

2448/11 cr

THE P. 6 1/47/II

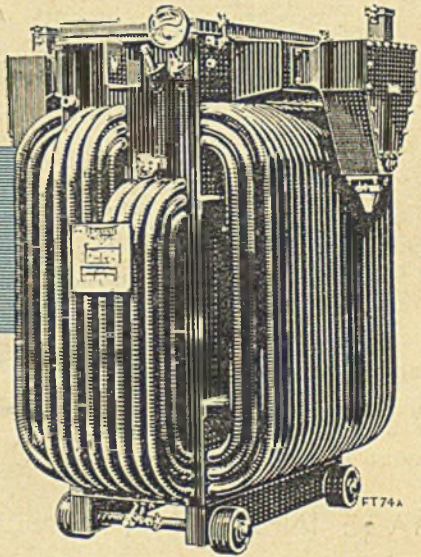
ELECTRICIAN

THE TECHNICAL NEWSPAPER OF THE ELECTRICAL INDUSTRY

19

For your new Transformer

1030



FT74

Specify

Ferranti

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

15 AUGUST 1947
SIXPENCE

FORREST...

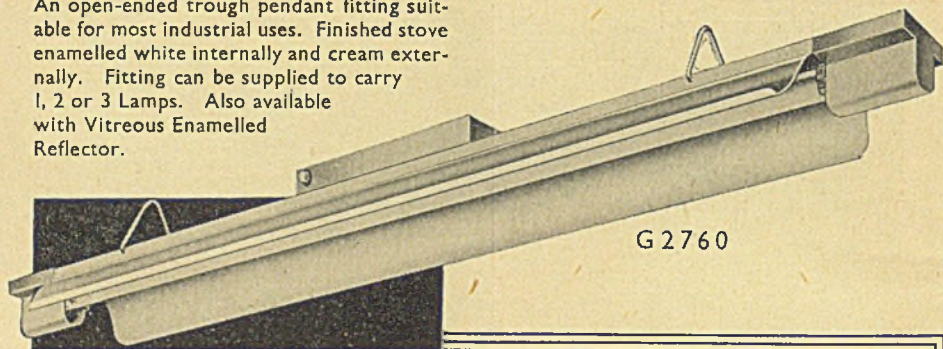
Members of the
Electric Light Fittings
Association

Lighting Specialists

Foremost in Fluorescent

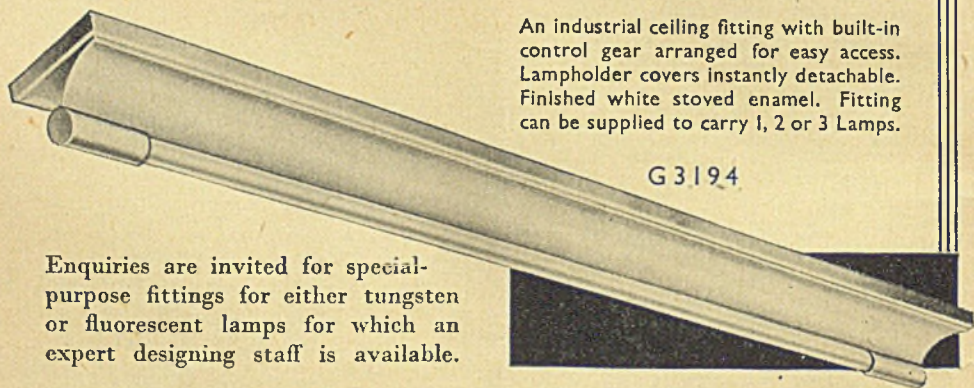
The Fittings illustrated are available for **IMMEDIATE DELIVERY**

An open-ended trough pendant fitting suitable for most industrial uses. Finished enamelled white internally and cream externally. Fitting can be supplied to carry 1, 2 or 3 Lamps. Also available with Vitreous Enamelled Reflector.



G 2760

An industrial ceiling fitting with built-in control gear arranged for easy access. Lampholder covers instantly detachable. Finished white stove enamel. Fitting can be supplied to carry 1, 2 or 3 Lamps.



G 3194

Enquiries are invited for special-purpose fittings for either tungsten or fluorescent lamps for which an expert designing staff is available.

MADE IN ACTON, LONDON.

Orders are accepted, subject to our standard conditions of sale, a copy of which will be forwarded on request.

OSBORNE RD., ACTON, LONDON, W. 3.

ESTD. 1780

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AND SON LTD

Telephone: ACORN 5081 (5 lines)
Telegrams: GEFSOL, EALUX, LONDON

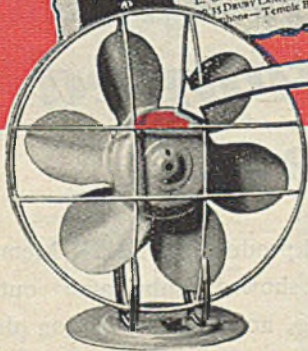
TRAPINEX *Paint* TRANSFERS

The Finishing Touch!

LINK YOUR PRODUCT AND PUBLICITY BY BRILLIANT TRAPINEX PAINT TRANSFERS

The method of marking a product by means of brilliantly coloured paint printed "Trapinex" transfers affords the perfect link up with other forms of publicity at point of sale. L. G. Hawkins & Co. Ltd. use this method of tying the nameplate in their press advertising with the same design of "Trapinex" transfer on their electrical products.

"Trapinex" (Regd.) Transfers offer all the advantages of paint over printer's ink. More brilliant colours in any number, bold design, long lasting durability, washability, and weather proof qualities.



Your Marking Problems Solved!

"Trapinex" Paint Transfers (Patd.) are used for an immense variety of purposes on products as diverse as cosmetics and heavy machinery for brand marks, name plates, warnings, diagrams, decorations, etc., as well as for packaging, display and publicity.

Direct printing in paint on gleaming plastics by the "Trapinex" process provides display cards for window or counter display at point of sale, or for railway and tube sights.

Advice freely given, but when you write for prices please state:—(1) Size, (2) Quantity, (3) Number of colours, (4) Purpose, (5) Wording required, (6) A rough sketch would help. WE HAVE NO STOCK LINES OR PRICE LISTS.

