries

A.S.E.E. Luncheon

THE annual luncheon of the Association of Supervising Electrical Engineers is to be held at the Connaught Rooms, London, W.C.2, on Saturday, March 10th. Tickets, 10s. 6d. each, are obtainable from the general secretary, 54, Station Road, New Barnet, Herts, not later than February 26th.

Building Limit Area Extended

The Minister of Works has made an Order (S.R. & O. 1945 No. 105) extending the area in which a licence is required before any building work costing £10 or more is put in hand, to cover Kent, Essex, Surrey, East Sussex and parts of Berkshire, Bedfordshire, Hertfordshire, Buckinghamshire, Hampshire, West Sussex and Oxfordshire.

All-electric Mobile Canteens

The supplying of food to the outside traffic staff has been a problem which has faced the managements of most Transport Departments. At Liverpool, to supplement many small static canteens in various parts of the city and outlying districts, Mr. W. G. Marks, the general manager of the Corporation Passenger Transport Department, has designed two mobile canteens which are stationed at specified parts of the routes at definite times.

One of the Liverpool Passenger Transport Department's mobile all-electric canteens showing (above) the method of connection to a feeder box and (right) the serving counter and electrical equipment

The vehicles were originally purchased as wartime emergency buses for transporting war workers to armament factories. With the original transverse seating placed longitudinally on either side of the saloon and six small tables in the floor space the saloon comfortably seats twenty people. Beyond the serving counter, there is accommodation for crockery, etc., and there are two 8-gal. thermostatically controlled urns (2 kW each) for boiling water. The water for these two urns is held in two 40-gal. tanks on either side of the roof. A sink for washing-up is fed from a 10-gal. electrically heated boiler (2 kW). A small electric cooker (total loading 5·1 kW) is used for heating such things as pies and making toast. With the lighting and extract fan the total load is just over 11 kW. The canteens are stocked each morning from the Department's bakery and at the predetermined points they are connected to feeder boxes which are provided for the purpose.

Exhibition of Switchgear

Among the items displayed at a switchgear exhibition held at the Manchester works of Cooke & Ferguson, Ltd., this week is an indoor axial air blast circuit-breaker (type EA 4) with a three-phase rating of 1,000 MVA at 33 kV and a maximum 1,200 A rating. Each phase consists of a single retractable nozzle contact, normally kept closed by springs. Each is in series with an external isolating switch, which opens immediately after current is broken in the interrupter head. The whole truck assembly can be incorporated in fully metalclad gear, or fitted into cellular layouts.

Another exhibit is an outdoor circuit-breaker (Type OE6) of the phase segregated low oil content design for up to 1,500 MVA at 33 kV, or 1,200 A. It is of the arc controlled, single break type, extinction being assisted by compensated cross-jet pots.

An unusual gang-operated isolator with a three-phase rating of 400 A at 6·6/11 kV is made very compactly by reason of its "telescopic" design. It may be fitted to cubicle gear, so saving space and steel, or used as a cable isolator; in the latter case either the upper or lower fixed insulators are enclosed in

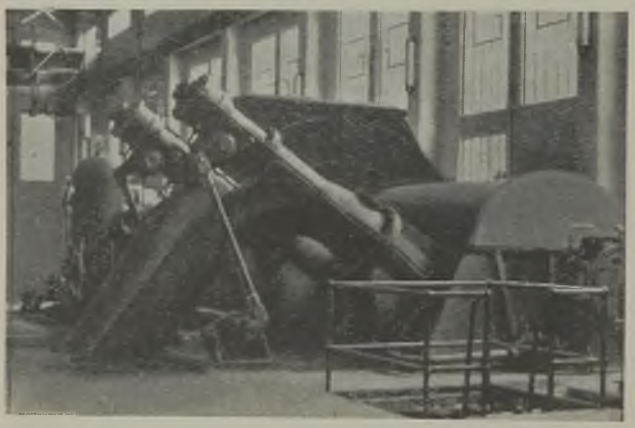
the incoming cable box. Some of the advantages of this particular design are that the isolator occupies the same space whether in the open or closed position. Phase barriers are unnecessary, since the action of the telescopic insulators provides adequate barrier action. It can be used as a bus-support and lends itself to easy installation. There is less risk of accident since there are no exposed moving parts at line potential. Electro-magnetic forces are minimised due to the fact that the direction of movement of the isolator is parallel to the direction of current flow.

Engineers for Oilfields

Three hundred skilled men from the mechanical, electrical and building trades are required for oil production and refining work in the Persian Gulf. A salary of £600 a year is offered, with free bachelor accommodation, passages out and home, medical attendance and kit allowance. The contract for service will be for three years. Further details are obtainable from the Ministry of Labour.

Tasmania Thanks Britain

A tribute to the workers of Britain in connection with the recent installation by the English Electric Company of some large hydro-electric generating plant appears in the 1943-44 report of the Hydro-Electric Commission of Tasmania. The report says that anxiety over the power position has been relieved by new power units at Tarraleah and Waddamana Stations. That Great Britain was able to build and to deliver these during the war whilst fighting for her existence through air and sea warfare is an achievement which the Commission proposes to record by a suitable plate on each machine, such as: " Built by the workers of Great Britain and carried by British seamen to Tasmania during the war years 1939-1944."



One of the generating sets in the Tarraleah power station

The new power units referred to comprise four English Electric water turbine driven alternator sets of the horizontal impulse type, two sets being installed at each of the two power stations at Tarraleah and Waddamana. At Tarraleah each turbine has a rating of 21,000 BHP at a speed of 428 RPM, operating with a 940 ft. head. Each alternator has an output of 18,750 kVA at 11 kV, 3 phase, 50 cycles. At Waddamana the rating of each turbine is 17,600 BHP at 500 RPM, with a head of 1,070 ft., and the output of each alternator is 15,000 kVA at 11 kV, 3-phase, 50 cycles. The electricity from these power stations is used for the production of zinc and carbide and an ancillary feature of interest is the inclusion of English Electric " Aerofoil " water flow recorders in both installations.

Grading of Meter Staffs

The following scheme of grading for meter and test room staffs has been proposed by the Electrical Power Engineers' Association and is receiving consideration by the National Joint Board:—(1) Meter superintendent, normal duties: (a) in a Class " A " testing station with polyphase testing equipment, Grade 5; (b) in other Class " A " stations, Grade 6; (c) in a Class " B " station, Grade 7. (2) Meter superintendent, with additional duties: (a) for three additional duties, one grade higher; (b) for seven additional duties, two grades higher; (c) where in this way a meter superintendent is entitled to Grade 4 or over, he shall receive a more appropriate title, *e.g.*, superintendent of the meter and testing departments. (3) Chief assistant or deputy: where he acts as a superintendent of the department he shall be graded not lower than two steps below that normally appropriate to the superintendent. (4) Engineer in charge of a sub-department, Grade 8. (5) Senior testing assistants, Grade 8b. (6) Testing assistants (qualifications specified), Grade 9.

Bathroom Fatality

Another case in which a fatal electric shock was received from a portable electric fire in a bathroom is reported in the *Liverpool Echo*. The victim was Frank Latham, aged sixteen, who was found with his head over the bath taps and the fire underneath him in the water. At the inquest an engineer stated that he thought the boy had got out of the bath and picked up the electric fire, and was carrying it back into the bath when he received a shock.

Recording a verdict of " Misadventure," the coroner asked the Press to call attention to the risk of using electric fires in bathrooms.

Gift to Leeds College

Following a gift of £1,000 for equipment by Mr. W. Bowen, governing director of the Bowen Instrument Co., Ltd., and Cables & Plastics, Ltd., Leeds College of Technology is to become one of about twenty-two provincial centres of the National Physical Laboratory, Teddington. Until about a year ago Mr. Bowen acted as part-time lecturer at the college.

Mr. Bowen is now a member of the electrical engineering trades advisory sub-committee of the College.

Disposal of Electrical Surplus

The *I.M.E.A. Journal* states that at the last meeting of the I.M.E.A.-B.E.A.M.A. Joint Committee it was reported that negotiations were in progress between B.E.A.M.A. and the Government for the formation of a company or corporation which would control the disposal of all standard Government surplus electrical equipment and that the rate of release and the price to be charged would be decided by this company. The hope was expressed that some arrangement on these lines would be in force before any large quantity of Government stores came on to the market.

Fan Manufacturers

At the interim general meeting of the Fan and Allied Manufacturers' Association (F.A.M.A.) held recently, the chairman, Mr. M. Geoffrey Woods, in a review of the activities of the Association since it was inaugurated in January last year, pointed out that the work being done was laying the foundations of greater progress and prosperity for the industry, and would play an important part in thematter of exports in due course.

Light Fittings Restrictions Removed

Under the Limitation of Supplies (Miscellaneous) (No. 25) Order, 1945 (S.R. & O. 1945 No. 62) which came into operation on February 1st, supplies of lighting fittings are no longer restricted. The Board of Trade will, however, in due course, issue Orders requiring manufacturers to submit periodical returns showing the number of persons employed and the value of goods supplied (a) by export (b) to the home market and (c) to Government Departments. New manufacturers will also be required to notify the Board of Trade when they begin production.

E.D.A. Electric Kitchen Exhibition

Owing to the great public interest displayed in the Electrical Development Association's four all-electric kitchens, designed for use in low-cost post-war homes, the exhibition at the Building Centre, 23, Maddox Street, London, W.1, will remain open until Monday, March 5th, instead of closing on February 26th as was originally intended.

Trade Announcement

The Alpha Manufacturing & Electrical Co., Ltd., has moved its head office to 21, Cedars Road, Clapham, S.W.4.

Lamp Manufacture in South Africa

Our Cape Town Correspondent reports that the Electric Lamp Manufacturers of South Africa (Pty.), Ltd., is a newly registered company formed by a group of British lamp manufacturers for the purpose of supplying the requirements of the South African and Rhodesian market in incandescent and fluorescent electric lamps. The factory premises are at present in the course of erection at Port Elizabeth, and the address of the head office is P. O. Box 2406, Johannesburg. The factory is being erected on a 14-acre site in Neave Industrial Township, Korsten Commonage, Port Elizabeth.

Fuel Economy at Bradford

In connection with the fuel economy campaign Mr. T. H. Carr, electrical engineer and manager of the Bradford Electricity Department, has sent us the accompanying illustration of a topical display arranged in the undertaking's showroom window.

Topical window display at the Bradford electricity showrooms

Used Electrical Equipment

The Control of Industrial Electrical Equipment (No. 3) Order, 1945 (S.R. & O. 1945 No. 57) which came into operation on February 1st, exempts from the licensing requirements imposed by previous Orders the acquisition and disposal of all used industrial electrical equipment. The licensing requirements will continue to apply to new equipment.

Trade Publications

Metropolitan-Vickers Electrical Co., Ltd., 1, Kingsway, London, W.C.2.—Priced wartime folder detailing the variety of "Cosmos" lamps as well as "Metrovick" electric discharge lamps and fluorescent tubes at present available.

Hellermann Electric, Ltd., Goodtric Works, Brewer Street, Oxford.—Priced and illustrated brochure describing methods of cable binding and marking with rubber sleeving, and tools for applying the sleeving.

Applications for copies of these publications should be made on business letter-headings.

Calendars

The calendar of G. S. Peckham & Co., Ltd., 3-5, New Compton Street, W.C.2, has monthly sheets with very bold figures.

Coloured reproductions of artists' paintings ornament the calendar (with three-monthly sheets) of the Alpha Manufacturing & Electrical Co.

Change of Name

Hall Telephone Accessories (1928), Ltd., has changed its name to H.T.A., Ltd.

Forthcoming Events

Saturday, February 10th.—*London.*—Lighting Service Bureau, 2, Savoy Hill, 2.15 p.m. Illustrated lecture on "Distribution of Electricity in London," by E. H. Jesty.

Manchester.—College of Technology, 6-10 p.m. I.E.E. North-Western Students' Section and students of the College. Dance.

Leeds.—Electricity Offices, Whitehall Road, 2.30 p.m. I.E.E. North Midland Students' Section. "Routine Testing of E.H.V. Switchgear," by E. M. Gilligan.

Monday, February 12th. — *Newcastle-on-Tyne.*—Neville Hall, 6.15 p.m. I.E.E. North-Eastern Centre. "Survey of the Problems of Post-War Television," by B. J. Edwards.

Bristol. — Merchant Venturers' Technical College, 5 p.m. I.E.E. Western Centre. "Organisation of Industrial Electrical Maintenance," by J. C. B. Nicol.

Tuesday, February 13th. — *London.* — Institution of Electrical Engineers, 7 p.m. London Students' Section. Students' Lecture on "The Cathode-Ray Tube and its Applications," by Dr. W. Wilson.

London. — At Institution of Mechanical Engineers, 6 p.m. Illuminating Engineering Society. Discussion on the report of the D.S.I.R. Committee on the "Lighting of Buildings" to be introduced by Dr. C. C. Paterson, O.B.E., F.R.S.

Glasgow. — Royal Technical College, George Street, 6.15 p.m. I.E.E. Scottish Centre. "Standardisation and Design of AC Turbo-Type Generators," by G. A. Juhlin.

Manchester. — Engineers' Club, 6 p.m. I.E.E. North-Western Centre. "Thermoplastic Cables," by Dr. H. Barron, J. N. Dean and T. R. Scott, D.F.C.

Liverpool.—Corporation Electricity Showrooms, Whitechapel, 2.30 p.m. Illuminating Engineering Society (Liverpool Group). "Fluorescent Lamps," by H. R. Ruff, B.Sc., A.M.I.E.E.

Wednesday, February 14th. — *London.* — Institution of Electrical Engineers, 5.30 p.m. Transmission Section. "Operation, Maintenance and Testing of Overhead Lines and Associated Outdoor Equipment on AC Systems," by R. C. Hatton and Dr. J. McCombe.

Birmingham. — James Watt Institute, 7 p.m. Junior Institution of Engineers (Midland Section). Address by Maj.-Gen. K. C. Appleyard, president of the Institution, after which the T.V.A. film will be shown.

Thursday, February 15th.—*Cardiff.*—I.E.E. Cardiff Students' Section. "Control and Organisation of an Industrial Electrical Department," by W. P. Lewis.

Manchester.—Engineers' Club, 6.45 p.m. Institution of Mechanical Engineers (N.W. Branch). "Power Plant," by G. A. J. Begg, B.Sc.Tech.

Friday, February 16th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. Measurements Section. "Economic Utilisation of Modern Permanent Magnets," by D. J. Desmond, M.Sc.

London.—Institution of Mechanical Engineers, 5.30 p.m. Annual general meeting.

Newcastle-on-Tyne. — Neville Hall, 6.30 p.m. I.E.E. North-Eastern Students' Section. Address by the Centrechairman, J. A. Harle.

Bath.—Pump Room, 7.15 p.m. I.E.E. Bristol Students' Section. "Paper-insulated H.V. Cables: Causes of Breakdown and Contributory Phenomena," by J. W. Miles.

Saturday, February 17th. — *Swansea.* — I.E.E. West Wales (Swansea) Sub-Centre. "Electrostatic Precipitation of Dust from Boiler Plant Flue Gases," by J. Bruce.

Monday, February 19th. — *Bradford.* — Technical College, 6.45 p.m. Bradford Engineering Society. "Removal of Scale and Deposits from Plant for Chemical Processes, and the Prevention of Scale Formation," by P. H. Flood-Page, A.M.I.Mech.E.

Birmingham. — Birmingham Electric Club. "Brains Trust."

Friday, February 23rd —*Newcastle-on-Tyne.* Old Assembly Rooms. I.E.E. North-Eastern Students' Section. Annual dance.

Parliamentary News

By our Special Reporter

REPLYING to a question by Capt. Shaw in the House of Commons on January 30th, Mr. Chapman, Under Secretary of State for Scotland, said that the Commission's report on the inquiry into the Loch Sloy hydro-electric scheme had been received. The Secretary of State was considering it and hoped to present it to Parliament at an early date.

Consumers' Deposits

Vice-Admiral Taylor asked the Minister of Fuel and Power whether, in view of the conversion of houses into self-contained flats or flatlets now taking place in the South Paddington district, he would consider some alteration of the policy of the Metropolitan Electric Supply Co. to prevent the necessity of individual meter deposits to that company.

Major Lloyd George said he assumed that Admiral Taylor was referring to the deposits required by way of security from prospective credit consumers by this and many other gas and electricity companies. The powers to require security were conferred on the company by Parliament, but if Admiral Taylor knew of cases of hardship and would let him have particulars, he would be glad to look into them. He reiterated this reply when Admiral Taylor put a further question in which he referred to the deposit demanded from the small flatlets as a high one, and said that where the public responded to the Minister's appeal the users of electricity, even if they did not consume that electricity, were actually paying for it.

U-Boat Devices

On January 31st Rear-Admiral Sir Murray Sueter asked the First Lord of the Admiralty whether he had information to show to what extent modern U-boats could, by means of a floating air device, run their Diesel engines for charging the electric batteries when submerged.

Mr. Alexander said it had already been disclosed that U-boats were fitted with a device to enable them to charge their batteries while submerged. The publication of any further details would not be in the public interest.

Manufacturers' Activities

Large Orders for Overseas Markets

Metropolitan-Vickers Electrical Co., Ltd.

NOTABLE examples of heavy engineering under construction at the Met-Vick works are two 60,000-kW, 3,000-RPM turbo-alternators for operation at 1,235 lb. per sq. in., which employ reheating and central-flow condensers and have hydrogen-cooled alternators. Another 3,000-RPM unit for overseas, rated at 50,000 kW, is designed for approximately the same pressure, but without re-heat; the alternator like many under construction is wound for 33 kV.

Other large turbo-alternators under construction or completed during the year are two rated at 60,000 kW and two at 50,000 kW, all running at 1,500 RPM and two of 45,000 kW running at 3,000 RPM. Numerous sets of 30,000 kW include two for the U.S.S.R. to which several 1,000 to 5,000-kW mobile power stations have also been shipped. Four units of 7,500 and 10,000 kW are intended for South Africa. Transportable geared generating sets of 500 kW each and geared-turbine propulsion units of 7,500 SHP for cargo vessels are other examples of the varied types on order.

Water-wheel alternators of up to 33,000 kVA, synchronous condensers rated at 30,000 kVA and below and geared alternators of from 20 to 5,000 kVA are among the salient-pole AC machines ordered, many of the last-named being for Russia. Large induction motors include ratings up to 3,000 HP at 11 kV. Prominent among smaller AC machines are flame-proof types for the mining and the oil industries. A substantial proportion of the DC demand was for engine-driven welding generators.

Apart from these the tendency has been towards AC welding with multi- and single-operator transformers. Automatic welding equipments have been ordered for a wide variety of applications. An outstanding new feature is the electrode for welding armour plate. In resistance welding the most important of the company's introductions has been a roller spot-welding machine for light alloys giving welding speeds up to 144 spot welds per min. (*Electrical Review*, January 19th, p. 105.) Atomic-hydrogen welding has been further developed in connection with wartime products and, with automatic operation, has achieved high outputs.

Possibly the largest direct-coupled Ward-Leonard winder equipment in this country, rated at 2,650–5,300 HP, has been commissioned in the Sheffield area to deal with 2,000 tons of coal per day from 1,245 ft.; other similar winders are on order for South Africa. AC winders ranging from 250 to 1,000 HP are being manufactured for British collieries and 28 double-drum AC winders up to 220 HP continuous rating for Russia. Flame-proof motor-generator sets and control gear from 15 to 75 kW have been specially developed for charging batteries of shuttle cars and for supplying DC to coal-face power-loading and other mining machinery obtained from the United States. Unified boiler DC control equipments are now applied to pulverised-fuel boilers.

Control board for a large boiler operated with unified control

Ten electric locomotives for the South African Railways have been or are shortly to be shipped. Designs are being prepared for twenty-eight larger locomotives (2,500 HP) for the same system and for similar multi-unit operation; electric boilers will provide steam for coach heating. A number of induction-heating equipments have been supplied to meet specific instances for which 50 cycles is most suitable, *e.g.*, stress relief of large welded steam pipes, heating duralumin bars to forging temperature and where fire risk is important, as in heating magnesium.

Products of the transformer department's activities are a 60-MVA 132/33-kVA weather-proof unit and a 20-kVA three-winding 110/38·5/6·6-kV (star-star-delta) unit for the U.S.S.R., for which a large number of flame-

proof mining-type transformers ranging from 75 to 320 kVA at 6,000 and 3,000/440V (believed to be the largest of the type made in this country) have also been ordered. Russian requirements are responsible for much of the work going through the switchgear department also, chiefly for 44 and 120 kV, including impulse high-speed breakers of 2,000 MVA tested for three-cycle operation. Among orders received are those for 66-kV equipments at Fulham and Battersea (London Power Co.).

A relay has been developed for protecting any motor against mechanical overload above 120 per cent. full-load torque, single-phasing, stalling two- and three-phase short circuits and faults to earth. Carrier-current protection is being applied to transmission lines containing considerable lengths of underground cable.

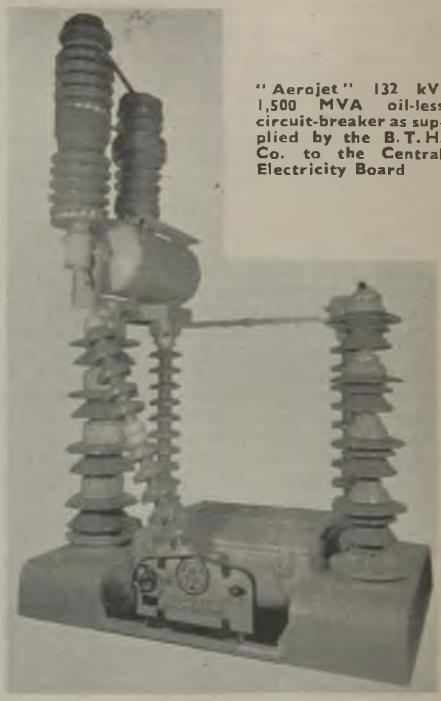
An improved model of the Sunvic "Simmerstat" has been produced for infinitely variable control of either single- or multiple-element boiling plates. Several electron microscopes (of which the first in this country was made by the company) for magnification up to ten thousand diameters were among the items constructed in the research department. This department has also given assistance to Government and industrial organisations.

British Thomson-Houston Co., Ltd.

Marine engineering figured prominently in the work of the B.T.H. Co. in 1944. Turbo-alternators for electric drive included geared units of 5,000 kVA at 4,100 RPM, with steam conditions of 425 lb. per sq. in. and 740 deg. F., and with 28½ in. vac. and feed heating. A twin-screw effect with economy has been obtained with single-screw tankers by mounting in the same frame two electrically independent half motors, one of which is used at three-quarters of the ship's maximum speed; auxiliaries are supplied from 550-kW, 220-V, 1,000-RPM DC generators driven by 8,000-RPM condensing turbines. For a cable-laying vessel a constant-current system derived from constant-voltage generators is employed to provide "steam-engine" characteristics on the motors by means of Amplidyne exciters.

Among the turbo-alternators built for land service was one for 30,000 kW and one for 20,000 kW, the latter for generation at 22 kV, and a number of transportable geared sets for overseas for 500 to 2,500 kW. Orders have been received from India for complete automatic hydro-electric stations containing units of from 1,150 kVA at 750 RPM to 3,750 kVA at 600 RPM.

The first large installation of oil-less 132-kV circuit-breakers in Great Britain is claimed to be the six 1,500-MVA air-blast units ordered by the Central Electricity Board. This "Aerojet" design, which was described in its 2,500-MVA form in an I.E.E. paper last spring (*Electrical Review*, March 31st and April 7th, 1944), has also been worked out for 33 kV, 1,000 MVA. The trend towards air-break switchgear is also



"Aerojet" 132 kV, 1,500 MVA oil-less circuit-breaker as supplied by the B.T.H. Co. to the Central Electricity Board

observable in the medium-voltage types under construction, although a number of new oil-filled and oil-break designs have also been produced. Designs are in hand for a new line of fabricated flameproof mining switchgear to comply with the revised regulations, giving visual indication of the position of the switch blades.

The outstanding achievement of the transformer department has been a 120,000-kVA bank of single-phase units for Russia for 242-kV operation. Other transformers completed or ordered include two of 60,000 kVA at 132 kV, one of 37,500 kVA (11/33 kV for direct connection to a turbo-alternator) and, for overseas service, three of 20,000 kVA at 110/38·5/6·6 kV. For furnaces a 9,220 kVA (21,000 A) unit was the largest of many and there is a big demand for cast-in-concrete reactors.

The manufacture of new and modernised rolling-mill equipment, particularly for wide-strip production, has been responsible for great activity. Five reversing hot-mill drives are among those in hand with peak HP of 4,000 and 6,000, together with drives and

screwdowns, table rolls and their auxiliaries. A 4,850-HP motor (12,100 HP peak) is being built for the conversion of a reversing mill from steam to electric drive; it will be supplied from a motor-generator set equipped with Amplidyne control to give rapid acceleration.

There has been a noticeable trend towards the use of straight AC drives for colliery winders owing to the satisfactory operation of air-break reversers and of dynamic braking; an associated trend is towards rotor control by contactors and grid resistances instead of liquid controllers; installations of upwards of 3,000 HP (continuous) are under consideration. Ward-Leonard drives are, nevertheless, much in demand, an example of which is provided by a winder raising 22,000 lb. from nearly 3,000 ft. at 2,500 ft. per min., powered by two direct-coupled DC motors having a combined peak-rating of 6,900 HP. Thrustors are to be used for the automatic working of air-lock doors in a colliery; initial control will be by photo-electric relays which will be operated by and will count the number of tubs passing in and out.

Increasing use of synthetic rubber is reflected in orders for motors up to 900 HP for driving mixers; these are of the salient-pole synchronous-induction types to give the high starting and pull-out torques required. A 1,000-HP wind-tunnel drive for export is one of several kinds of testing equipment made. Six 190-HP and ten 290-HP eddy-current couplings for power station auxiliaries in Russia, Amplidyne generators, "Thy-mo-trol" (electronic) control for DC drives (especially for machine tools), compact magnetos, inductor alternators up to 1,000 kW at 10,000 cycles per sec. for metal heating and valve oscillators for dielectric heating at 500,000 cycles furnish other examples of manifold activities.

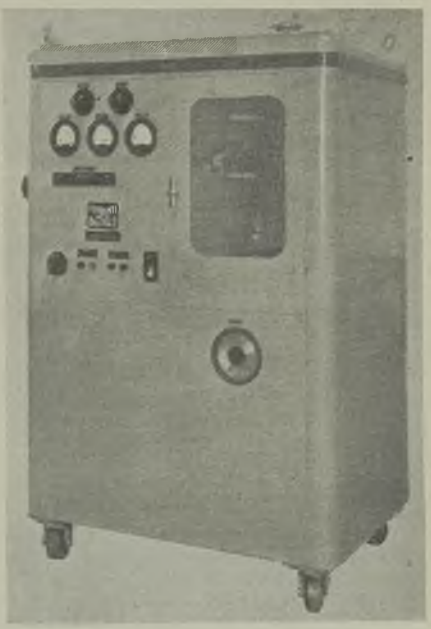
Ferranti, Ltd.

A 60,000-kVA transformer under construction for the Central Electricity Board makes the fortieth Ferranti transformer ordered for the grid. For export there are eighteen 10,000-kVA and 11,000-kVA single-phase units, forming 110-kV three-phase banks and also several 15,000-kVA three-phase 110-kV transformers for the Government of Northern Ireland as well as numerous smaller units with on-load tap-change gear. Both voltage and kVA ratings of surge-stress control method of design have been increased and the surge strength of any winding can now be predetermined.

Automatic moving-coil voltage regulators have been increasingly applied to the control of individual or groups of loads as a copper-saving alternative to supply voltage maintenance. The simplicity characteristics of the astatic relays have been extended to relays for current control and for resistance or impedance control.

An astatic relay in combination with a time-temperature cycle that is related to a heating-current time cycle, time switches and motor-driven potentiometers has been employed to control automatically a wide range of manufacturing processes. The use of small induction disc motors has been extended to give continuously variable speed control over a wide range with stable ratio of stalled to running torque. By exponential acceleration and linear retardation of induction disc motors very high-speed operation of voltage regulators can now be obtained.

A number of radio-frequency heating equipments have been supplied for soldering and brazing and surface hardening and for the preheating of synthetic-resin moulding preforms. Developments in high-voltage metal rectifiers for electrostatic precipitation include



Equipment for r.f. heating of moulding pre-forms

shock-proof units incorporating transformer, rectifier and control gear.

A 1,200-kV impulse generator was constructed during the year for testing cable dielectric under lightning-surge conditions. A 400-kV DC generator for cable testing was also made. For the magnetisation of large permanent magnets by heavy unidirectional impulse currents, 200,000 ampere-turns of excitation are obtainable by means of apparatus employing an ignitron with ignition controlled by a strobotron tube.

Views on the News

Reflections on Current Topics

ALWAYS ready to learn, I have just visited the Kitchen Planning Exhibition which the British Commercial Gas Association has arranged at Dorland Hall, Lower Regent Street. On a much more ambitious scale than the E.D.A. display and having much more space available, the exhibition includes no fewer than ten model kitchens designed to meet every requirement, as well as examples of individual appliances and a film show. With considerable use of anodised aluminium and well-thought-out colour schemes, there is no denying the attractiveness of the layout but, having seen so many all-electric designs lately, I could not help getting the impression that the gas kitchens were only half-equipped —even those with tubular electric lamps, electric extract fans, electrically-driven washing machines and electric clocks.

The continuous working surface has been adopted throughout and two which are described as "package" kitchens are reminiscent of the "Poplar" unit but without most of its advantages. There is also a combined kitchen and bathroom unit.

* * *

An irate consumer has written to the *Daily Mail*, I see, complaining that he is called upon to implement a guarantee although he has been economising. What worries him most is what happens to the electricity that has been "saved," which he says is anybody's guess. "Probably the Electricity Company sells it again to a non-saver . . . and in the end everybody is happy except the Ministry of Fuel and Power and the chap who first saved it." Probably he thinks that the company should save it for him until after-peak hours. My sympathies are with both parties.

* * *

Mr. Walter Higgs, M.P., has replied to critics of his advocacy of nationalisation of electricity supply. In a letter to the *Birmingham Mail* he instances as examples of successful public ownership the grid and the Post Office. Once again it is pointed out that there is a uniform postage rate, although no mention is made of charges to rural dwellers for telephone connections and calls—a better parallel when comparing the Post Office with electricity supply authorities.

Brig.-Gen. Hayes (Edmundsons) had questioned whether there were actually 300,000 farms in this country. Mr. Higgs quotes *Whitaker* in support of his figure and says that even two- or three-acre holdings want power, heat and light. He disavows any intention of advocating wholesale nationalisation, although he would do so if he thought it would benefit the community. But who is to decide? There are many people who believe (or say they do) that wholesale nationalisation is a panacea, but I find that they are most frequently people with nothing nationalisable.

* * *

A housewife writing in the *Builder* has some doubts about the "super-kitchen" of which so many models are to be seen nowadays. Architects, she says, are setting out to make the kitchen so beautifully trim and slick and immaculate that it would seem a downright shame to spoil the look of it with saucepans that have to be cleaned, crockery to be washed up, and the other miscellanea that really do exist in everyday life. She questions whether a standard working level of 36 in. is best for everything and suggests that 30 in. is better suited to the average woman for some work. The fetish of the continuous surface which has led to the placing of units close together without a dirt and grease proof joint is also condemned, and she prefers the cooker to stand by itself so that the sides and back may be kept clean as well as the front. The extract fan receives a good mark, and so does the "utility room."

* * *

Manufacturers planning to re-equip their factories for post-war production will welcome the slackening of the control on machine tools. So too will the fillers-up of forms. Although, as this step indicates, the machine tool position is considerably easier, the surplus at present is not so big as some people seem to think, its value being only about £3,000,000. Furthermore, much of the plant is at the moment in factories operated or controlled by the Government and will probably not come on to the market until the war situation is a little clearer.

* * *

Everything is done in a big way on the other side of the Atlantic and this, as we know, goes for crime. The petty electrical larceners of this country are content to get a few units for nothing but Isidore Wolfsohn, of Yonkers, New York, is said to have cost the Consolidated Edison Co., $1,500,000 over a period of thirty years. His racket was to fix the meters of complacent consumers and share with them the resultant "savings." In this way he earned an annual income of between $10,000 and $20,000. He will be missed by the consumers in his sphere of operations for he is now spending an "indeterminate term" in the penitentiary.—**REFLECTOR.**

Industrial X-Rays

Applications to Inspection and Testing

LAST week's meeting in London of the Institution of Electrical Engineers was held jointly with the Industrial Radiology Group of the Institute of Physics, when MR. V. E. PULLIN, C.B.E., read his paper on X-rays in engineering and industry which was reviewed in our last issue. The hon. secretary of the Group (DR. L. MULLINS, Kodak, Ltd.) opened the subsequent discussion with the remark that it was probably for reasons of length that the author had omitted to mention the important developments in high speed radiography, which demanded very high X-ray intensities for extremely short times. He therefore described these researches in some detail since they illustrated how the electrical engineer could contribute to the progress of industrial radiology. Three other methods had become of importance recently. The first concerned the photographic recording of the fluorescent screen image on to films as small as 35 mm. and apparatus was now commercially available in America. In that way, permanent records were obtained with less expense than when full size films were utilised. The second was an application of cine-radiography in which serial photographs of the fluorescent screen image of changing phenomena could be made in much the same way as ordinary cinematograph exposures were produced. The third branch was X-ray micrography in which enlargements were made from radiographs in ultra fine grain material, a method first reported in 1913.

Training of Operators and Inspectors

DR. S. F. DOREY (Lloyd's Register of Shipping) said that the training of operators was important and it involved also inspectors who must know how the apparatus should be used to get the results aimed at. As regarded the interpretation of evidence, so far as porosity was concerned some standardisation was necessary but there were difficulties. In welded pressure work, the borderline cases were the important ones. Any tendency to feel that mechanical tests could be done without must be resisted. Nevertheless, there was a call for the greater extension of the use of radiological methods and it was satisfactory to hear that radiological laboratories had been set up throughout the country for war purposes, where apparatus was regularly inspected and operators were trained.