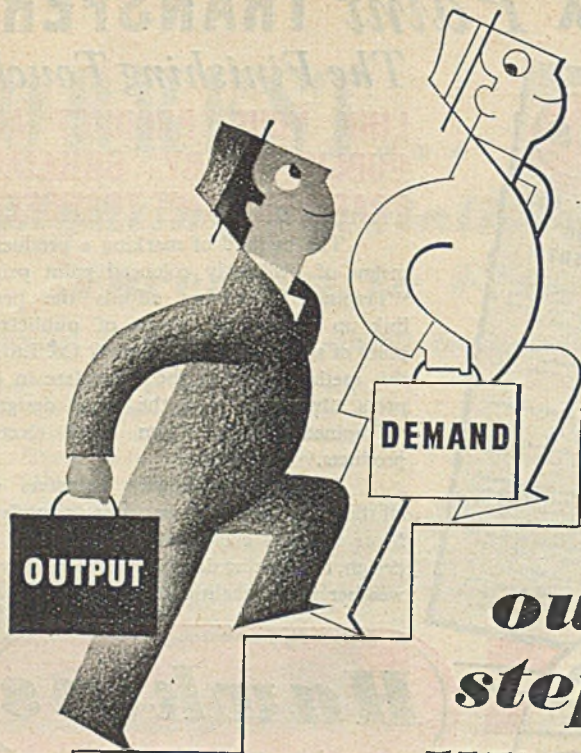
WINDOW PUBLICITY

For window display applied direct to the glass in open designs, "Trapinex" Paint Printed Transfers have unique advantages—no film or paper background obscures the goods, a point which retailers fully appreciate.

TRAPINEX THE *Painted* WORD
PREFABRICATED



TRAPINEX (Regd.) Paint Transfers are fully patented and manufactured only by TRAPINEX LTD., 19, Commerce Works, 43, Commerce Road, Wood Green, London, N.22
Phone: Bowes Park 6811. Grams: Trapinex, Wood, London. Cables: Trapinex, London.



output stepped up...

In the last six months we doubled production of 212K Memroy all-insulated switch-fuses. We showed substantial output increases in other M.E.M lines too, and the production drive continues. Before very long, the sheer weight of M.E.M. output will certainly make itself felt. But industry and housing are still demanding tremendous quantities of M.E.M. gear and, in spite of this fine response from the factory, demand still keeps ahead of supply. Your wholesaler has the difficult job of sharing out such supplies as are available. Your best plan is still to keep in touch with him.

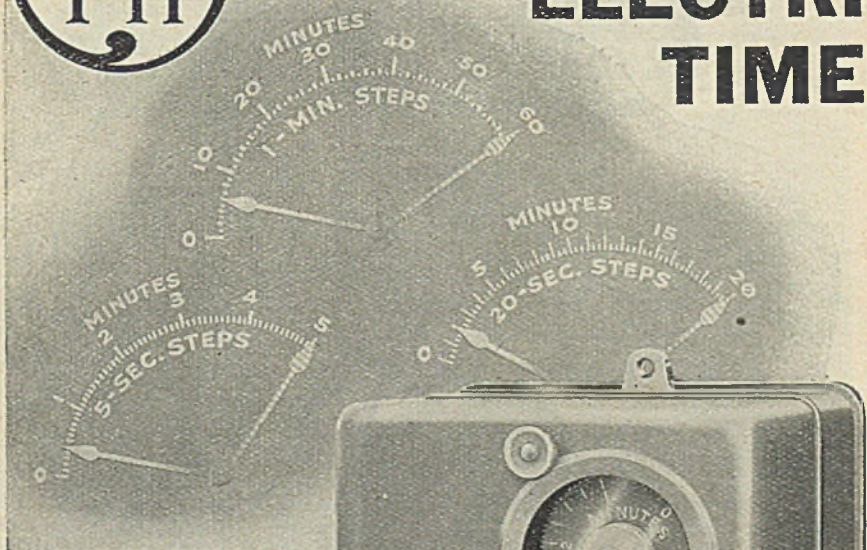
MEM

Switch, fuse and
motor control gear,
electric fires and localised
lighting equipment

Midland Electric Manufacturing Co. Ltd., Birmingham, 11 · Branches in London & Manchester



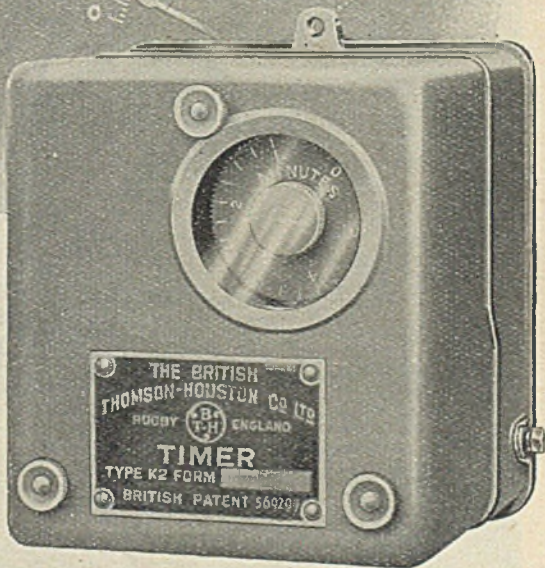
INDUSTRIAL ELECTRIC TIMER



Designed to withstand frequent and arduous service in industry, the BTH Timer has three ranges, namely:—

*up to 5 min. in 5 sec. steps,
up to 20 min. in 20 sec. steps,
up to 60 min. in 60 sec. steps.*

It is controlled by any form of pilot switch or push button and will give lasting trouble-free service.



Write for list No. 5642-5

BTH

RUGBY

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, RUGBY, ENGLAND

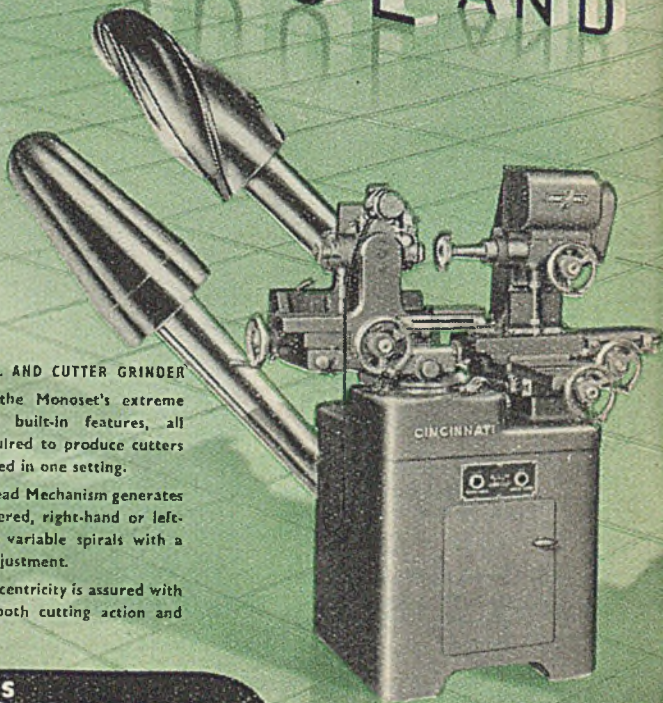
A 3761



CINCINNATI

Covers every aspect of

TOOL AND



MONOSET TOOL AND CUTTER GRINDER

Because of the Monoset's extreme flexibility and built-in features, all operations required to produce cutters can be completed in one setting.