MR. E. J. TUNNICLIFFE (Siemens-Schuckert (Great Britain), Ltd.) discussed high-voltage generating equipment and showed a slide of a modern 1,250-kV electrostatic machine (½-mA) which was not much larger than the man attending it, foreshadowing a complete revolution in apparatus design. Its volumetric capacity was the same as that of a 200-kV generator of the more conventional type. With regard to X-ray crystallographic methods, only that day he had encountered the urgent need for a piece of apparatus which would enable diamonds to be examined for their correct orientation in tool holders. He also had in mind a 220-kV apparatus so constructed that the components would pass through a 20-in. diameter manhole on board ship and could be handled by two men.

Use in Chemical Analysis

DR. T. RAINE (Metropolitan-Vickers) said that X-ray crystallography was applied to a considerable extent for routine testing in the metallurgical and ceramic industries. A special application was to cemented carbide tool tips. Moreover, that method was supplementing chemical analysis for the reason that whereas the latter only gave information of the individual compounds, X-rays gave information about the combinations of elements.

MR. C. CROXSON (Royal Arsenal) said that apparatus for flash radiography had now been put into a completely self-contained unit which could be taken to any part of the country, as mobile apparatus, working up to 300 kV. He believed there would be an increasing demand in industry for gamma-ray examination. The remarkable apparatus now becoming available in America had great possibilities, although at present it was very expensive. In the examination of castings, the right place for the use of X-rays was in the foundry in order to assist in the development of sound methods rather than afterwards for inspection purposes only. Recent research work at Woolwich indicated great possibilities for radiography at higher voltages than two million, although only for laboratory purposes at the moment.

DR. S. TORRANCE (G. A. Harvey, Ltd.) referred to the Admiralty radiological section, which consisted of a corps of radiographers who had spent some time in the laboratories of industrial works and travelled round the shipyards and inspected welding work. He understood that at least one shipyard, which prided itself on the excellence of its welding, had been sadly disillusioned when radiology was introduced and that a great improvement had since taken place. Referring to the suggestion that industrial radiographers should undergo some training in basic principles, he said he would like to include

the inspectors of insurance companies also who looked upon welding as a bad substitute for riveting. If insignificant defects were made the reason for rejection, the expense involved in rewelding, resurfacing and re-radiographing would seriously affect export prospects. The author had not mentioned the important work of determining internal stress by X-ray crystallography, a most fruitful field where much important work was to be done. He foresaw the day when the excellence of welding would be recognised by all—even the insurance companies—and it would be necessary to carry out a survey of all welds by some simple means, such as supersonic methods, with X-ray examination necessary, perhaps, only as a means of arbitration.

MR. D. E. THOMAS (vice-chairman, Industrial Radiology Group) emphasised the importance of X-ray crystallographic methods in detecting strains and so avoiding failures. This technique had not yet reached the factory stage, although it was proving useful in the laboratory.

DR. R. C. EVANS thought the author had rather given the impression that X-ray crystallography had not been developed sufficiently. That, however, was not the case. The X-ray crystallographer needed only a few tens of kV but before the war the only tubes available to him were of foreign origin and one or two made in this country, the design of which revealed little understanding of the crystallographer's needs.

THE AUTHOR, replying to the discussion, said he would like to remove a wrong impression. By far the most important aspect of the application of radiology in industry was X-ray crystallography, but he had left it out of the paper because he felt there was sufficient for discussion in the subject of radiography as applied to inspection. Nevertheless, he would like to see a symposium on X-ray crystallography with direct reference to its industrial uses.

ELECTRICITY SUPPLY

Hull Undertaking's Finances. Kearsley Extensions Begun.

Chester.—FARM SUPPLIES.—The Electricity Committee is to provide a supply to farms in the parish of Rushton at a cost of £1,230 for transformer, switchgear and electric lines.

HOSPITAL INSTALLATION.—The Health Committee has arranged for the city electrical engineer to improve the electrical installation at the city hospital at a cost of £450.

Guildford.—ALL-IN TARIFF CONCESSION.—On a number of occasions during recent years consumers taking their supplies on the "all in" rate (domestic and business premises) have received a rebate in the form of a reduction of the fixed charge. For the December quarter the rebate was 50 per cent. and the Electricity Committee recommends a similar concession in respect of the March quarter accounts.

Hull.—UNDERTAKING'S ESTIMATES.—In our issue of January 26th, we briefly referred to the Electricity Department's estimates which were presented by the general manager, Mr. D. Bellamy at a recent meeting of the Electricity Committee (not by Councillor McNicol as previously stated). Mr. Bellamy said that for the financial year ending March 31st next, the position was much better than estimated a year ago, with a probable revenue from the sale of electricity of £1,006,300 against the £911,975 estimated. Instead of a loss of £30,000 the probable result was a surplus of £11,150, although there had been a further unexpected rise in the price of coal. An amount, estimated at £28,673, would however be required for appropriations for works of a capital nature and special repairs and renewals.

The estimates for 1945-46 indicated an excess of expenditure over income, apart from special repairs and renewals, of £75,000. After referring to the various factors concerned (extra plant charges, coal cost, etc.) Mr. Bellamy said that the actual position was obviously very problematic, and at this stage it was not possible to submit any application for increase in charges on the basis of depleted reserves (the reserve fund showed an increase of £105,000 between 1939 and 1944) but some price revision in the near future would be essential. The position was entirely due to the extraordinary increase in fuel cost; all other costs could in all probability have been met by increased output and improved efficiency.

HIGH PRIORITY. — The Electricity Committee reports that it has been placed second on the list of 31 undertakings in the order of preference for the manufacture of plant and machinery for extensions.

Glasgow.—DESIGN OF NEW STATION.—After hearing a report by the manager with regard to the desirability of employing consulting engineers in connection with the erection of the new generating station at Braehead, the Electricity Committee has agreed to recommend that Merz & McLellan, London, should be asked to design and supervise the construction of the scheme on terms to be arranged.

WASH-HOUSE LIGHTING INSTALLATION.—The Corporation Sub-committee on Baths and Washhouses has accepted a tender by the Electricity Department for the installation of electric, in place of gas, lighting at Townhead Washhouse, at an estimated cost of £150.

Lancashire. — KEARSLEY EXTENSIONS. — It is reported that preliminary excavation work has been carried out and actual building is expected to begin soon on extensions at the Kearsley power station of the Lancashire Electric Power Co. The total cost is estimated at £3,250,000 and continuous employment will be provided for 400 for about three years.

Leicester. — DECISION IN FAVOUR OF ELECTRICITY.—Last week the City Council again considered whether the first batch of temporary houses to be erected should be all-electric. At a previous meeting the Council had passed,

by 24 votes to 23, a resolution moved by the chairman of the Gas Committee asking the Housing Committee to reconsider its all-electric programme and use the mains where gas was laid for gas cookers and wash boilers. The Housing Committee's reconsidered decision that the houses should have electrical services was approved, after a debate, by 31 votes to 10, and it was also decided that this policy should further apply to the remainder of the dwellings.

London.—CHANGE OF SYSTEM.—St. Marylebone Electricity Committee is seeking sanction to borrow £2,000 for change of system and voltage.

Milford Haven.—ELECTRICITY FOR PREFABRICATED HOUSES.—Mr. A. J. Dalton, electrical engineer and manager of the U.D.C. Electricity Department, informs us that all the hundred new permanent prefabricated houses to be erected will have electric lighting, power points for heating in all rooms except the living room, and electric refrigerators. Half the houses will have electric cookers and washboilers and the other half gas. In addition all the houses will have convenient plugs and screwed bosses fitted to the hot-water tanks ready to take immersion heaters if desired by the tenants. The layout is such that the Council's gas undertaking is saved the necessity of laying mains for half the housing scheme. Mr. Dalton says that during the debates there were many references to "freedom of choice," but finally it appeared that the term had only a very limited meaning and that in the ultimate analysis cooking was the only really contentious point.

Mountain Ash.—FURTHER GIFT TO CONSUMERS.—Following the "Christmas Box" given to electricity consumers in the December quarter, a further concession has been announced for the March quarter by which consumers will benefit to the extent of £2,500. The normal net lighting rate is 2d. per kWh, but for this quarter the first 100 kWh will be charged at 1½d. per kWh, less ½d. per kWh for prompt payment. For all additional consumption the price will be 2d. per kWh, less the same discount. The two-part tariff running charge is to be ¾d., less ¼d. for prompt payment.

When the proposals were reported to the Council at its last meeting, Councillor Trevor Howells said that he had travelled throughout Glamorgan and found everyone asking how the undertaking was able to do it. Suggestions were made that it was due to special privileges supposed to be received from the South Wales Power Co. Actually at least a score of undertakings in South Wales enjoyed the same terms as they at Mountain Ash, and the only reason for their ability to offer such low charges was to be found in sound administration.

Overseas

Argentina. — NATIONALISATION POLICY. — The Provisional Comptroller of the Province of Cordoba, General Guglielmone, in a Press conference, announced some details of a decree recently approved by the Poder Ejecutivo, whereby the Province is gradually to take charge of all electricity services. General Guglielmone said that this important decree realised a long projected Government aim. All contracts, he said, had been carefully investigated and it was believed that during the period 1944 to 1960 the State would incorporate all electricity plants in the province, amounting to more than 200 enterprises. It is believed that the financing of the scheme will require the sum of about 20 million pesos, which is to be raised by the issue of bonds.—*Reuter's Trade Service.*

Australia. — MELBOURNE POST-WAR SCHEMES. —Melbourne City Council has approved a programme of post-war capital works which have been classified into three degrees of urgency. Projects contemplated by the Electric Supply Department are estimated to cost £512,000, of which £157,000 for generating plant extensions is of first importance.

EXTENSIONS AT PYRMONT.—The Sydney County Council is renewing its application to the N.S.W. Government for consent to install an additional 50,000-kW set at the Pyrmont power station. An earlier application was held in abeyance pending a decision to place a contract for plant to be installed at the Railways Department's White Bay power station.

United States.—T.V.A. OUTPUT.—The Tennessee Valley Authority in its annual statement to Congress and President Roosevelt, covering the twelve months ended June 30th last, reports the generation of more than 10,000 million kWh. A total of 3,362 million kWh was supplied to 129 municipalities and co-operative electric systems which, in distributing electricity to 550,000 consumers, earned a combined net income of $6,363,000. Domestic use of electricity under T.V.A. rates increased from 1,598 to 1,707 kWh per customer, while the average charge declined from 1·96 cents to 1·88 cents per kWh. For the whole of the United States the average domestic consumption was 1,117 kWh and the average price paid 3·55 cents.—*Reuter's Trade Service.*

TRANSPORT

Glasgow.—USE OF LOCAL RAILWAYS.—Councillor H. T. McCalman, chairman of the Clyde Valley Regional Planning Committee, speaking in Glasgow recently, suggested that as an alternative to costly extensions of the underground transport system in the city, an electric railway system might be developed by using the local railway system which served the area before the advent of the tramcar. Mr. A. E. Matthew, deputy technical consultant, Clyde Valley Regional Planning Committee, said the committee hoped to make local railways an integral part of the electrification of national railways.

Leeds.—LARGE DEFICITS.—The Corporation Transport Department is expected to show a deficit of £45,000 for the current year, while for 1945-46 the loss is expected to be £86,760.

Newcastle-on-Tyne.—MANAGER'S REPORT.—Mr. H. C. Godsmark, general manager of the Corporation Transport and Electricity Department, in his report for the year ended March 31st last, states that increased costs of operation have now exceeded the rise in revenue, and this, together with the weight of taxation, accounts for the reduction in the surplus from £102,277 in 1942-43 to £80,852 last year. Mr. Godsmark says he is concerned at the position which the undertaking will face after the war when it will be necessary to make extensive replacements. The funds which in normal times would have been used for buying new vehicles have gone in E.P.T. The report suggests that a revision of fares will be necessary.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Scophony, Ltd., held its annual general meeting on Tuesday. A statement presented by the chairman, Sir Maurice Bonham Carter, said that this country need not rely on the import of scientific instruments for industry. The company had under negotiation several contracts for new types of instruments required after the war. As soon as possible a television unit would be developed with a screen about 3 ft. by 2 ft. and introducing colour, as well as a large unit suitable for public entertainment. Television should benefit from the improvements in high-frequency and ultra-frequency transmission and reception technique. The transmission and reception of a wider frequency band should not create undue difficulties. It was also anticipated that the country could be covered for the reception of television by a wireless relay system.

The net profit, after providing for depreciation and administration expenses, was £14,665 for the year ended March 31st. This compares with £14,900 in the previous year. After deducting controller's charges, directors' fees and a small loss by the subsidiary, Scophony Electronics, Ltd., and £5,000 (£1,000) for contingencies, there remains £5,948 (£10,921), which is set against a debit balance of £5,869, leaving £79 to be carried forward. In exchange for American patent rights and certain equipment sold to the Scophony Corporation of America, the company has received 625 "A" shares of $1 each of that company.

R. A. Lister & Co., Ltd.—Mr. Percy Lister, the chairman, stated at the annual meeting on January 30th that the "total war" effort had resulted in orders for products of the company and its subsidiaries being filled by competitors so as to permit the largest possible number of Lister and Blackstone products being available to meet the ever-growing demands of the Services. With the coming of peace no effort would be spared to rebuild on the connections and experience obtained at very considerable cost over a long period of years. There was good reason to believe that despite enemy occupation the company's French and Belgian interests had been safeguarded.

E. K. Cole, Ltd.—At a recent extraordinary meeting a resolution was passed approving the extension of the objects of the company.

The Power Securities Corporation, Ltd., is maintaining its dividend at 6 per cent. The gross profit for 1944 was £113,375, as compared with £113,632 for 1943.

New Companies

Ellison Radio & Electrical Co., Ltd.—Private company. Registered January 20th. Capital, £500. Objects: To carry on the business of retail and wholesale merchants, manufacturers, factors, importers, exporters and repairers of and agents for wireless apparatus and electrical instruments and accessories, etc. Directors: S. Harrison, 51, Old Montague Street, E.1, director of Harrison & Co. (Electrical), Ltd., and J. Kleinmar, 11, St. John Street, Newport Pagnell, Bucks. Secretary: D. Gerlis. Registered office: 6, Broad Street Place, E.C.2.

Brett Daniels, Ltd.—Private company. Registered January 25th. Capital, £5,000. Objects: To carry on the business of manufacturers of and dealers in refrigerators and cold storage plant, etc. W. B. Daniels, Hillcrest, Deacons Hill Road, Elstree, is the first director. Registered office: 343/5, Finchley Road, N.W.2.

Belpar Industrial Products, Ltd.—Private company. Registered January 26th. Capital, £100. Objects: To carry on the business of electric lighting and equipment specialists, radio, motor and electrical engineers, etc. Subscribers: J. Brodie, solicitor; and Joyce Pasquell, secretary, both of 265, Strand, W.C.2. Registered office: Danes Inn House, 265, Strand, W.C.2.

Harbottle Leeson, Ltd.—Private company. Registered January 25th. Capital, £5,000. Objects: To carry on the business of manufacturers of and dealers in electrical, gas, oil, and other lamps, reflectors, fires, stoves, cookers, wireless sets and accessories, etc. Directors: J. P. Harbottle, Kirkendale, Treebor Avenue, Farnham; and two others. Registered office: 63, Elm Grove, Southsea.

Grenlock Radio, Ltd.—Private company. Registered January 25th. Capital, £1,000. Objects: To carry on the business of manufacturers, repairers and service engineers of radio, television, electric and electronic apparatus, etc. Directors: E. I. Greenburg and T. G. Rocker, both of Shipston-on-Stour, Warwick.

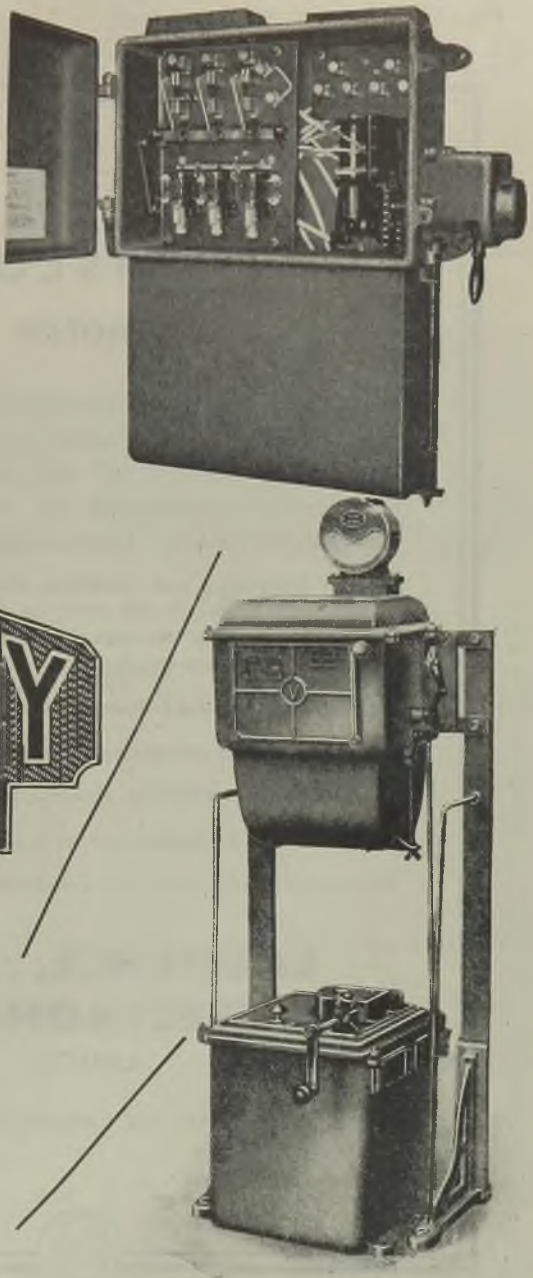
Victor Towler & Co., Ltd.—Private company. Registered January 25th. Capital, £1,000. Objects: To carry on the business of radio and electrical engineers, etc. Directors: V. T. Towler and Mrs. W. K. Towler, both of 21, Elmwood Drive, Ewell, Surrey. Registered office: 9, The Broadway, Tolworth, Surrey.

A. J. Walker & Sons, Ltd.—Private company. Registered January 17th. Capital, £1,000. Objects: To carry on the business of electrical, mechanical, precision, motor, and radio engineers, tool makers, etc. The directors are: A. M. J. Walker, 38, Netheravon Road, Chiswick, and three others. Registered office: 8-10, Ravenscourt Avenue, W.6.

Fanol Manufacturing & Trading Co., Ltd.—Private company. Registered January 22nd. Capital, £1,000. Objects: To carry on the business of electrical equipment specialists, electrical, mechanical, radio, motor and general engineers, etc. A. Donner, 172, Ellesmere Road, N.W.10, is the first director. Registered office: 80, Castellain Road, W.9.

Hermoplast, Ltd.—Private company. Registered January 6th. Capital, £100. Objects: To carry on the business of manufacturers of, and dealers in, plastic substances, materials and preparations for waterproofing fabrics or paper preparations and compositions for electrical

control for slip-ring motors from



THE VERITY RANGE

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

Facts about the "TRISLOT" motor

The L.S.E. "TRISLOT" motor is a patented squirrel-cage machine which develops up to 100% full load torque with 150-175% full load current (in star). For heavy drives a direct started type will give 200% F.L.T. with 250-350% F.L.C. Its advantages include :—

Greater simplicity and reliability than a slip-ring machine (Indestructible short circuited rotor, no slip rings or brushes) and **simpler and cheaper switchgear** for hand or automatic operation. (No resistances or auto-transformers).

Starting performance independent of skill of operator.

Effective overload protection (because of low starting current).

Quiet starting and smooth acceleration.

Can be made Totally Enclosed with same performance.

Minimum cabling costs. Maintenance practically nil.

LAURENCE, SCOTT & ELECTROMOTORS
LIMITED

Specialist Makers of Electric Motors since 1883

NORWICH, MANCHESTER LONDON & BRANCHES

LSE

insulation, etc. Directors: H. V. Strong, 9, The Orchard, Blackheath, S.E.3 and Elizabeth Mousley, 4, Robins Court, King Avenue, S.W. Secretary: Elizabeth Mousley. Registered office: 11-13, Sylvan Grove, Old Kent Road, S.E.15.

Paribel Products, Ltd.—Private company. Registered January 20th. Capital, £100. Objects: To carry on the business of electric lighting equipment specialists, electrical, radio, motor and general engineers, etc. Subscribers: D. Howes, 36, Studley Grange Road, W.7, and J. Brodie, 265, Strand, W.C.2. Registered office: Danes Inn House, 265, Strand, W.C.2.

Companies' Returns
Statements of Capital

Anglo-Portuguese Telephone Co., Ltd.—Capital, £1,700,000 in £1,199,375 ordinary stock and 400,625 ordinary and 100,000 "A" ordinary shares of £1. Return dated August 8th. £1,195,375 ordinary stock and 100,000 "A" ordinary shares issued and fully paid up, plus premiums of 3s. per share on 309,533 shares and 5s. per share on 123,750 shares. Mortgages and charges: £445,142.

Metropolitan Electric Cable & Construction Co., Ltd.—Capital, £60,000 in 10s. shares. Return dated June 20th, 1944 (filed August 30th, 1944). All shares taken up. £59,900 paid. £100 considered as paid. Mortgages and charges: Nil. The 90,000 5½ per cent. cumulative redeemable preference shares of £1 have been redeemed.

Ferro-Concrete & Electrical Construction, Ltd.—Capital, £10,000 in 2,500 redeemable preference and 7,500 ordinary shares of £1. Return dated October 18th. 750 preference and 2,700 ordinary shares taken up. £3,450 paid. Mortgages and charges: Nil.

West London & Provincial Electric & General Trust, Ltd.—Capital, £390,000 in £198,000 ordinary stock and £192,000 preference stock. Return dated June 15th (filed November 15th). All stock issued and fully paid. Mortgages and charges: £200,000.

New Development Co., Ltd.—Capital, £5,000 in £1 shares. Return dated June 1st (filed August 30th, 1944). 1,275 shares taken up. £1,275 paid. Mortgages and charges: Nil.

Bastian & Allen, Ltd.—Capital, £5,000 in £1 shares. Return dated September 7th. All shares taken up. £5,000 paid. Mortgages and charges: £5,000.

Kalgoorlie Electric Power & Lighting Corporation, Ltd.—Capital, £200,000 in 10s. shares. Return dated September 7th. 375,000 shares taken up. £137,498 10s. paid. £50,001 10s. considered as paid. Mortgages and charges: Nil.

Premier Accumulator Co., Ltd.—Capital, £100 in £1 shares. Return dated September 6th. Two shares taken up. £2 paid. Mortgages and charges: Nil.

Siemens & General Electric Railway Signal Co., Ltd.—Capital, £20,000 in 10,000 "A" ordinary and 10,000 "B" ordinary shares of £1. Return dated August 15th, 1944. 3,500 "A" and 3,500 "B" shares taken up. £7,000 paid. Mortgages and charges: Nil.

Morley Electrical Engineering Co., Ltd.—Capital, £5,000 in 5,000 shares of £1 each. Return dated August 15th. All shares taken up. £3,980 paid. £1,020 considered as paid. Mortgages and charges: £1,000.

Exe Valley Electricity Co., Ltd.—Capital, £225,000 in 225,000 ordinary shares of £1 each. Return dated August 3rd. 215,000 shares taken up. £209,700 paid. £5,300 considered as paid. Mortgages and charges: Nil.

Impex Electrical, Ltd.—Capital, £14,000 in £1 shares (all ordinary). Return dated December 7th. All shares taken up. £14,000 paid. Mortgages and charges: Nil.

Bankruptcies

P. W. Penty, electrical contractor, trading as the Sackville Electrical Co., and residing and carrying on business at 38, Mannville Terrace, Morley Street, Bradford.—Supplemental payment of 4 per cent. statutory interest on February 14th at Hallfield Chambers, 71, Manningham Lane, Bradford.

T. H. Carter and **Daisy Carter**, trading in partnership with H. C. Jeffrey as the Wrexham Electrical & Cycle Co., at 8, Town Hill, Wrexham.—Order made December 20th suspending discharge for twelve months. (No application for discharge was made by H. C. Jeffrey.)

TRADE MARK APPLICATIONS

RECENT applications for trade marks include the following, objections against which can be entered within a month from January 31st:—

BATRYMAX. No. 630,242, Class 9. Electric batteries, electric cells and accumulators; wireless apparatus operated by electric batteries, electric cells and accumulators; and cases for electric torches. Also No. 630,243, Class 11. Torches, electric lamps and electric lamp bulbs. —Ever Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, London, N.7.

TABBAT. No. 631,570, Class 11. Electrical apparatus for lighting, heating, steam generating, cooking, refrigerating, drying and ventilating, an dparts not included in other classes:—Ever Ready Co. (Great Britain), Ltd.

CORDAPLAS. No. 630,680, Class 9. Aerials for wireless telephony, telegraphy and television; electric flexibles; and insulated wire, insulated conductors and cables, all for electric transmission systems.—Concordia Electric Wire & Cable Co., Ltd., Trent Mills, Derwent Street, Long Eaton, near Nottingham.

GRIPPER. No. 624,958, Class 11. Electric handlamps.—British Central Electrical Co., Ltd., 6 and 8, Rosebery Avenue, London, E.C.1.

EFCO. No. 630,360, Class 11. Electric furnace installations and parts not included in other classes.—Electric Furnace Co., Ltd., 17, Victoria Street, London, S.W.1.

LITLUX. No. 631,066, Class 11. Lamps, reflectors, shades, lighting fittings and parts not included in other classes; and electric light bulbs.—Dernier & Hamlyn, Ltd., 23, Newman Street, Oxford Street, London, W.1.

SILVER CREST. No. 631,455, Class 11. Electric lamps.—John Ismay & Sons, Ltd., Roden Street Works, Roden Street, Ilford.

STOCKS AND SHARES

TUESDAY EVENING.

THE general tendency of Stock Exchange markets is somewhat undecided. There seems to be a willingness to buy gilt-edged stock, without this exercising sympathetic influence over investment securities as a whole. A mild shake-out occurred in the speculative varieties last week; on the fall, there was a good deal of inquiry for the shares that had been mainly affected. The European news, more especially that from the Eastern front, is considered to presage a definite approach of an early end of the war. And what is going to happen when peace comes, even optimism is a little cautious of stating in any but vague terms.

Radio Shares

By way of showing how sensitive are to-day's Stock Exchange markets, it may be of service to mention that one day last week the mere announcement that Sir Louis Sterling had launched an action against A. C. Cossor, Ltd., was sufficient to shake, not only Cossor shares, but the radio group as a whole. Electric & Musical Industries were lowered in price; so, too, were E. K. Cole and Philco descriptions. Cossor fell to 30s., sellers, at which price support was forthcoming, and the shares rallied to 32s., but "Ekco" are ¼ down at 40s., and E.M.I. show 1s. loss at 33s. 6d. Scophony changed hands around 4s. 9d., upon the issue of the report and accounts. In his statement at the annual meeting, the chairman gave interesting details of the manner in which television developments were being pressed forward.

Home Railway Dividends

This week there begins the tale of dividend-declarations from the Home Railway companies in respect of 1944. To-day, Tuesday, the London, Midland & Scottish announcement arrived. Next week it will be the turn of the Southern Railway and London Passenger Transport Board. The little animation which sprang up in the Stock Exchange Home Railway market last month, by way of prelude to the dividend announcements, has subsided, and the companies' statements are awaited with no more than languid interest. The Southern Railway is expected to pay 5 per cent. for the year on its preferred stock, which would give the buyer of to-day a yield of 6½ per cent. on the money, allowing for inclusion of the dividend in the price.

Transport "C"

London Passenger Transport "C" Stock at 70 returns £4 13s. 9d. By comparison with other junior stocks in the Home Railway group, Transport "C" is expensive, the reason for which is the expectation that after the war, when the undertakings are handed back to their owners, the Transport Board will receive the full benefit of the purely passenger traffic with which the Board is chiefly concerned. At present, the receipts go into the pool, in the same way as those of the other railway companies. The fixed proportion which the Board receives as its share of the aggregate takings is loaded with a proportion, also, of the goods traffic handled by the other lines. To a smaller extent this applies to the Southern Railway, whose passenger traffic is substantially greater than its goods business.

Mixed Movements

De La Rue shares, after drooping to 9 5/16, rallied to 9¾, showing ¼ rise on balance. International Combustions at 7½ are ⅛ down, the recent sharp advance, on the dividend increase, having brought in a certain amount of profit-taking. Henley's have hardened to 27s. 3d. Telegraph Constructions at 58s. gained 1s. Siemens are 6d. up at 36s. 3d Veritys at 9s. 6d. regained their small loss of last week. Falls lowered British Thermostat to 20s. 9d., Electric Construction to three guineas and English Electrics to 56s. 6d.

The cable group is quiet. International "Tel. & Tel." at 27 are a dollar better. Cable & Wireless ordinary is 10s. down, but Globe Telegraph ordinary at 41s. 6d. has gained a few pence. Calcutta Trams made further upward progress; on the other hand, Calcutta Electric Supply went back. Brazilian Tractions were unaffected by publication of remarkably good earnings.

Home Electricity

Utility companies, it has been announced, are to be allowed to issue reports and accounts of a more informative nature than those which, for security reasons, have been published since the war began. The accounts of the Home electricity supply companies are awaited with a degree of interest greater, of course, than that which prevailed in pre-war times. The particular point to which notice will be directed in the forthcoming figures will be the amount that each company has been able to save. On the other hand, the extra expenditure to which rises in costs have subjected the undertakings is bound to have been considerable. It has been mentioned here as a matter for surprise that even the steep rise that has occurred in the price of coal, has failed to exert more than a transient effect upon quotations in the market for Home electricity supply ordinary shares.

Forthcoming Accounts

Just lately, there have been strong official admonitions to reduce the use of electricity and gas, although this particular factor will

(*Continued on page* 220)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend Previous	Dividend Last	Middle Price Feb. 6	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Ordinary					
Bournemouth and Poole	12½	12½	63/6	..	3 19 1
British Power and Light	7	7	33/6	..	4 3 10
City of London	7	5½	30/–	..	3 13 4
Clyde Valley	8	8	42/–	..	3 16 0
County of London	8	8	45/–	..	3 11 1
Edmundsons	6	6	32/–	..	3 15 0
Elec. Dis. Yorkshire	9	9	45/6	..	3 19 6
Elec. Fin. and Securities	12½	13½	61/–	..	4 8 6
Elec. Supply Corporation	10	10	51/–	..	3 18 6
Lancs. Light and Power	7½	7½	37/6	+6d.	4 0 0
Llanelly Elec.	6	6	28/–	+6d.	4 5 9
Lond. Assoc. Electric	3	4	26/6	..	3 0 6
London Electric	6	6	31/–	+1/6	3 17 5
Metropolitan E.S.	8	8	44/6	..	3 12 0
Midland Counties	8	8	41/6	..	3 17 0
Mid. Elec. Power	9	9	44/6	..	4 1 0
Newcastle Elec.	7	7	32/–	..	4 7 6
North Eastern Elec.	7	7	35/–	..	4 0 0
Northampton	10	10	50/6	..	3 19 4
Northmet Power	7	7	42/6	+6d.	3 6 0
Richmond Elec.	6	6	26/–	..	4 12 4
Scottish Power	8	8	40/6	..	3 19 0
Southern Areas	5	5	23/–	..	4 7 0
South London	7	7	30/–	..	4 13 4
West Devon	5	5	25/–	+6d.	4 0 0
West Glos.	4½	3½	25/–	..	2 16 0
Yorkshire Elec.	8	8	43/–xd	+6d.	3 14 5
Public Boards					
Central Electricity :					
1955–75	5	5	116	+1	4 6 0
1951–73	4½	4½	106	..	4 5 0
1963–93	3½	3½	105	..	3 6 8
1974–94	3½	3½	101	..	3 4 4
London Elec. Trans.	2½	2½	98	..	2 11 0
London & Home Counties 1955–75	4½	4½	111	..	4 1 1
Lond. Pass. Trans. Bd.					
A	4½	4½	122½	..	3 13 6
B	5	5	123½	..	4 1 0
C	3	3½	69	..	4 14 2
West Midlands J.E.A. 1948–68	5	5	106½	..	4 14 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	6/9	..	—
Calcutta Elec.	6*	6*	47/6	–1/–	2 11 2
Cawnpore Elec.	10	7	42/–	+9d.	3 6 9
East African Power	7	7	36/–	+6d.	3 17 9
Jerusalem Elec.	7	5	28/–	..	3 11 5
Kalgoorlie (10/–)	5	5	10/6	..	4 15 3
Madras Elec.	Nil	4	31/6	..	2 10 9
Montreal Power	1½	1½	24½	..	—
Nigerian Elec.	8	10	37/6	..	5 6 8
Palestine Elec. "A"	5*	5*	38/–	..	2 12 8
Perak Hydro-elec.	6	7	13/–	..	—
Tokyo Elec. 6%	6	6	23½	..	—
Victoria Falls Power	15	15	90/–	..	3 7 7
Whitehall Inv. Pref.	—	6	26/–	..	4 12 4