The Spiral Lead Mechanism generates straight or tapered, right-hand or left-hand, infinitely variable spirals with a single simple adjustment.

Excellent concentricity is assured with subsequent smooth cutting action and long tool life.

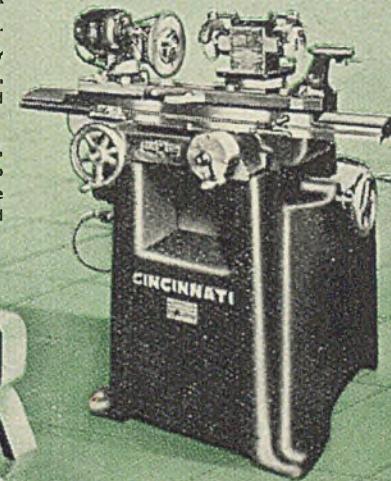
**CHARLES
CHURCHILL
& CO. LTD.**

COVENTRY ROAD : SOUTH YARDLEY : BIRMINGHAM, 25

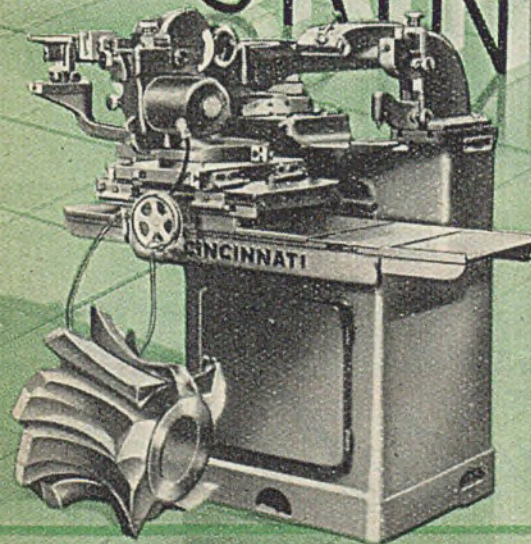
No. 2 TOOL AND CUTTER GRINDER

This machine requires no introduction. Its unusual flexibility permits a variety of milling cutters, reamers, form tools, hobs, etc., to be easily, quickly and accurately ground.

Where these machines are installed, reductions in sharpening time of 15% to 25% are regularly effected—a valuable consideration when planning increased production.



CUTTER GRINDING



CONTOUR CUTTER GRINDER

Introducing for the first time the advantages of contour ground milling cutters fully compensated for either undercut or helical teeth or, if required, both together.

Master template provides required form.

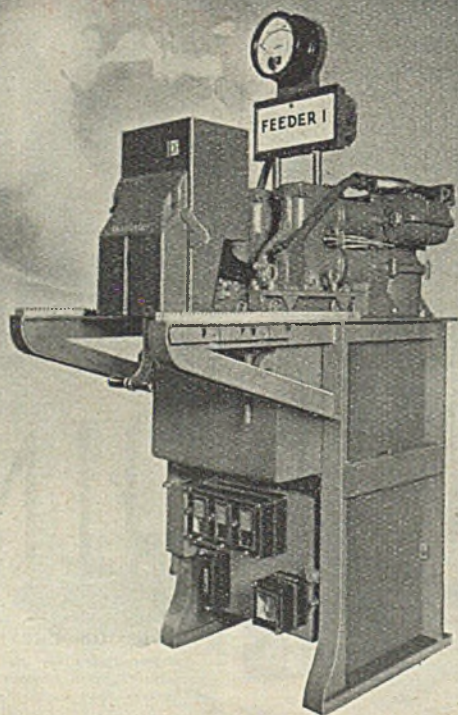
Machine copies form with any desired clearance angle.

A simple angular setting compensates for "undercut".

Interchangeable "helix" cams mount on the left end of the work spindle and compensate for helix angle.

The result—a new standard of form milling.

Also grinds:—Circular Form Tools.
Single Point Form Tools.



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Switchgear

HEBBURN Co. DURHAM ENGLAND

**1,509,600
CUSTOMERS!**

The estimated number of electric cookers in service indicates YOUR potential market for SIMMERSTATS!

The SIMMERSTAT (retail 21/-), fitted in place of the usual 3-heat or 4-heat hot-plate switch, MODERNISES any cooker, providing PERFECT SIMMERING control.

Every housewife that cooks by electricity is a potential customer. Write now for Trade Terms for immediate delivery to:

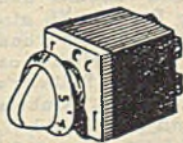
SUNVIC CONTROLS LTD.
STANHOPE HOUSE, KEAN ST., LONDON, W.C.2

Phone: TEMple Bar 8202



The **SIMMERSTAT**

The
All-heat
HOTPLATE
CONTROL



The Process of Wire Drawing (No. 1)



Wire DRAWING

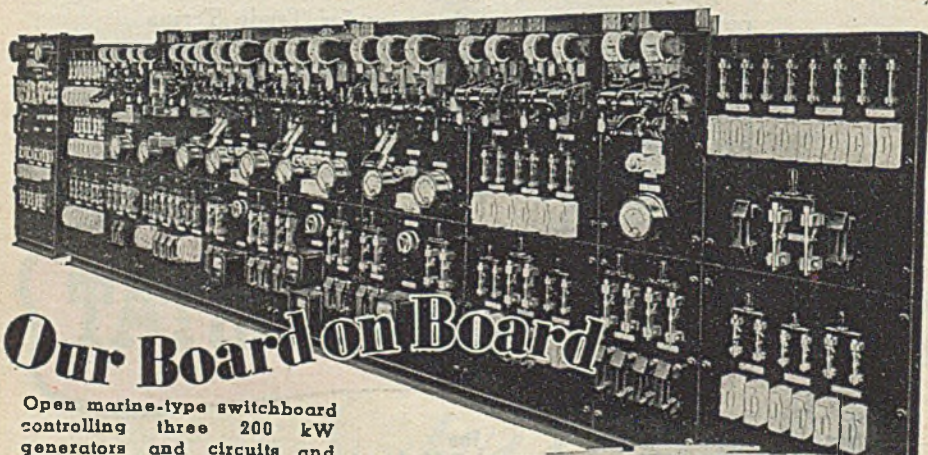
Wires, from thickest to medium gauge, are drawn in one operation on all-British high speed machines using Tungsten Carbide and Diamond dies, giving perfect finish and gauge to meet the most exacting specifications required to-day.