Company	Dividend Previous	Dividend Last	Middle Price Feb. 6	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron Elec. Ord.	10	15	62/–	..	4 16 9
Assoc. Brit. Eng.	6	7	53/9	..	2 12 0
Assoc. Elec. :					
Ord.	10	10	57/3	..	3 10 0
Pref.	8	8	40/–	..	4 0 0
Automatic Tel. & El.	12½	12½	66/3	..	3 15 6
Babcock & Wilcox	11	11	52/6	–1/–	4 3 10
British Aluminium	10	10	46/–	..	4 7 0
British Insul. Ord.	20	20	5⅝	..	3 11 2
British Thermostat (5/–)	18½	18½	20/9	–6d.	4 9 0
British Vac. Cleaner (5/–)	30	30	33/–	..	4 11 0
Brush Ord. (5/–)	8	9	11/–	..	4 1 6
Burco (5/–)	15	15	15/9	..	4 15 3
Callender's	15	20	5¾	..	3 9 9
Chloride Elec. Storage	15	15	87/6	..	3 18 7
Christy Bros.	12½	17½	77/6	..	4 10 2
Cole, E. K. (5/–)	15	20	40/–	–½	2 10 0
Consolidated Signal	24	27½	6¾	..	4 0 0
Cossor, A. C. (5/–)	7½*	10*	32/–	..	1 11 4
Crabtree (10/–)	17½	17½	44/–	..	3 19 7
Crompton Parkinson Ord. (5/–)	20	22½	34/6	..	3 5 3
De La Rue	35	40	9¼	+¼	4 2 0
E.M.I. (10/–)	6	8	33/6	–1/–	2 7 9
Elec. Construction	10	12½	63/–	–6d.	3 19 4
Enfield Cable Ord.	12½	12½	63/–	..	3 19 4
English Electric	10	10	56/6	–9d.	3 10 2
Ericsson Tel. (5/–)	22*	20*	54/–	–6d.	1 15 9
Ever Ready (5/–)	40	40	44/–	..	4 11 0
Falk Stadelmann	7½	7½	34/9	..	4 6 2
Ferranti Pref.	7	7	31/9	..	4 8 2
G.E.C. :					
Pref.	6½	6½	34/6	..	3 15 4
Ord.	17½	17½	98/6	..	3 11 2
General Cable (5/–)	15	15	17/–	..	4 8 3
Greenwood & Batley	15	15	48/3	..	6 3 0
Hall Telephone (10/–)	12½	12½	31/–	..	4 0 8
Henley's (5/–)	20	20	27/3	+3d.	3 13 9
4½% Pref.	4½	4½	24/–	..	3 15 0
Hopkinsons	15	17½	76/3	..	4 11 7
India Rubber Pref.	5½	5½	24/–	..	4 11 9
Intl. Combustion	30	32½	7½	–¼	4 6 8
Johnson & Phillips	15	15	76/–	..	3 19 0
Lancashire Dynamo	22½	22½	102/6	..	4 10 0
Laurence, Scott (5/–)	12½	12½	14/3	..	4 8 6
London Elec. Wire	7½	7½	38/–	..	3 19 0
Mather & Platt	10	10	56/3	..	3 11 2
Metal Industries (B)	8	8½	47/–	..	3 12 6
Met. Elec. Cable Pref.	5½	5½	21/3	..	5 3 6
Mid. Elec. Mfg.	25	25	7 3/16	..	3 9 10
Murex	20	20	5 1/16	..	3 18 9
Newman Ind. (2/–)	20	20	7/3	..	5 10 0
Philco (2/–)	—	—	14/6	..	—
Power Securities	6	6	29/6	..	4 1 4
Pye Deferred (5/–)	25	25	33/9	..	3 14 0
Ransome & Marles	20	20	87/6	..	4 11 4
Revo (10/–)	17½	17½	44/6	..	3 18 7
Reyrolle	12½	12½	72/6	..	3 9 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Feb. 6	Rise or Fall	Yield £ s. d.
Equipment and Manufacturing (*Continued*)					
Siemens Ord. ..	7½	7½	36/3	+6d.	4 2 10
Strand Elec. (5/–)	10	12½	11/–	..	5 13 8
Switchgear & Cowans (5/–) ..	20	20	20/9	..	4 16 7
T.C.C. (10/–) ..	5	7½	25/–	..	3 0 0
T.C. & M. ..	10	10	58/–	+1/–	3 9 2
TelephoneMfg.(5/–)	9	9	12/–	..	3 15 0
Thorn Elec. (5/–)	20	20	29/–	..	3 9 0
Tube Investments	20	22½	5½	..	4 1 10
Vactric (5/–) ..	Nil	22½	17/–	..	6 10 6
Veritys (5/–) ..	7½	7½	9/6	+6d.	3 19 0
WalsallConduits(4/–)55	55		52/6	..	4 3 10
Ward & Goldstone (5/–)	20	20	30/6	..	3 5 8
WestinghouseBrake	14	14	76/–	..	3 13 8
West, Allen (5/–)	7½	7½	8/9	..	4 5 9
Traction and Transport					
Anglo-Arg. Trans.:					
First Pref. (£5)	Nil	Nil	2/6	..	—
4% Inc. ..	Nil	Nil	6½	..	—
Brit. Elec. Traction:					
Def. Ord. ..	45	45	1205	..	3 15 0
Pref. Ord. ..	8	8	190	..	4 4 3
Bristol Trams ..	10	10	57/–	..	3 10 2
Brazil Traction ..	1½	2	26	..	7 13 10
Calcutta Trams	6½	7½	65/6	+1/–	2 5 9
Cape Elec. Trams	5	6	26/–	..	4 12 4
Lancs. Transport	10	10	49/–	..	4 1 8
Southern Rly.:					
5% Prefd. ..	5	5	78	..	6 8 2
5% Pref. ..	5	5	119½	..	4 3 8
T. Tilling ..	10	10	61/6	..	3 5 0
West Riding ..	10	10	49/–	..	4 1 8
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	125	..	4 16 0
Def.	1½	1½	30	..	5 0 0
Anglo-Portuguese	8	8	27/6	–6d.	5 16 4
Cable & Wireless:					
5½% Pref. ..	5½	5½	118	..	4 13 3
Ord.	4	4	84½	–½	4 14 8
CanadianMarconi	$1 Nil	4cts.	10/6	+1/16	—
Globe Tel. & Tel.:					
Ord.	8½*	5*	41/6	+6d.	2 8 2
Pref.	6	6	31/–	..	3 17 5
Great Northern Tel. (£10)	Nil	Nil	29	..	—
Inter. Tel. & Tel.	Nil	Nil	27	+1	—
Marconi-Marine..	7½	7½	34/6	..	4 7 0
Oriental Tel. Ord.	4	4	50/–	..	—
Telephone Props.	Nil	6	20/–	..	6 0 0
Tele. Rentals (5/–)	10	10	12/3	+3d.	4 1 8

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from page* 218)

hardly enter into the accounts for 1944. The date at which the expanded information will become available in the reports and accounts is a matter for doubt. The year ends, for a number of the companies, in December, and the accounts ordinarily appear in March. Some people think that a period of six months will have to elapse, dating either from the end of the year, or from the middle of March, before the accounts reach shareholders' hands. In the face of all the uncertainty and perplexity as to what the figures will show, prices of the ordinary shares remain consistently good. Lancashire Electric, Llanelly, West Devon and Northmets are all 6d. higher. Yorkshire Electrics at 43s. have recovered the dividend of 6d. net.

Walsall Conduits

Walsall Conduits hold their recent advance to 52s. 6d. The company's year ends with December, the report appearing in the following June. For years past the dividend has been 55 per cent. per annum on the 750,000 ordinary shares of 4s. each. As is generally known, the company manufactures steel conduits, fittings and accessories for electric lighting and power installations. It came into being in November, 1936. For the broken period of that year, the dividend was 6¼ per cent., after which there started the 55 per cent. per annum distributions already mentioned. The capital has remained at £350,000, of which £200,000 is in 5 per cent. preference shares of £1 each, since its inception. At the present price the yield on the money is £4 3s. 10d. per cent. The company's balance sheet is a strong one. During the bad times of 1940, the price of the ordinary shares fell to 18s. To-day's quotation is the highest since 1937.

London Electric Wire

The London Electric Wire Co. and Smiths, Ltd., is another company whose year finishes with December, and whose report normally appears in the following June. Ten years ago, the company paid a dividend of 6¼ per cent. The rate was raised in the following year, 1936, to 7½ per cent. Since then, this has been the regular annual dividend on the ordinary shares. The company manufactures electric wire, etc. It controls the Liverpool Electric Cable Co. and the Vactite Wire Co. On its issued capital of £684,070, it made a profit for 1937 of £143,000. This was the best result achieved during the past decade, but the 7½ per cent. dividend has been earned, with very few exceptions, with a comfortable margin to spare. The lowest price in recent years has been 20s. in 1940; the best 41s. 3d., in 1936. The price has scarcely changed during the present year, remaining at 38s. throughout January.

NEW PATENTS

Electrical Specifications Recently Published

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

AKT.-GES. Brown, Boveri & Cie.—" Device for the protection of switching apparatus against excess voltages, particularly against lightning." 11237/42. August 11th, 1941. (566848.)

Automatic Telephone & Electric Co., Ltd.—" Telephone or like systems." 11516/43. September 11th, 1942. (566934.)

Automatic Telephone & Electric Co., Ltd., and T. G. Rice.—" Circuits employing non-linear resistance material." 11329. July 13th, 1943. (566903.)

H. E. Bayliss.—" Methods of manufacturing electrical resistances." 5124. March 31st, 1943. (566950.) Also 21952/42. (Divided out of 566950.) (566971.)

British Thomson-Houston Co., Ltd.—" Control devices for electric irons." 5963/43. April 16th, 1942. (566815.) " Ultra-high frequency impedance measuring apparatus." 14792/43. September 15th, 1942. (566843.)

P. G. Caldwell.—" Electric resistance heaters and circuit arrangement therefor adaptable also for battery charging." 6151. April 16th, 1943. (566953.)

C. H. W. Clark and Steatite & Porcelain Products, Ltd.—" Insulators for high-tension electrical transmission systems." 7544. May 12th, 1943. (566871.)

A. C. Cossor, Ltd., and A. H. A. Wynn.—" Frequency measuring or indicating devices for use with oscillation generators." 11451. July 14th, 1943. (566906.)

H. L. Cottrell (Beatty Bros., Ltd.).—" Clothes wringers for domestic washing machines." 18454. December 29th, 1942. (566850.)

Electric Resistance Furnace Co., Ltd., and R. A. Smith.—" Electric furnaces of the salt bath type." 9828/42. June 15th, 1943. (566885.)

Electrolux, Ltd.—" Absorption refrigerating apparatus of inert gas type." 8084/43. June 22nd, 1942. (Addition to 526616.) (566873.)

H. J. Finer.—" Lamp standards and the like." 8321. May 25th, 1943. (566826.)

General Electric Co., Ltd., B. L. C. Angell and J. B. Lovell-Foot.—" Frequency-controlled electric oscillators." 9348. June 10th, 1943. (566829.)

Graviner Manufacturing Co., Ltd., and A. Mathisen.—" Explosive devices for use in fire-fighting equipment systems, electrical switch devices, and other purposes." 6973. May 3rd, 1943. (566867.)

B. M. Hadfield.—" Electronic voltage regulators." 9313. June 10th, 1943. (566895.)

Holden & Hunt, Ltd., R. W. Holden and H. K. Basterfield.—" Electric current timing devices." 9397. June 11th, 1943. (566961.)

R. Jablonsky.—" Method of and means for heating articles in a high-frequency electric field." 7712. May 14th, 1943. (566927.)

Landis & Gyr, Soc. Anon.—" Relay systems of remote control or indication." 5220/43. April 6th, 1942. (566862.)

H. Lindars.—" Electrical control device for intermittently operating apparatus." 12345. July 29th, 1943. (566911.)

Marconi's Wireless Telegraph Co., Ltd.—" Cathode-ray beam deflecting circuits." 10652/43. June 30th, 1942. (566835.) " Power supply circuits particularly for electron-discharge devices." 8607/43. May 30th, 1942. (566877.) " Electron-discharge devices." 11206/43. July 11th, 1942. (566902.)

C. G. Mayo.—" Variable resistances for operation at high frequencies." 2816. February 19th, 1943. (566945.) " Alternating current bridge circuits." 3212/44. February 19th, 1943. (Divided out of 566945.) (566970.)

D. G. O. Morris and Metropolitan-Vickers Electrical Co., Ltd. — " Dynamo-electric machines." 13440. October 18th, 1941. (566882.)

Radio Corporation of America.—" Method of and apparatus for heat treating metal." 6881/43. April 30th, 1942. (566866.)

Standard Telephones & Cables, Ltd.—" Selenium cell and method of making it." 9837/43. June 24th, 1942. (566833.) " High-frequency amplifying system." 13802/43. August 24th, 1942. (566841.) " Distortion reduction on modulated amplifiers." 14867/43. November 16th, 1942. (566844.)

Standard Telephones & Cables, Ltd., and W. T. Gibson.—" Metal-glass and like seals." 11640. July 16th, 1943. (566969.)

Standard Telephones & Cables, Ltd., and H. E. S. McLellan.—" Wirewound electrical resistors." 11440. July 14th, 1943. (566905.)

Telephone Manufacturing Co., Ltd., S. J. Smith and R. G. St. Terry.—" Electric clock mechanisms." 9740. June 17th, 1943. (566831.)

Under Water Welders & Repairers, Ltd., P. L. Hunting and H. W. Hamblin.—" Electric welding apparatus." 11485. July 14th, 1943. (566908.)

Ship-Launching Triggers

METHODS of holding ships prior to launch are dealt with by MR. H. B. R. ROWELL in a paper prepared for the North-East Coast Institution of Engineers and Shipbuilders.

The author discusses the advantages of hydraulic and mechanical lever triggers for releasing the ships from the standing ways. The use of electrical solenoids for releasing the trigger gear is gaining favour. They are reliable and instantaneous, being wired in series and actuated by push button. Two circuits are employed; one for the solenoids energised at 110 V from the shipyard's mains and the other at 12 V from a battery for pilot lamps and buzzers needed for signalling launching instructions.

Means are also described for calculating the load imposed on the launching triggers by measuring their static strains with the aid of wire-wound electrical resistance gauges described by Dr. S. F. Dorey in the paper which he submitted in April, 1944, to the Institution of Naval Architects.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

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

Australia.—March 7th. 44,000-V switchgear (Spec. 384). City Electric Light Co., Ltd., Boundary Street, Brisbane (£2 2s.).

March 21st. Victorian State Electricity Commission. Paper and varnished cambric insulated cable. Spec. 44-45/41. April 4th. Electrical switchboard indicating and recording instruments (Spec. 44-45/25). July 4th. 40,000-kVA synchronous condenser (Spec. 45-46/1).

March 27th. P.M.G.'s Department. Induction coils (Sch. C4592). April 3rd. Automatic telephone switchboard and associated automatic trunk ticketing equipment and/or associated voice-frequency signalling equipment (Sch. C4608).

Belfast.—March 6th. Electricity Department. Materials including feeder and section pillars, armourclad compound filled 6,600-V switchgear, meters and instrument transformers, l.v. fuse units, cut-outs, joint boxes, cables, lamps, switch tripping batteries and charging equipments, etc. (See this issue.)

Birkenhead.—February 12th. Town Council. Electric lamps for twelve months. Borough electrical engineer, Craven Street, Birkenhead.

Brightlingsea.—February 13th. Urban District Council. Electrically driven borehole pump with automatic switchgear. John Fowler, Clerk, Town Hall, Brightlingsea, Essex.

Manchester.—March 1st. Electricity Department. Four outdoor-type substation kiosks and switchgear. (See this issue.)

Orders Placed

Blackburn.—Electricity Committee. Extensions to Whitebirk generating station. Equipment for the electrical sequence operation of the soot blowers. (£1,680).—Clyde Blowers. Automatic boiler control and turbine recorder (£19,492).—Geo. Kent. H.p. and l.p. pipework (£46,150).—Babcock & Wilcox. Belt conveyor (£11,697).—New Conveyor Co.

Glasgow.—Electricity Committee. 6,000-kVA transformer (£4,865).—Bruce Peebles.

London.—POPLAR.—Electricity Committee. Three feeder pillars (£281).—B.I. Cables.

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.

Ashton-under-Lyne. — Children's home (£35,000); A. T. Kemp, borough surveyor.

Ashton-in-Makerfield. — Fire station; Chief Regional Officer, National Fire Service, Wigan.

Caernarvonshire. — School meals kitchen, Bethesda; W. Lloyd Jones, county architect, County Offices, Caernarvon.

Cornbrook. — Alterations and additions to factory; A. R. Walsingham, architect, 50, High Grove Road, Cheadle, Cheshire.

Gloucestershire. — County home for the blind proposed by Public Health Committee; county architect, Shire Hall, Gloucester.

Hastings.—Boys' secondary school, Wishing Tree Road, St. Leonards; borough surveyor.

Hull.—School huts (£11,330); borough engineer.

Keighley.—Central kitchen on site adjoining Ingrow Council School; E. G. Felgate, borough architect, 26, College Street.

Lancashire.—Junior infants' and nursery school, Fiddler's Lane, Irlam; A. T. Nicholson, county architect, Fishergate Hill, Preston.

Completion and equipment of the Great Sankey Senior Council School, Liverpool, for Lancashire Education Committee (£13,000); Quiggin & Gee, architects, North House, North John Street, Liverpool, 2.

Manchester. — Two-storey building, Carruthers Street, Ancoats; T. & S. S. Hurst, Ltd., Phœnix Works, Ancoats, Manchester, 4.

Margate.—Additions and alterations to Westbrook concert pavilion (£7,000); borough surveyor.

Northampton. — Maternity block, General Hospital, Cheyne Walk; governors.

Oldham.—Assembly hall, etc., at Hollins Central School; G. E. Hardy, borough engineer.

Perth.—Cooking centre at Tulloch and proposed new schools for Perthshire Education Committee; county clerk, Perth.

Rowley Regis.—School dining hall and kitchen; Pritchard, Godwin & Clist, architects, Bank Buildings, Kidderminster.

Shropshire.—Extensions, Harlescourt School (£1,700); county architect, Shrewsbury.

West Bromwich. — Laundry at General Hospital; governors.

York. — Factory extension, Leeman Road; York Dry Cleaners, Ltd.

Extensions, brass foundry, Piccadilly; W. Dove & Sons, Ltd.