R. H. SYMONDS



Ltd.
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Works : Enfield, Middlesex

 E.34



Our Board on Board

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

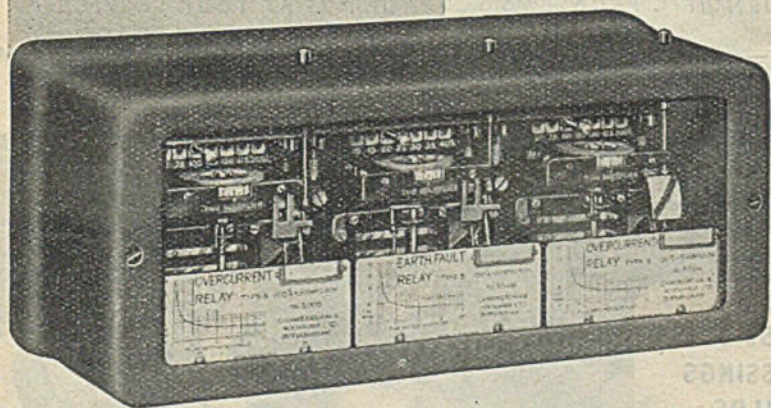


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A New

development in

PROTECTIVE RELAYS



... new in design, efficiency, simplicity and scope.

This example from the range of new protective relays developed by CHAMBERLAIN & HOOKHAM LTD., is an overcurrent and earth leakage relay which combines most advantages of earlier types of protective devices with a number of especially valuable features.

For full information apply to the Manufacturers:

CHAMBERLAIN & HOOKHAM LTD., BIRMINGHAM

**LOW CONSUMPTION
HIGH SENSITIVITY
HIGH TORQUE
READY ACCESSIBILITY
EASY READING**

INSPECT AT SPEED

SEE WHAT IS HAPPENING WITHOUT STOPPING FAST RUNNING MACHINES

- ★ By installing a **Scophony Electronic Stroboscope** detailed inspection of all moving parts can be made without slowing or stopping machines; or interfering with production in any way. The Stroboscope is a highly sensitive instrument which arrests visual motion, thus allowing the effect of vibration, bounce and wear to be observed in all rotating and reciprocating mechanisms.
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- ★ The **Scophony Stroboscope** is the wonder of this mechanical age and no wise maintenance engineer can afford to be without one. It is indispensable in mills, factories, garages, research laboratories, locomotion and a host of other places.

—it's another SCOPHONY PRODUCT

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FOR SCIENTIFIC PROBLEMS SCOPHONY IS AT YOUR SERVICE

UNIVERSAL TOOLS LTD

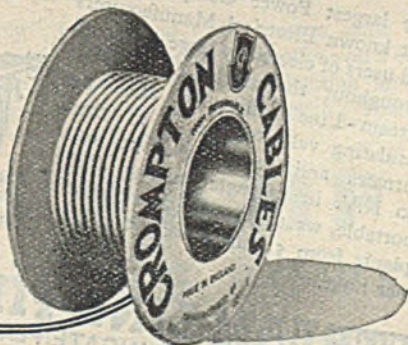
PRESS TOOLS
PRESSINGS
MOULDS
AND JIGS

TRAMWAY PATH · MITCHAM · SURREY

**VANTAGE TO
WIREMAN**



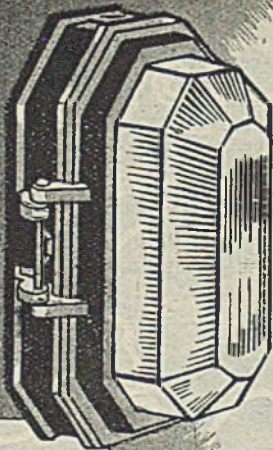
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Crompton
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CROMPTON PARKINSON LTD, ASTOR HOUSE, ALDWYCH, LONDON, W.C.2

Telephone : CHAncery 3333

Telegrams : Crompark, Estrand, London



CAT. No. 6291
THE NEW
DIE-CAST FITTING

PRISMALUX
DIRECTIONAL
LIGHTING UNITS
BY

Wardle

This new Die-cast Prismatic Fitting replaces the old style bulkhead fitting. For horizontal or vertical mounting.

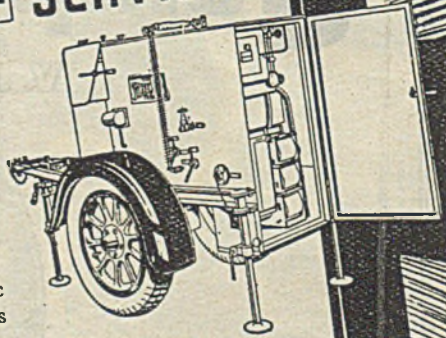
Write for booklet E/L.580/1.

THE WARDLE ENGINEERING COMPANY LTD.
OLD TRAFFORD, MANCHESTER 16. Tel. TRAfford Park 1801 (3 Lines)
London Office: 34, VICTORIA ST., LONDON, S.W. 1

dm WA 3

AN ESSENTIAL SERVICE

The largest Power Companies, the best known Electrical Manufacturers and users of electricity large and small throughout the world employ the Stream-Line Filter to raise the insulating value of the oil in transformers and switch gear to over 60 K.V. in a single passage. Fully portable, weatherproof and automatic plants from 5 gallons to 500 gallons per hour.



STREAM-LINE FILTERS LTD.
HELE-SHAW WORKS, INGATE PLACE, LONDON, S.W. 8

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NEXT TIME HELL GET AN ATLAS

Atlas lamps brighten up even the most brilliant ideas-men . . . throw new light on obscure situations . . . stay steady and strong when the human element fails. More and more efficient people are specifying Atlas lamps because they have checked up that for long life and sheer light value there is no better lamp.