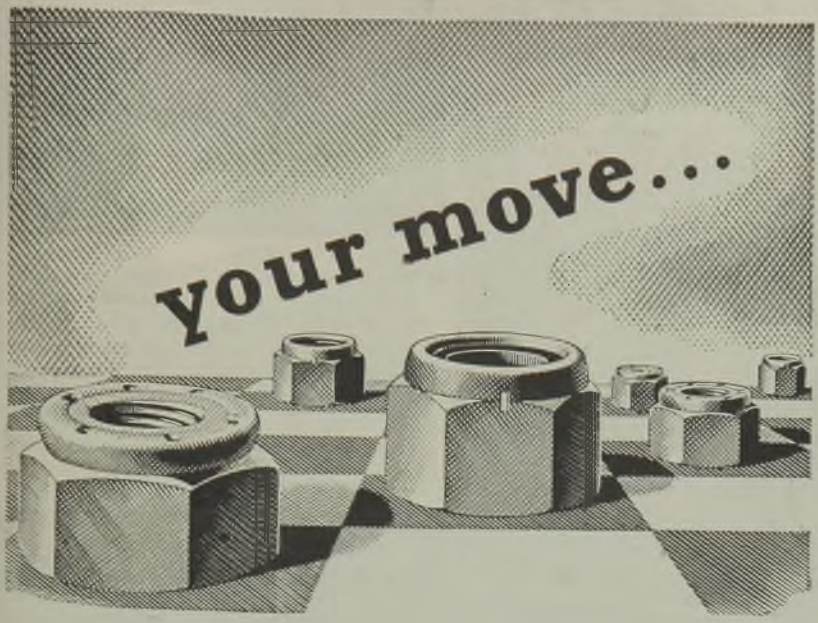
INFORMATION DEPARTMENT

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

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding manufacturers of the following:—

FISK cable tallies.

HOFFMAN cloth cutting and pressing machine.



" These metal diaphragm nuts seem pretty good. Better in some ways than the fibre collar. But of course they may prove a pig in a poke. And millions of the good old Simmonds Nut have been giving faithful service for years past. Perhaps the Simmonds Nut is safer."

Just a moment, you're the designer, of course, and you'll have to decide. But we should like to put a word in. We can only speak for ourselves, but *our* metal diaphragm Stop Nut — the Pinnacle — is no pig in a poke. We foresaw the possibilities of the metal diaphragm nut years ago. The Pinnacle is the result. It is a tried and proved metal Stop Nut, better for some purposes than any fibre collar nut. That's why we spent 5 years developing it. As we said at the start, the choice is yours, and there is a good case for both types. But whether you choose a Simmonds Nut or a Pinnacle Nut you can be sure of one quality — it will do its job.

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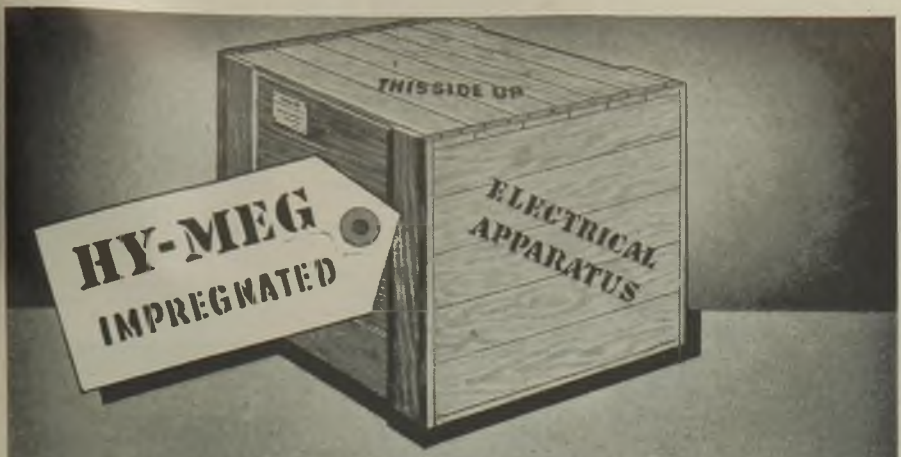

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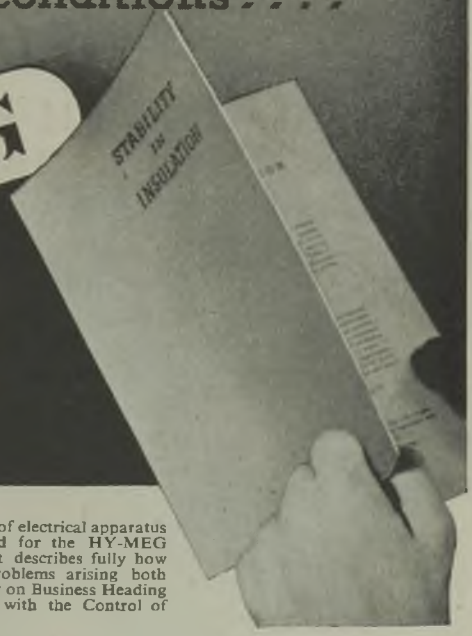

Executives in charge of the production of electrical apparatus calling for impregnation, should send for the HY-MEG Booklet "Stability in Insulation". It describes fully how HY-MEG scientifically overcomes problems arising both in production and in operation. Apply on Business Heading or Card and enclose 2d. to comply with the Control of Paper Orders.

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A moulded plastic electrical component was made with a number of wire inserts and, in order to judge the efficiency and probable serviceability of the component in use, it was essential to know exactly what had happened to the metal inserts. The absence of metallic inclusions or of faulty wiring were also important points, but the particular question involved was this—had any distortion or displacement of the metal parts occurred under the moulding pressure?

It was impossible to judge by external examination, and destructive examination might easily have given a misleading indication. The answer was obtained—quickly and satisfactorily—by radiography. X-ray examination of mouldings confirmed that the manufacturing process was suitable and it left the specimens examined quite unharmed.

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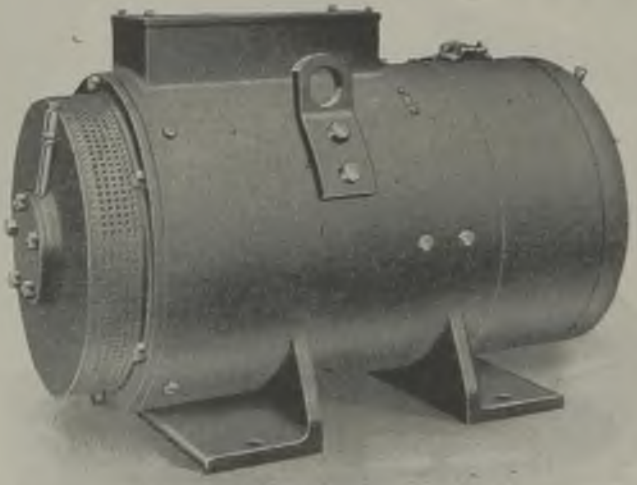
Photograph of moulded component—by courtesy of British Industrial Plastics Ltd.

Radiograph—on 'CrystalleX' film—of same plastic assembly revealing the positions of wire inserts.

Electro Dynamic Construction Co. Ltd.



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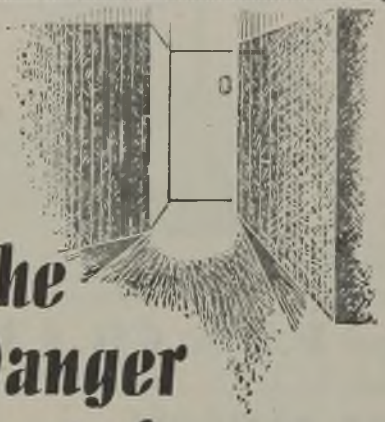

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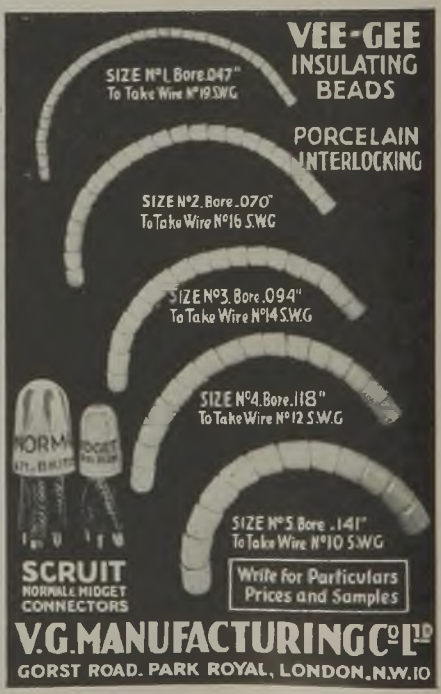

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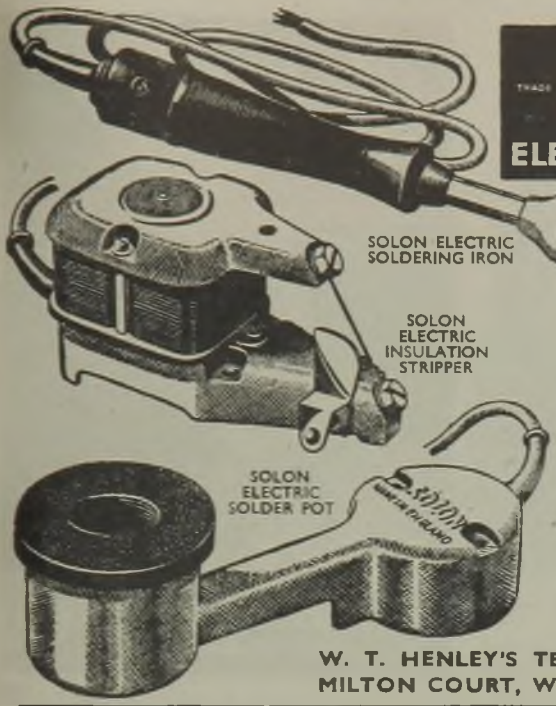

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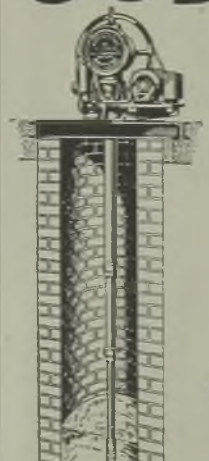

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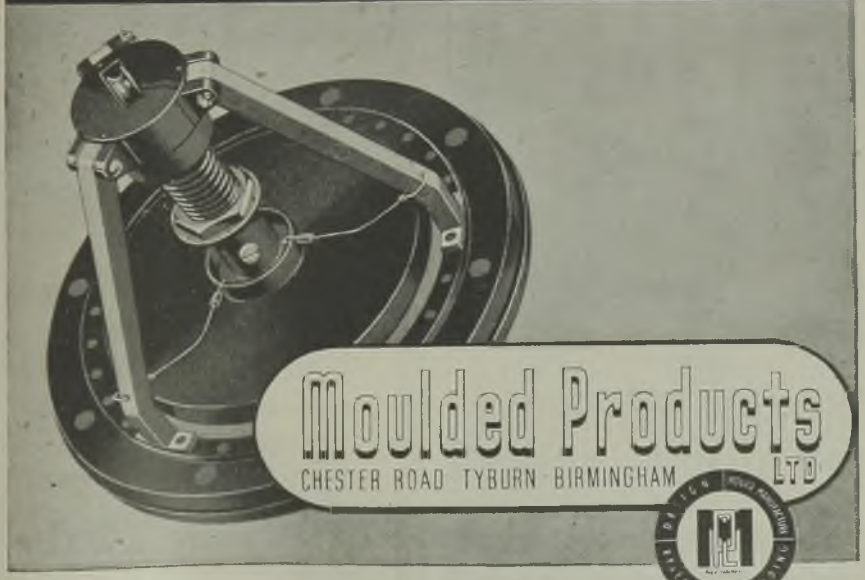

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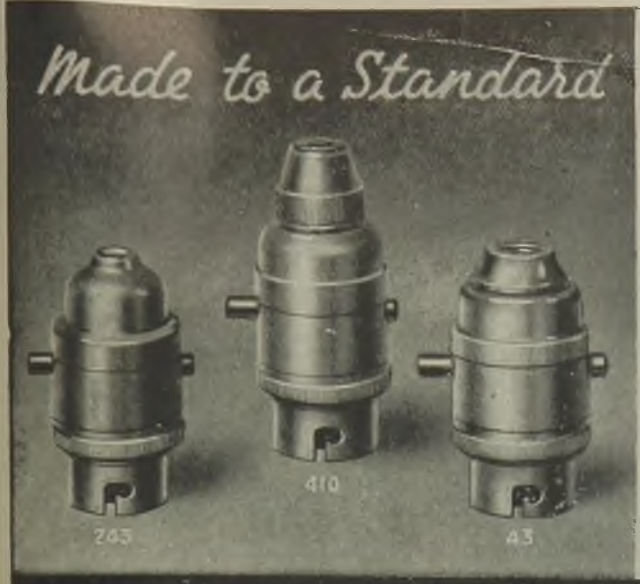

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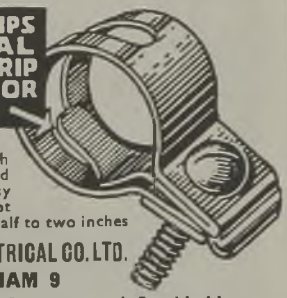

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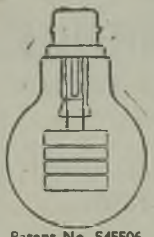

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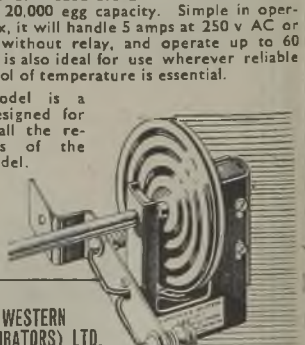

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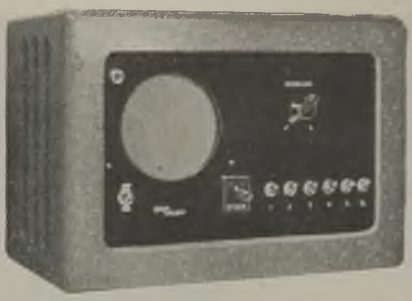

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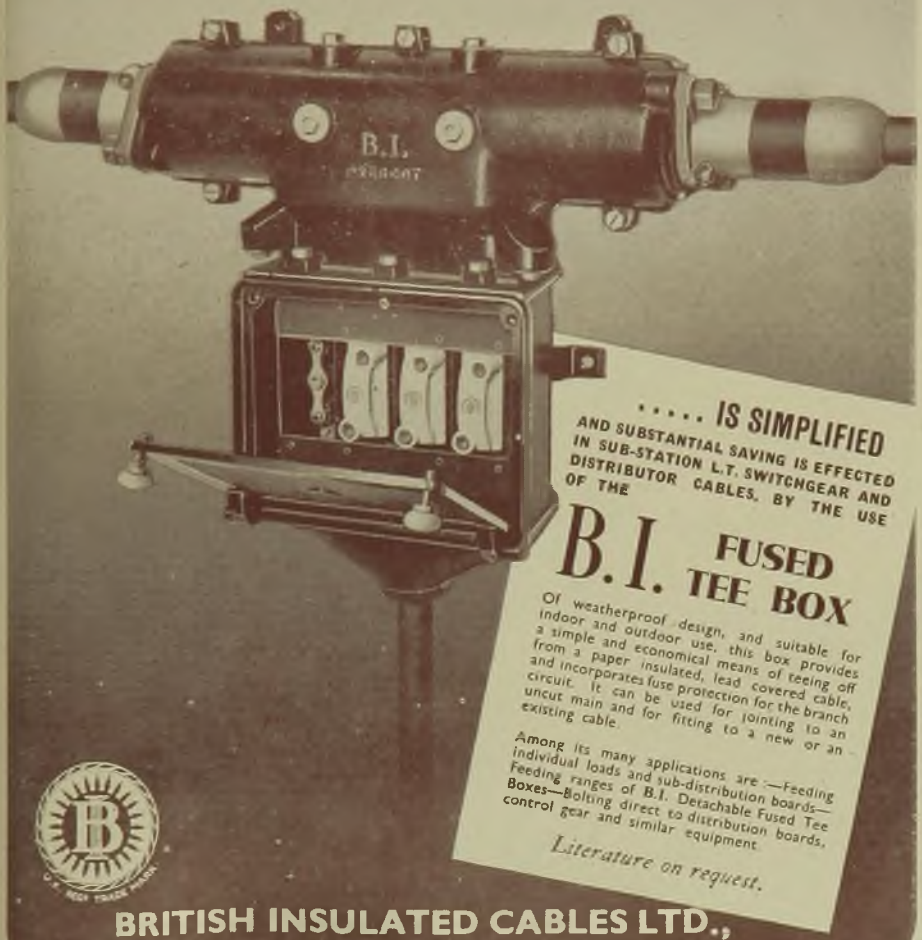

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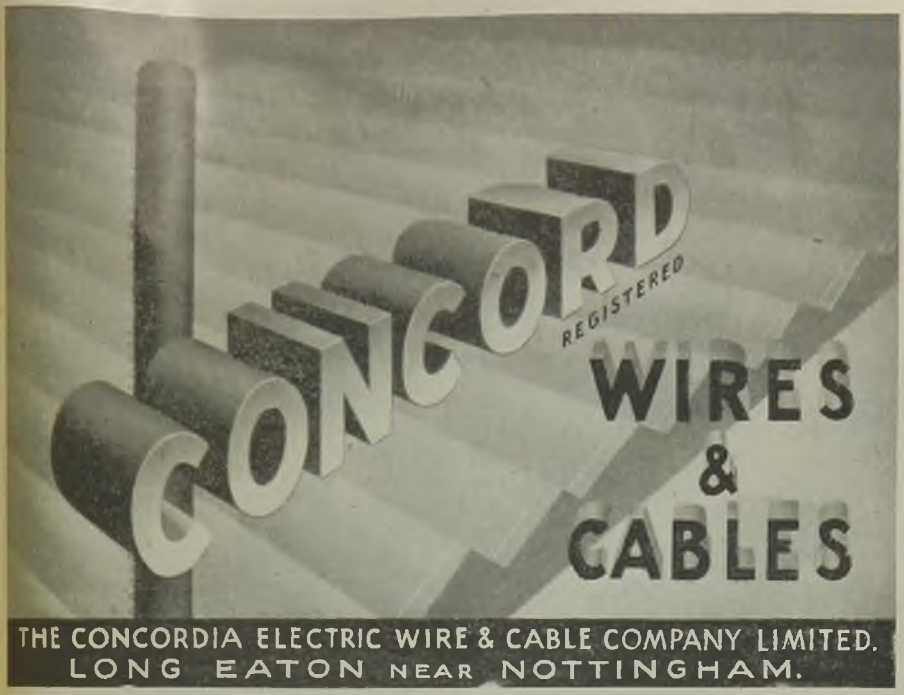

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THE CHARGE for advertisements in this section is 2/- per line (approx. 8 words) per insertion, minimum 2 lines 4/-, or for display advertisements 30/- per inch, with a minimum of one inch. Where the advertisement includes a Box Number there is an additional charge of 6d. for postage of replies.