Every Atlas lamp is guaranteed to be made to strict B.S.I. specification and is tested at each stage of manufacture. Write for terms today.

A COMPLETE LIGHTING SERVICE

Our lighting engineers will supply you with exactly the lighting you need, exactly where you need it. We design and supply modern fittings using new materials boldly, yet

planned with common sense and 'eye-appeal'. We offer you a complete, individual lighting service. Why not get in touch? There is no obligation.

ATLAS LAMPS



for STAYING POWER

A136

THORN ELECTRICAL INDUSTRIES LTD., 105-109 JUDD ST., LONDON, W.C.1 Tel. Euston 1183

NORTHERN BRANCH: STEVENSON SQUARE, MANCHESTER 1. TEL. CENTRAL 3185

N.E. DEPOT: 46 SANDHILL, NEWCASTLE-ON-TYNE 1. TEL. NEWCASTLE 24068

70 *Years on*

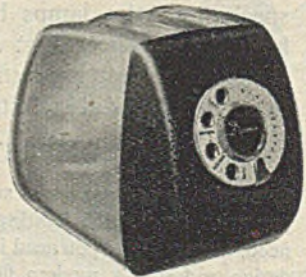


Ericsson

TELEPHONES Ltd.
22, LINCOLN'S INN FIELDS
W.C.2

THE MODERN TREND

in domestic electrical equipment is a vital factor in the competitive market of today. No dealer can afford to display or attempt to sell, an appliance which is not completely up-to-date in design and wholly reliable in performance . . . as, in turn, no housewife can resist the clean modern lines and labour-saving efficiency of DIAMIX products.



THE AUTOMATIC TOASTER

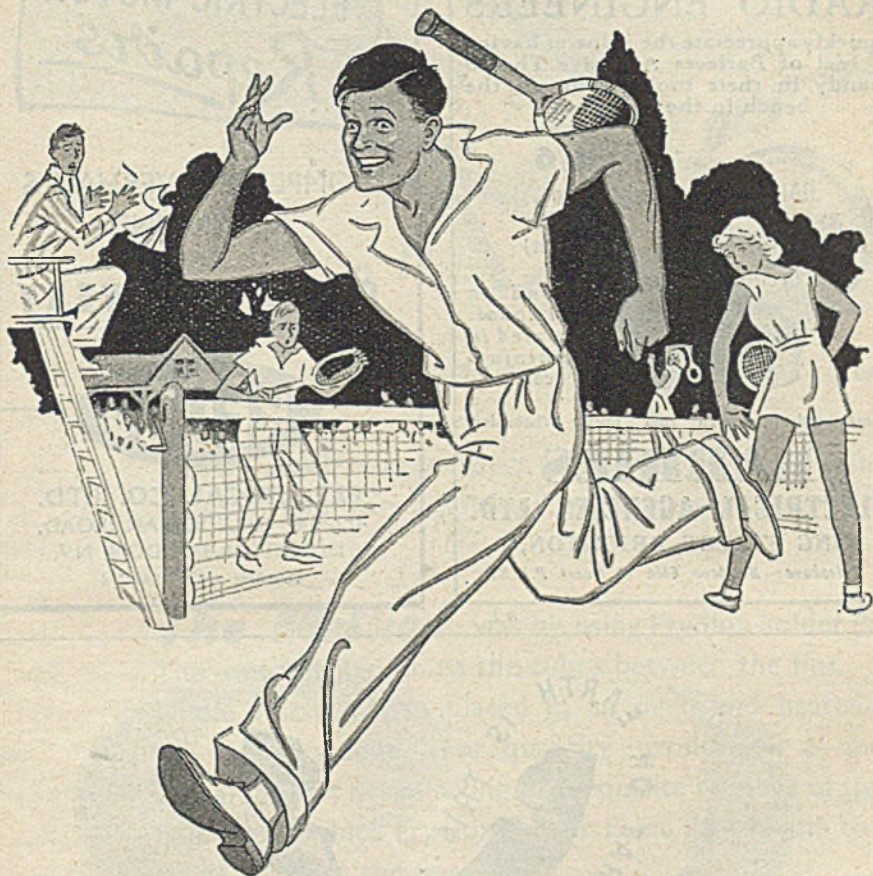
is but one example from the DIAMIX range, which also includes the "Junior" and "Push button" Cookers, Thermostatic Irons, Fires and Boiling Rings. Please write or 'phone for New Season's Catalogues.

BRITISH

Diamix LIMITED

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“Came at me like a cannon ball—the idea that it can be made in rubber. Must speak to Lorival about it!”

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- ★ *While each material possesses its own characteristics, in many applications one is as suitable as the other, and in these times of scarcity it is as well to have this in mind. Firms in need of components, complete articles or packaging should seek our advice, which is based upon wide experience and specialized knowledge. We produce articles in rubber and ebonite as well as plastics, and our service includes design and manufacture.*

LORIVAL PLASTICS



UNITED EBONITE & LORIVAL LIMITED
LITTLE LEVER, NEAR BOLTON, LANC'S

ELECTRICAL AND RADIO ENGINEERS

quickly appreciate the value of having a reel of Barlecta Adhesive Thread handy in their tool kit or on the bench in the workshop.



4/6
per 100 yard
REEL
(subject)

Wound on
metal spool.
Enclosed in
aluminium
case.

Please order through your usual Wholesaler.

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ELECTRICAL AGENCIES LTD.

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Telephone: Brighton 8366 (7 lines) P.B.X.

B.I.

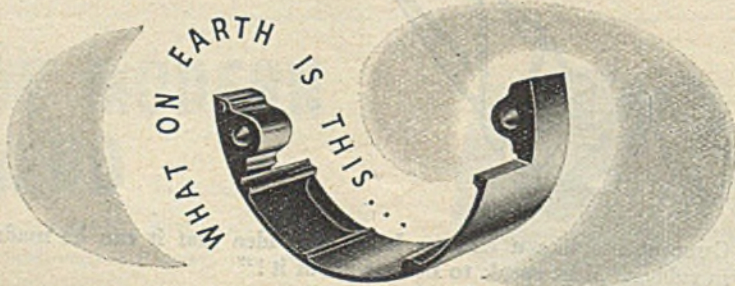
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COMPLETE OVERHAULS
REWINDING
AND
QUICK DELIVERY

REDCO

ELECTRICAL CO. LTD.
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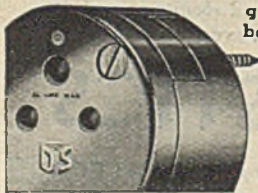
Telephone: NORTH 4871-2



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

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

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

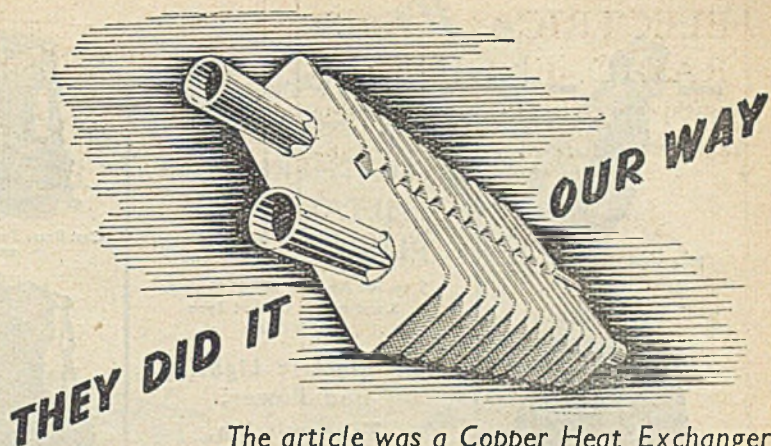


FUSED PLUG AND SOCKET



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

EIM47



The article was a Copper Heat Exchanger

The Job was to sweat on the fins using a minimum of solder and man hours and without employing skilled labour.

The Method was by using Fryolux Solder Paint. This was trickled on to the tubes between the fins. The whole unit was then placed in an oven and heated and the job was done. For quantity production a special container was made having the requisite number of spaced holes from which Fryolux Solder Paint flowed on to the tubes between the fins.

FRYOLUX Solder Paint FOR TINNING AND SWEAT SOLDERING

Apply by brushing, spraying or dipping—heat by any convenient means—and the job's done.

70% SAVING IN MATERIAL

50% SAVING IN LABOUR COSTS

FRY'S METAL FOUNDRIES Ltd., Tandem Works, Merton Abbey, London, S.W.19
And at MANCHESTER, GLASGOW, BRISTOL and DUBLIN.



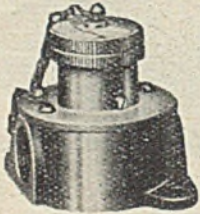
**WEATHERPROOF
METAL - CLAD
PLUGS & SOCKETS**

5 to 300 Amp. 250 / 500 Volt.
3 and 4 Pole Earthed Type
and 2 Pole.

*For Electric Lighting
and Power,
Transmission,
Communication,
Portable Tools, etc.*



Plug with Guard Ring to protect Pins



C.I. Terminal Socket & Cover

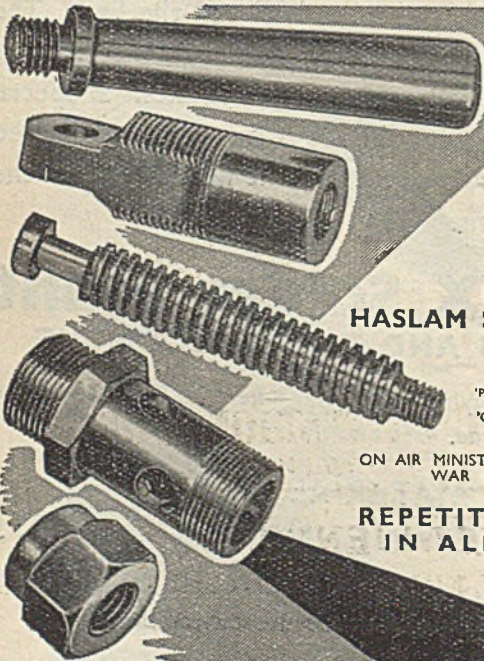


Cast Brass Terminal Socket and Cover



Through Socket and Cover

Manufactured by SIMMONDS & STOKES LTD.
VICTORIA HOUSE, SOUTHAMPTON ROW, LONDON, W.C.1 HOLBORN 2637



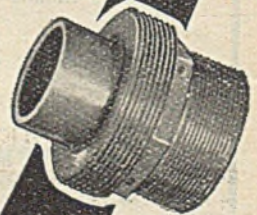
**THE
CASTLE**

**ENGINEERING CO.,
(NOTTINGHAM) LTD.
HASLAM ST., CASTLE BOULEVARD,
NOTTINGHAM**

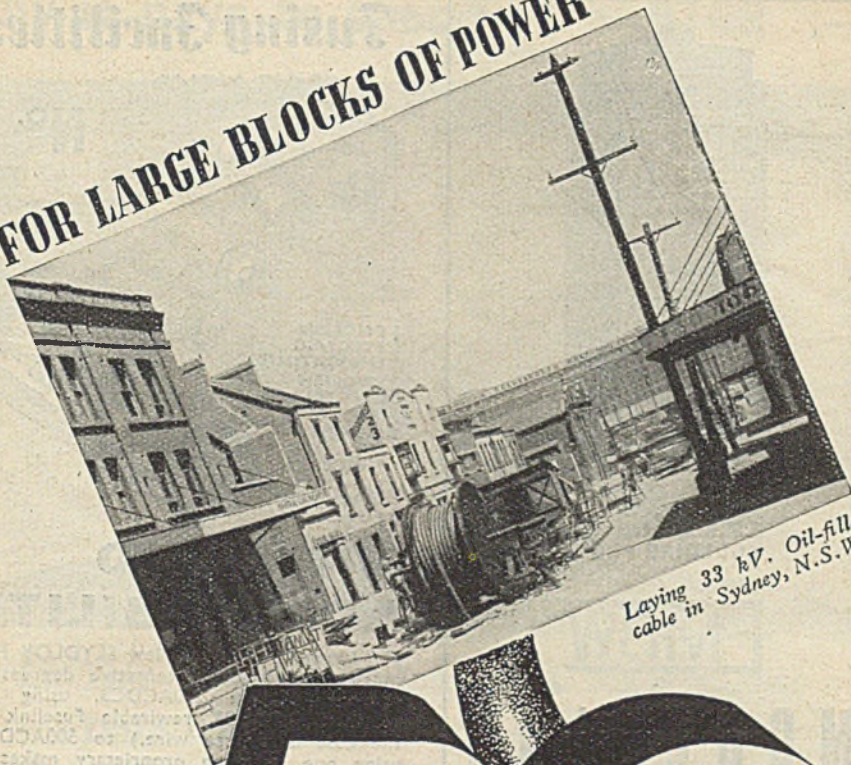
'PHONE: NOTTINGHAM 46068 (3 Lines)
'GRAMS: CAPSTAN, NOTTINGHAM