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

Original testimonials should not be sent with applications for employment.

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Note.—Forms Nos. 29, 30 and 31 are in respect of materials which shall be supplied to any Department of the Corporation.

Forms of Tender and further particulars may be obtained from the City Electrical Engineer and General Manager, East Bridge Street, Belfast.

Sealed Tenders, on official forms only, enclosed in the envelope supplied with the Tender Form, endorsed with the name and address of the firm tendering and marked "Tender for Stores, Electricity Department," must be lodged with the undersigned not later than 4 p.m. on Tuesday, 6th March, 1945.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

JOHN DUNLOP, Town Clerk.

City Hall, Belfast. 1402

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Tenders to be delivered by ten o'clock a.m. on Thursday, 1st March, 1945.

PHILIP B. DINGLE.
Town Clerk.

Town Hall,
Manchester, 2.
2nd February, 1945. 1403

SITUATIONS VACANT

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

CITY OF COVENTRY

Electricity Department

Appointment of Power Station Superintendent

APPLICATIONS are invited for the position of Power Station Superintendent, at the Longford Generating Station, Coventry, from persons qualified to carry out the duties of the post, and having had a sound technical and practical training in all branches of engineering associated with large Electric Power Stations.

The conditions of employment will be in accordance with the National Joint Board Agreement, and the salary equal to Class J, Grade 3 (at present £724, rising to £759 per annum).

A house, the property of the Undertaking, is available to the successful candidate, if he so desires, rent free, with free light and power.

The appointment will be subject to the provisions of the Local Government and Other Officers Superannuation Act, 1937, and the successful candidate will be required to contribute to the Staff Widows and Orphans Pensions Scheme, and pass a medical examination.

Applications, stating age, details of training and experience and accompanied by copies of not more than three testimonials, must be delivered to the undersigned, not later than Monday, 26th February, 1945.

F. W. GODDEN,
Electrical Engineer and Manager.
1353

COUNTY BOROUGH OF BARNSLEY EDUCATION COMMITTEE

Mining and Technical College
(Principal: H. L. Haslegrave, Wh.Sc., M.A., Ph.D., M.Sc., M.I.Mech.E., M.I.E.E.)

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Further particulars and application forms may be obtained from the Principal, Technical College, Church Street, Barnsley, to whom completed applications should be sent by Saturday, 24th February, 1945.

H. V. LIGHTFOOT.
Director of Education.
1372

CITY OF NOTTINGHAM

Electricity Department

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for North Wilford Generating Station (Plant Capacity, 88,500 kW).

Applicants must have experience in the control of large Electric Supply Systems and Parallel Operation of Turbo-Alternator Plant with the Grid System. They must be technically qualified up to at least Ordinary National Certificate in Electrical Engineering and have had a good general engineering experience.

The salaries will be in accordance with the N.J.B. Schedule, as under:—

Shift Control Engineers, Class H, Grade 9A (plus 2½%).
Assistant Shift Control Engineers, Class H, Grade 10.

Extensions are in progress which will increase the capacity of the Generating Station by 60,000 kW, and which should be in operation by September, 1946. A further increase of 52,500 kW is scheduled for 1947.

The appointments will be subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidates will be required to pass a medical examination.

Applications, giving full details of training and experience and including not more than three testimonials, must be delivered to the undersigned by Friday, February 16th, and endorsed "Shift Control Engineer" or "Assistant Shift Control Engineer."

J. E. RICHARDS,
Town Clerk.

Guildhall, Nottingham.
January 29th, 1945. 1375

MIDDLESEX COUNTY COUNCIL

Education Committee

Southall Technical College, Beaconsfield Road, Southall

APPLICATIONS are invited for the following posts; duties to commence in September next:—

(1) Teacher of Mechanical Engineering subjects.
(2) Teacher of Electrical Engineering subjects.
(3) Teacher for Physical Training.

Posts (1) and (2) are mainly connected with part-time day and evening courses for the Ordinary and Higher National Certificate, while Post (3) is mainly connected with the Junior Technical School of Engineering, and candidates are asked to indicate optional subjects they are prepared to teach.

The appointments in the first instance will be of a temporary nature but may become permanent after the war and the salary will be in accordance with the appropriate Burnham Scale (London area).

Application forms and further particulars may be obtained by sending a stamped addressed foolscap envelope to the Principal, to whom completed forms should be returned not later than Wednesday, 28th February, 1945.

H. M. WALTON,
Secretary to the Middlesex Education Committee.
1397

SLONETRIC HOUSE

REQUIRE the following staff and offer good prospects:
Male Clerical Assistant, with trade experience.
Junior Female or Male Clerk, for general office routine.

SLOAN ELECTRICAL CO. LTD.
Wholesale Electrical Distributors.
Albany Rd.,
Leyton, E.10.
LEY. 5015/6/7.
1396

ASSISTANT Switchboard Attendant required, knowledge of A.C. and D.C. switchboard operation. Wages in accordance with No. 10 J.I.C. schedule, at present 2s. 3.46d. per hour. Apply—Power Station Superintendent, Northmet Power Co., Taylors Lane, Willesden, N.W.10. 1388

BOROUGH OF EALING

Electricity Supply Department

APPLICATIONS are invited for the post of Static Sub-station Attendant. Applicants should have had considerable experience in the operation of 22-kV and 11-kV switchgear and instruments.

The conditions of appointment will be in accordance with the D.J.B. No. 10 Area, and the present value of the wages is 2s. 4.79d. per hour for 48-hour shift.

The successful applicant will be required to live in a house now vacant and owned by the Department.

After a satisfactory probationary period 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.

Canvassing any member or officer of the Council, either directly or indirectly, will be deemed a disqualification.

Sealed and endorsed applications, stating age, qualifications, whether married or single, full details of scholastic and technical education, training and experience, positions held, present position and salary, when free to commence duties, and accompanied by copies of recent testimonials, must be delivered at my office not later than Wednesday, February 14th, 1945.

RONALD BIRT,
Borough Electrical Engineer and Manager.

Electricity House,
Ealing, W.5
29th January, 1945. 1367

EXPERIENCED MAN REQUIRED FOR INSIDE SALES AND SERVICE DEPARTMENT

EXCELLENT opportunity is offered to man with good training and experience in handling Sales enquiries and progress work at Head Office of Electrical Switch and Accessory Manufacturers. Applicant must have a general knowledge of electricity as applied to domestic appliances and be capable of dealing with correspondence and telephone enquiries relating to Sales and Service. The situation is permanent and in the London area. Write full particulars of previous experience and salary required to—Box 1377, c/o The Electrical Review.

BUYER. Leading company in London area, engaged in electrical and mechanical engineering and non-ferrous foundry work, are preparing to appoint a First Assistant to their Chief Purchasing Agent. Commencing salary £600 p.a., age 35-40. Full particulars of education, technical and commercial experience and appointments held, to—Box 1401, c/o The Electrical Review.

CHIEF of Test required by large firm of Plastic manufacturers in Home Counties. Applicants must have had plastics experience, trained as mechanical engineers, be fully conversant with quantity production and provide proof of having held similar post. Salary £500 p.a. Applications in writing (no interviews), stating date of birth, full details of qualifications and experience (including a list in chronological order of posts held) and quoting reference No. 135, should be addressed to the Ministry of Labour and National Service Appointments Office, Lloyds Bank Chambers, Hobson Street, Cambridge. 1369

CORPORATION of Kirkcaldy, Electricity Department: Mains Assistant. Applicants must be Corporate Members of the I.E.E. or of equivalent standard, and must not exceed 45 years of age. They should have had experience with a Public Supply Authority and be experienced in erection, commissioning and maintenance of E.H.T. and L.T. distribution systems. Salary in accordance with Grade 8, Class D, of the N.J.B. Schedule, at present £356 p.a. The appointment will be subject to the terms of the Town Council's conditions of service, and a satisfactory medical examination. Copies of three recent testimonials are requested. Applicants should write, quoting D.1075XA, to the Ministry of Labour and National Service, Appointments Department, Central (T. & S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 20th February, 1945. 1374

CROMPTON Parkinson Ltd. invite applications for a post of Technical Editorial Writer. Only those applicants having a thorough technical knowledge of electrical equipment and sound experience of editorial writing will be considered. The position is permanent and progressive. Applications should be made in the first instance by letter addressed to the Chief Personnel Officer, Crompton Parkinson Ltd., Electra House, Victoria Embankment, London, W.C.2. 1376

DOMESTIC Electrical Appliances. Old-established London manufacturers desire to appoint a suitable man capable of taking full responsibility for designing and development. Applicants, who should state their age, must have had experience in a similar capacity and be prepared to justify a salary of £1,000 per annum. Write—Box ZV.74, Deacon's, 5 St. Mary Axe, E.C.3. 6723

ELECTRICAL and Radio Engineering firm in Southern England, manufacturing radio equipment of advanced design, require Test Methods Engineer (ref. No. 646) to take charge of department concerned with preparation and progress of test apparatus requirements and of test and inspection instructions in the pre-production stage. Minimum salary £450 p.a., but a high commencing salary would be paid to a candidate with exceptional qualifications and experience. Also Test Engineering Assistant (ref. No. 1001), with production experience, capable of diagnosis and experiment work in radio testing. Salary £350 p.a. minimum. Applications in writing (no interviews), stating date of birth, full details of qualifications and experience (including a list in chronological order of posts held), and quoting the appropriate reference number, should be addressed to the Ministry of Labour and National Service Appointments Office, 91, Pembroke Road, Clifton, Bristol, 8. 1370

LEADING firm of electrical manufacturers have vacancy for General Representative in London area to handle lamps, cables, accessories, etc. Applications, stating age and experience, to—Box 1343, c/o The Electrical Review.

LONDON firm of Engineers' Representatives require Traveller with knowledge of springs, stampings, spinnings, etc. Write, stating experience, age, and salary required. Full particulars essential.—Box 1389, c/o The Electrical Review.

MANAGER or Superintendent required by firm proposing to develop a line of Automatic Switchgear. Applicant should have experience in the design and production of this type of apparatus. State experience, when at liberty, and present remuneration.—Box 1381, c/o The Electrical Review.

NON-ring Electric Lamp Manufacturers wish to contact Engineer having experience in the manufacture of fluorescent tubes. No offer of engagement can be made until the relevant restrictions on engagement are withdrawn. Applicants should state experience, etc., which will be treated in strictest confidence.—Box 6700, c/o The Electrical Review.

NORTH-West Midlands Joint Electricity Authority: Junior Mains Assistant. Applicants should preferably be graduates or corporate members of the I.E.E. and/or possess a university degree. They should also have had a sound technical training and practical experience on an E.H.T. and L.T. distribution system. Salary £393 per annum in accordance with Class G, Grade 8a, of the N.J.B. Schedule. The appointment will be subject to the Local Government Superannuation Act, 1937, and a satisfactory medical report. Applicants should write, quoting D.1079XA, to the Ministry of Labour and National Service Appointments Department, Central (T. and S.) Register, Room 5/17, Sardinia Street, Kingsway, London, W.C.2, for the necessary forms, which should be returned completed on or before 21st February, 1945. 1386

OVERHEAD Linesmen and Mates required in Wiltshire (Melksham and Corsham areas), must be experienced in erection of overhead lines on wooden poles. Rates of pay per hour: Linesmen, 1s. 11½d.; Mates, 1s. 8½d. Applications should be forwarded to—R.O.3B, 7, Priory Road, Bristol, 8. 1368

OVERSEAS Employment. Leading Eastern Merchants require thoroughly qualified (by diploma) Electrical Engineering Assistant for South India. Age not over 40; commencing salary equivalent of £750 £900 p.a. according to qualifications and experience, plus free passages and leave pay. Four-year agreement in first instance. Applications in writing (no interviews), stating date of birth, full details of qualifications and experience, including present employment; also identity and national service or other registration particulars, and quoting reference No. O.S.337, should be addressed to the Ministry of Labour and National Service, Appointments Department, A.3(A), Sardinia Street, Kingsway, London, W.C.2. 1371

STORES Clerk required by electrical wholesalers. Good knowledge of electrical material essential. Apply—London Electrical Company, 92, Blackfriars Rd., S.E.1. 25

OVERSEAS Employment. The following are urgently required by a large British Engineering Works in Calcutta. Mechanical Engineer (Ref. No. O.S. 494), fully experienced, to take charge of all maintenance and construction work. Minimum salary Rs.1,000 per month. Works Manager (Ref. No. O.S. 495), for Bolt and Nut making department. Minimum salary Rs.1,000 per month. Assistant Works Managers (Ref. No. O.S. 496) for Points and Crossings and Signal Department, machine shop experience desirable; (Ref. No. O.S. 497) experienced in Bolt and Nut making; (Ref. No. O.S. 498) experienced in Roll turning and Roll design. Commencing salary for each post Rs. 700 per month. Two Qualified Engineers (Ref. No. O.S. 499) with Mechanical and/or Electrical experience, for commercial organisation. Commencing salary Rs.700 per month. Qualified Accountant (Ref. No. O.S. 500), experienced in commercial accounting. Commencing salary Rs.700 per month. Cost Accountant (Ref. No. O.S. 501) for Works department. Commencing salary Rs.700 per month. Commencing salaries may be increased if warranted by qualifications and experience and on confirmation appointments will carry incremental scale, provident fund and annual bonus. Temporary war allowance. Free passages. Medical attention and periodic leave in United Kingdom. Applications in writing (no interviews), stating date of birth, full details of qualifications and experience, including present employment, also identity and National Service or other registration particulars, and quoting the appropriate Reference No., should be addressed to the Ministry of Labour and National Service Appointments Department, A3(A), Sardinia Street, Kingsway, London, W.C.2. 1398

SALES Representative required for Atlas Lamps in North London. Remunerative position with excellent post-war prospects for keen, energetic man not liable for military service. Connections in electrical and hardware trade and large users an advantage. Salary, commission and expenses. Write in confidence details of past experience to—Box E.T.7, T.E.I. Ltd., 105, Judd St., W.C.1. 1373

SALES Representative required for Edinburgh, Fife and Border Counties. Permanent progressive post with salary, expenses and commission. Previous experience of electric lamp and light fittings market, and representative with connection preferred but not essential. Write, giving age and full particulars of experience to—Mr. S. W. Fuller, E. K. Cole Ltd., Southend-on-Sea, Essex. 1383

THE Newcastle & District Electric Lighting Co. Ltd., of 81, Westgate Road, Newcastle-upon-Tyne, 1, invite applications for the position of Power Station Shift Engineer at their Close Power Station. The salary for this position will be in accordance with the District Joint Board Schedule, Grade 8, Class F, at present £397 per annum to commence. Applicants must have had good boiler house, engine room and A.C. system switching experience. Knowledge of turbo-generators and rotary converter substations is also necessary. Age 45/50 years. Applications with full particulars not later than February 17th, by letter only, marked "Power Station." 6717

THE Wholesale Fittings Co. Ltd., 50-52, Commercial St., E.1 (Tel. Bis. 4356) and London branches, wholesale electrical distributors, have vacancies for Storekeepers, Office Staff and Counter Salesmen. Please apply above address, any day between 11 and 1. 1344

VACANCIES for Technical and Office Staff. Apply—General Radiological Ltd., 15-18, Clipstone Street, Gt. Portland Street, W.1 (Museum 3121). 6716

WELL-educated young man with technical and commercial abilities. Willing to be specially trained; later to assist manager of engineering concern. Apply to—Box 1391, c/o The Electrical Review.

WORKS Manager required at once for small works manufacturing electrical resistances, rheostats, etc. Knowledge of windings, etc., essential. Good post-war prospects for suitable man. Midland area.—Box 6695, c/o The Electrical Review.

APPOINTMENTS FILLED

Dissatisfaction having been so often expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

ADVERTISER, Chemical Engineer (27), B.Sc., 7 years' experience in electrical industry on technical development and production, desires responsible position with wide scope and good prospects. Special interest plastics and insulation.—Box 6703, c/o The Electrical Review.