ON AIR MINISTRY, ADMIRALTY AND
WAR OFFICE LISTS

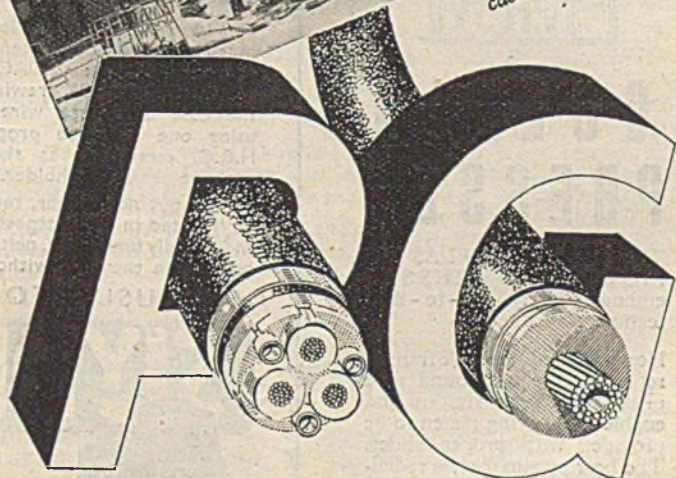
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IN ALL METALS**



FOR LARGE BLOCKS OF POWER



Laying 33 kV. Oil-filled
cable in Sydney, N.S.W



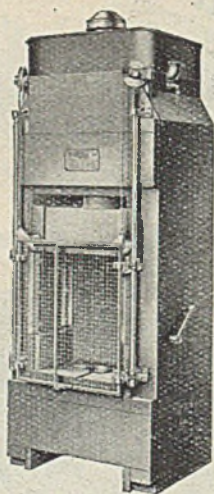
OIL-FILLED SUPER TENSION CABLES

33 kV to 330 kV

PIRELLI-GENERAL

MANUFACTURERS OF EVERY KIND OF ELECTRIC CABLE

Advt. of Pirelli-General Cable Works Ltd., Southampton.



E.M.B.W. 160 TON
MOULDING PRESS.

FMBW

MOULDING PRESSES

The new EMBW PLASTIC MOULDING PRESSES embody many up-to-date features:

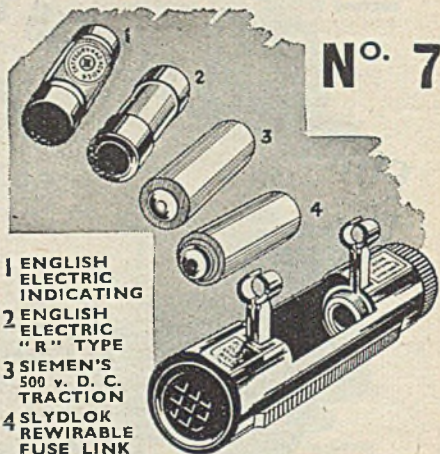
Heavy welded steel side frames, replacing the old round type pillars, give great rigidity and enable the moving platen to be provided with proper slides. The bearing surfaces lie radially from the centre of the platen so that any expansion due to variations in temperature has no effect on the working clearance.

Made in up-stroke and down-stroke types. 25 to 160 tons.

E.M.B. CO.
LTD.

**WEST
BROMWICH**

Fusing Facilities



N^o. 7

- 1 ENGLISH ELECTRIC INDICATING
- 2 ENGLISH ELECTRIC "R" TYPE
- 3 SIEMENS 500 V. D. C. TRACTION
- 4 SLYDLOK REWRILABLE FUSE LINK

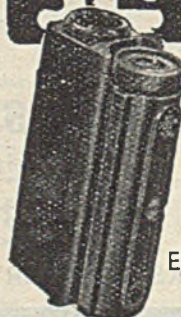
SIMPLIFIED ADAPTABILITY

The larger sizes in the New SLYDLOK Fuse range provide four alternative degrees of protection, from 250ACDC3, using the standard SLYDLOK rewirable Fuselink (at the cost of a fuse wire,) to 500ACDC4, using one of three proprietary makes of H.R.C. cartridges, as sketched above, all without change of holder.

Lower, but not higher, rated cartridges may be inserted in each respective size fuseholder and, equally important, neither can be inserted or used in the base without the other.

EXCLUSIVE TO THE NEW

SLYDLOK



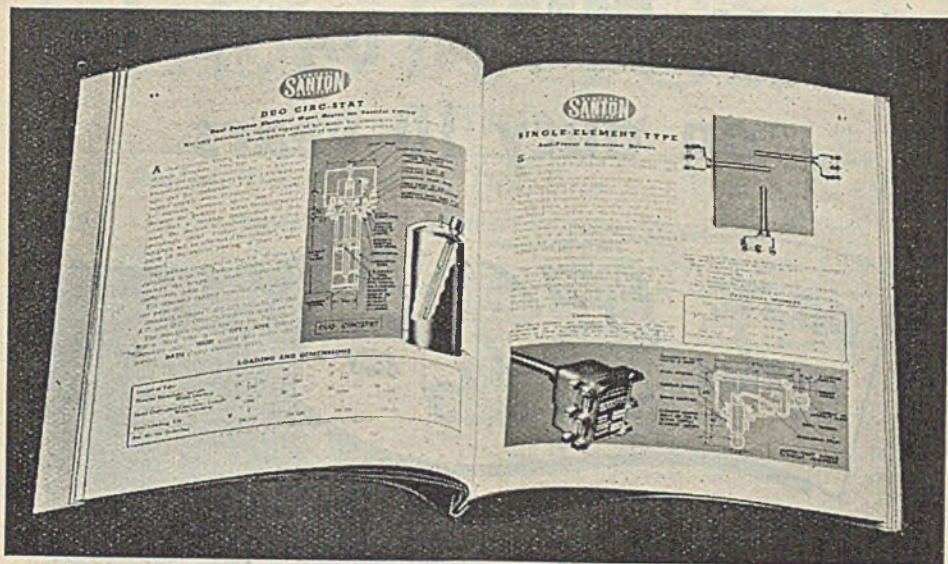
The fuse you will
eventually use

EDWARD *Wilcox*
& Co. Ltd.