B.Sc., age 38, designer of transformers, motors, rheostats, free.—Box 6735, c/o The Electrical Review.

DRAUGHTSMAN-Designer requires spare-time work.—Box 6685, c/o The Electrical Review.

ELECTRICAL and Mechanical Engineer desires post. Long experience in charge of planning installations and maintenance of industrial plant.—W. M., 82, Leighton Rd., Bush Hill Pk., Enfield, Middx. 6684

ELECTRICAL Engineer, age 26, having industrial and teaching experience, desires permanent, responsible and progressive position with Midland firm (would consider other area). Advertiser is particularly interested in electronic industrial applications.—Box 6739, c/o The Electrical Review.

ELECTRICAL Engineer, M.I.E.E., age 55, 30 years' experience (27 in Far East), retired from chief executive position with Colonial Government, now in temporary Government war post, seeks post-war employment; would travel.—Box 1342, c/o The Electrical Review.

ELECTRICAL Engineer requires spare time work, planning and revising installations, estimating, etc.—Box 6738, c/o The Electrical Review.

ELECTRICAL Engineer (30) desires change, London area preferred, but not essential. Now holding executive position covering estimating, layouts, installations and maintenance. Free one month after appointment.—Box 6720, c/o The Electrical Review.

ENGINEER, Grad. I.E.E., with electrical and production experience, desires position as Works Manager or similar post in small firm.—Box 6705, c/o The Electrical Review.

ENGINEER, Radio and Industrial Electronics, desires change, preferably highly technical sales appointment, 13 years' training and experience. At present technical executive in communication instrument factory, staff 700. Age 30, single. Salary £800.—Box 6724, c/o The Electrical Review.

POST in electricity supply sought by A.M.I.E.E., aged 39 years. Wide experience in urban and rural electrification, including administration of construction, operation and sales. Dominions appointment considered. Minimum salary £700 p.a.—Box 6686, c/o The Electrical Review.

QUALIFIED Production Engineer (39), experienced in el. assembly work, incl. winding technique and lamp production, desires change of position offering post-war prospects, preferably development of production methods, tooling investigation, time and motion study, as assistant to works manager. Good references. London area.—Box 6737, c/o The Electrical Review.

TO Manufacturers of Electrical Products: Technical Representative seeks change, sound connection in the Midland counties amongst manufacturers, wholesalers, contractors and large works. Previous experience cables, lamps, etc.—Box 6702, c/o The Electrical Review.

FOR SALE

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

CITY OF MANCHESTER

THE Electricity Committee invites tenders for the purchase and removal of:—

THIRTEEN REYROLLE IRONCLAD COMPOUND-FILLED OIL CIRCUIT BREAKERS (MOVABLE PORTIONS ONLY), TYPE R.1, 400-AMP. CAPACITY, 33-kV, FOR DOUBLE BUSBARS.

Also

63 BOILER TUBES, 17′ 0¼″ × 4″ o/dia. × 8's gauge thick, swelled one end to 4-1/64″ o/dia.
33 STRAIGHT TOP RETURN TUBES, 14′ 5¼″ × 4″ o/dia. × 6's gauge.
23 AS ABOVE, BUT BENT AT ONE END, 14′ 6¾″ × 4″ o/dia. × 6's gauge thick.
(All for Babcock Water Tube Boilers.)

Particulars and Form of Tender from Mr. R. A. S. Thwaites, Chief Engineer and Manager, Electricity Department, Town Hall, Manchester, 2.

Tenders to be delivered by 10 o'clock a.m. on Wednesday, the 21st February, 1945.

PHILIP B. DINGLE,
Town Clerk.

Town Hall,
Manchester, 2.
30th January, 1945. 1379

A.C. and D.C. House Service Meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one year. Repairs and recalibrations.—The Victa Electrical Co., 47, Battersea High Street, S.W.11. Tel. Battersea 0780. 19

GEORGE COHEN, SONS & CO. LTD.

for

GUARANTEED ELECTRICAL

PLANT.

MOTORS, GENERATORS,

SWITCHGEAR,

etc.

WOOD LANE, LONDON, W.12.
Telephone: Shepherds Bush 2070
and
STANNINGLEY, NEAR LEEDS.
Telephone: Pudsey 2241.
Established 1834. 27

REBUILT 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 Phœnix Works, Belgrave Terrace, Soho Road, Handsworth, Birmingham.
Telephone: Northern 0898. 26

WATER TUBE BOILERS IN STOCK

Four	25,000 lbs. evaporation.	175 lbs.	W.P.
Three	20,000 lbs. ,,	175 lbs.	,,
One	15,000 lbs. ,,	175 lbs.	,,
One	12,000 lbs. ,,	175 lbs.	,,
One	12,000 lbs. ,,	200 lbs.	,,
One	12,000 lbs. ,,	160 lbs.	,,
One	9/10,000 lbs. ,,	200 lbs.	,,

We install complete, including brickwork. Economisers, Pumps, Piping Valves, Generating Sets and Motors in stock. Please send us your enquiries; we can give immediate delivery.

BURFORD, TAYLOR & CO. LTD.,
Boiler Specialists, Middlesbrough.
Telephone: Middlesbrough 2622. 32

MAN POWER IS MULTIPLIED

by the installation of

MORGAN ELECTRIC LIFTING BLOCKS.

All capacities A.C. and D.C. Supply.
Delivery from 2-3 days.

MORGAN LIFTWAYS & POWERWAYS,
50, WILKIN STREET, N.W.5.
Gul. 1147 47

MODINSTAL ELECTRIC COMPANY LIMITED
INDUSTRIAL INFRA-RED APPARATUS FOR PAINT DRYING.
COMPLETE EQUIPMENTS OR SINGLE UNITS PROVIDED.
GUARANTEED HEAT GENERATORS.
OLDHAM WORKS, OLDHAM TERRACE, ACTON, W.3, LONDON.
Telephone: Acton 3504/5.
M.E.C. APPARATUS, DULL EMITTER SYSTEM 59

ELECTRIC MOTORS AND DYNAMOS

WE hold one of the largest stocks of New and Second-hand Motors. Secondhand machines are thoroughly overhauled. Inspection and tests can be made at our Works.

For Sale or Hire. Send your enquiries to:—

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

Telephone: 5512-3 Clerkenwell. 13

ECONOMISERS IN STOCK

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

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

BURFORD, TAYLOR & CO. LTD.,
7, Commercial Street, Middlesbrough. Telephone 2622.
65

ARC WELDING MACHINES FROM STOCK

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

MAX-ARC WELDERS LTD.,
190, THORNTON ROAD, CROYDON.
THOrnton Heath 4276-8.
35

BURDETTE & CO. LTD.

Stock

Reconditioned A.C. and D.C. Motors and Starters Equal to New.

STONHOUSE STREET, CLAPHAM, S.W.4.

Day and night service. MACaulay 4555.
17

A large stock of surplus Ebonite, Fibre, Carbon Rods, A.I.D. Turnbuckles, etc., also Searchlights (sale or hire), Mirrors, Lenses, also Winches of our well-known self-sustaining types. Hundreds of thousands supplied during the last 40 years to Govt. depts., corporations and traders.—London Electric Firm, Croydon. 42

A.C. and D.C. Motors, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 4422). 6463

A.C. Motor, 100 h.p., 400/3/50, 580 r.p.m., Crompton, slip ring, with liquid starter, reconditioned.—The Electroplant Co., Wembley, Middx. 1392

A.C. Motors, 1/50th h.p. to 3 h.p., from stock. Also D.C.—The Johnson Engineering Co., 86, Great Portland Street, London, W.1. Museum 6373. 57

AERIAL Cables, all sizes quoted for; good deliveries against Government contract numbers.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6725

ALTERNATING petrol/paraffin Sets, 400/3/50, direct coupled on bed. First-class order. 25 kVA, 35 kVA, 50 kVA, 70 kVA. Fully tested, for quick delivery. —The Electroplant Co., Wembley, Middx. 1393

ALTERNATOR, 500 kVA, 3-p., 50 c., 400/440 v., 750 revs., direct coupled exciter, 2 brgs., on bedplate. —Stewart Thomson & Sons, Fort Road, Seaforth, Liverpool, 21. 58

BELT Grinders or Sanders, 4" wide belt, £5 5s.; 6" wide belt, £10 10s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 52

BEST English Cables, 1/.044 up to 127/.103, deliveries against M.O.S. requirements.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6726

CARBONS, large stocks assorted sizes, solid and cored.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6727

CIRCUIT Breakers and Contactor Switchgear, 3-phase and D.C., 250 amps. up to 1,000 amps. Various sizes in stock.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 1333

ELECTRIC Bulbs of all descriptions for all purposes, from 1.25 v. to 20 v.; Torch Cases, Batteries, Electric Lamps. Prompt delivery.—Suplex Lamps Ltd., 50, Gray's Inn Rd., London, W.C.1. Tel. Holborn 0225. 1266

EXHAUST Fans, new, 14", 1-phase, 200/250 v., 1,900 cu. ft./min., £11 15s.—Southern Ignition Co. Ltd., 190, Thornton Road, Croydon. 75

FILING Cabinets, Steel Cupboards, Shelving, Safes, Card Index Cabinets, Oak Desks, Chairs, Lino, etc.—Office Furniture Co., 184, Vauxhall Bridge Rd., London, S.W.1. Tel.: Victoria 9770 and 8685. 46

FOR disposal, 200 secondhand Benjamin 300-watt Elliptical Angle Reflectors, "X" type, with G.E.S. holders, and 200 secondhand Benjamin 200-watt Elliptical Angle Reflectors with E.S. holders.—British Industrial Solvents Ltd., Salt End, Hedon, Hull. 6718

FOR sale, Patterns, Patents, full Working Drawings, Jigs and tools, together with complete stock of components and electric motors, of coil-winding machines. Orders on hand at the present time.—Box 1380, c/o The Electrical Review.

FOUR identical 150-kW. "Weir Sulzer/E.C.C." Diesel-driven Generating Sets, 220 volt D.C.—Stewart Thomson & Sons, Fort Rd., Seaforth, L'pool, 21. 74

GENERATING Sets for sale, 18 kVA, petrol, 400/3/50; 300-amp. petrol-driven Portable Welding Set; 2½-kW, 220-v. D.C. Crude Oil Set.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 1399

HEAVY duty Arc Welding Plants, 200 amps. Price £31 10s. complete. Also Spot Welders, £36 15s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 50

INSU-Glass covered Plain or Enamelled Instrument Wires, No. 18 s.w.g., No. 40 s.w.g., stock deliveries. —Saxonia, Roan Works, Greenwich, S.E.10. 29

KEEPALITE equipment with 26 chloride accumulators, practically new condition. Can be seen in operation. —E. Powell Ltd., 39, High St., Tunbridge Wells. 6742

LEAD-covered and Armoured Cables, P.I. and V.I.R., various special lines at low prices.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6728

LESLIE 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.). 18

METERS. For sale, 60 2.5-amp., 240-volt, 50-cycle, A.C. House Service Meters. Reason for disposal, capacity too small. Offers to—Engineer and Manager, Workington Corporation Electricity Dept. 1395

MOTOR Generator Set by Crompton Parkinson, new 1932, output 40 kW, 110 volts D.C., input 400 volts, 3-phase, 50 cycles, 67½-h.p. slip ring motor, with starter and switchboard; one 50-kW steam driven Generator Set, Browett/Brush, new 1927, engine 70-h.p., compound, 600 r.p.m., 150 lbs. pressure, dynamo 50 kW, 110 volts D.C., compound interpole, with accessories. All inspected on site London area.—Newman Industries Limited, Yate, Bristol. 1336

MOTOR Generator Sets and Convertors, all sizes and voltages from ½ kW up to 500 kW in stock.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, City Road, London, N.1. Telephone, Clerkenwell 5512, 5513 & 5514. 28

MOTORISED ½" Bench Drilling Machine, 13 speeds, £11 11s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 51

NAMEPLATES, Engraving, Diesinking, Stencils, Steel Punches.—Stilwell & Sons Ltd., 152, Far Gosford Street, Coventry. 14

PHONE 98 Staines. 35-kW Crude Oil Set, 220 vo.; 35-kW Browett Steam Set, 220 vo.; 50-kW Hindley Steam Set, 440/220 vo.; 75-h.p. National Twin Diesel: Three-throw Ramp Pump, 3½" × 6", 700 lbs. w.p.—Harry H. Gardam & Co. Ltd., Staines. 60

PORCELAIN Cleats, 2 and 3 groove, various sizes ex stock, price list.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6729

PORCELAIN Insulators, various sizes in stock, galv. spindles.—Edwardes Bros., 20, Blackfriars Road, London, S.E.1. 6730

PORTABLE Engine-driven Welding Sets, output 75/350 amps., brand new, Government licence to purchase, delivery stock.—Gladiator Welder Sets Ltd., 18, Leicester Road, Sale, Manchester. 49

ROTARY Converters in stock, all sizes; enquiries invited.—Universal Electrical, 221, City Road, London, E.C.1. 16

ROTARY Convertor with 3,000-v. transformer, switchgear and accessories by Metro-Vickers, 175 kW, 220 D.C. volts, 795 D.C. amps., 6-ph., 50 c., 1,000 r.p.m.; Motor Convertor by Bruce Peebles with switchgear and accessories, comprising A.C. Motor, 3,000 v., 50 c., 3-ph., 750 r.p.m., 43.5 amps.; D.C. Generator 200 kW, 910 D.C. amps., 220 v.—Lilleker Bros. Ltd., Doncaster Gate, Rotherham. 1335

ROTARY Convertor, input 420 volts, 28 amps., output 300 volts, single-phase, 50 cycles, speed 1,500 r.p.m. Purchased in 1930 and had very little use. Also single-phase stepdown Transformer, primary voltage 300, secondary voltage 230.—Secretary, War Memorial Hospital, High Wycombe. 1400

SELF-Priming Electric Pumps, 300 g.p.h., £11 11s.—John E. R. Steel, Clyde Mills, Bingley. Phone 1066. 53

SEVERAL Telescopic Tower Ladders ready for essential work. Extensions, Trestles and Steps to order.—Shaftesbury Ladders Ltd., 453, Katherine Road, E.7. Grangewood 3363. 15

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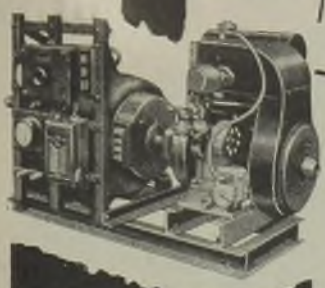

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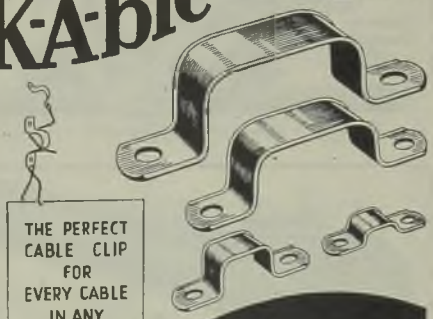

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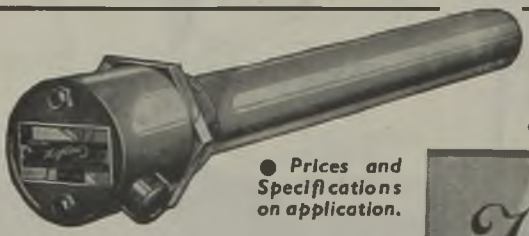

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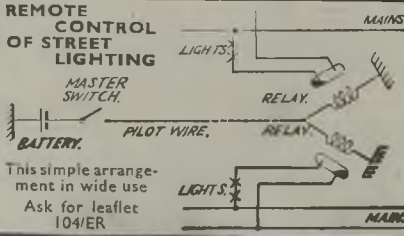

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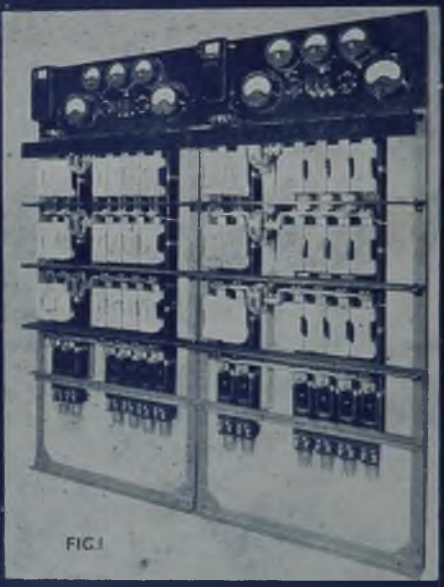

FIG.1

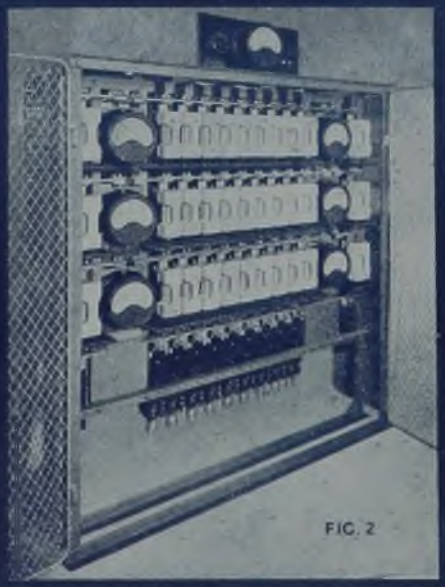

FIG. 2

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