Sharston Road, Wythenshawe, Manchester.

dm E.W. 13

Why it pays to specify "SANTON":—



1. The most complete and convenient Data-book in the industry . . .

No more valuable time wasted hunting up the right water heater to suit Mrs. Smith! All the information you require is at your fingertips in the new Santon Data-book. Contents of this handy reference volume include:

SPECIFICATIONS of all SANTON electric heaters as well as details of loadings and sizes.

WORKING DRAWINGS to help make installation even more simple.

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5934A

Trade Mark "SANTON"

15 AUGUST 1947

THE ELECTRICIAN

15,000 NIFE BATTERIES

on duty 10 years

cost
only

52!

for repairs!

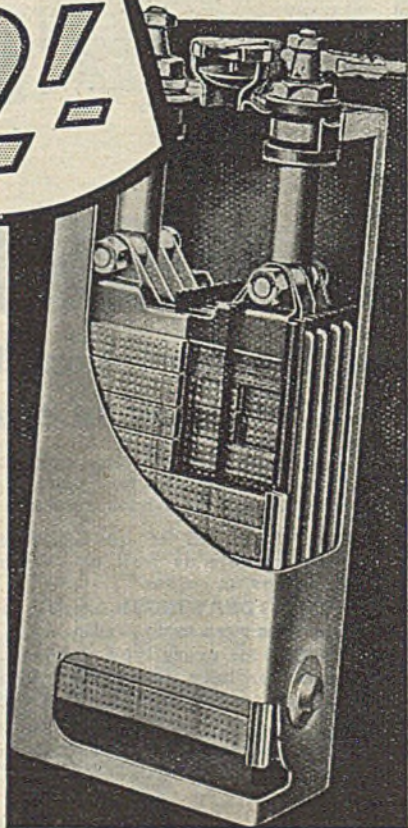
This was the actual experience of a Railway Company operating NIFE Batteries under very severe conditions. Obviously NIFE is no ordinary battery. It is an Alkaline cell of all-steel construction, practically indestructible, entirely free from corrosive fumes and immune from damage even by dead "shorting."

Proof that there is

MORE LIFE in a **NIFE**

Now available for all purposes except private radio and private cars.

NIFE BATTERIES LTD., Redditch, Worcs.





THE

ELECTRICIAN

ESTABLISHED 1861

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Crisis and Exports

REVIEWED against a background of the electrical industry, the arrangements drawn up to meet the national crisis show a lack of understanding of the general industrial position, of the conditions now obtaining, and of the requirements for improvement.

High in the list of objectives to be attained is an expansion of export trade, and since the electrical industry is already contributing substantially to that trade while meeting the demands for generating and other equipment at home, it is in a position to look upon the export forecasts made by Government spokesmen with an appreciation of the difficulties, sounder in its judgment than that of the political world.

Any review of those forecasts must, in the first place, take into account the fact that most of the industry of the country as a whole—from the making of machines to the production of cotton goods; from the making of steel to the manufacture of furniture; from the building of ships to the running of railways—is largely dependent in varying degree on the renewal or first installation of electrical plant of various kinds; on electrical power to run the plants; and in many cases on continuous electricity supply for process operation.

For well over two years the national peak load has been at a figure far in excess of generating capacity; the manufacturing output of electrical plant for industry has been restricted by steel and other shortages; load shedding has been widespread in the winter months; and the power stations have been short of coal.

To meet these conditions the industry of the country is now engaged in shaping schemes which will by staggering working hours reduce the peak load by a third; by rigid economy in power consumption in the domestic field during the summer, coal stocks have been built up at the power stations to a volume equal to four and a half weeks' winter supply; and since July last year an increase in generating capacity of about 330 MW has been brought about. So far so good; but against the latter figure of 330 MW additional plant, must be recorded the fact that the national demand for electricity supply during January to June this year increased by about 5.8 per cent. when compared with the first half of 1946, and last week-end street and factory lighting were added to the load.

Sales and Production

THE above examples of the conditions under which the industry of the country is working are only a few of those which could be quoted, but are, we submit, sufficient in number to indicate that the export targets held up by the Government are largely theoretical in value in the present stage of post-war recovery, and in any case make no allowance for the fact that countries, unhampered by any form of crisis, are competing for the same overseas trade. That industry in general will do its best and that the electrical industry in particular will do everything possible to meet the demands made upon it, are not in doubt; it would, however, be wrong for the public to be led into believing that the unqualified manufacture of goods for export is the sole solution. Apart from the necessity of putting our own house in order before we can hope to produce at maximum capacity, the goods which will result when that condition obtains will have to be sold in a market already showing signs of becoming selective compared with a year ago. In these circumstances, inquiry must be made to ensure that the goods we make will be those which will be wanted as the months go by; and that they are offered at the right price.

Less Interference—More Materials

GOVERNMENT spokesmen suggest that production is the key to the crisis problems, and though production, broadly

and simply, might have brought the desired results a year ago, to-day, output must be balanced against quality in design, perfection in performance and advanced technique. These conditions are, it is certain, well within the capacity of British industry, but if they are to be met, will demand, from Government departments, less interference and the maximum possible supply of raw materials; and, from the individual in every occupation, the determination to exert that degree of additional effort which will succeed in changing the prospects of approaching economic disaster into those which will ensure national stability and, finally, prosperity.

Industry's Unheeded Warnings

THE word crisis is to-day, too freely, used, in that there is nothing in our present embarrassment which has not been expected. Those who control our destinies have called it the eleventh hour, and if we accept that description as correct it must be because the warnings of industry, like those which preceded the fuel crisis, have not been heeded. If it is the eleventh hour of a crisis, it is also that hour when might be expected a clear declaration of the facts of our industrial position, and a removal of the red tape and fetters which restrain the wheels of industry and oppress those engaged in turning them. It is the hour for less talk; for less muddled thinking; for more action; and more work.

Technical Training and Research

IN view of the I.E.E. Report on the practical training of professional engineers, and our remarks upon it in THE ELECTRICIAN of July 18 last, it is of interest to note that there have been submitted to the Lord President of the Council and the Minister of Education, the recommendations of the Parliamentary and Scientific Committee with respect to colleges of technology and the training of technical man-power. In effect the recommendations confirm the findings of the electrical industry, that in order to restore and enhance our industrial position, it is necessary for research not only to be carried out as widely and as extensively as possible, but to ensure that its results are applied promptly to production. Before this con-

dition can be brought about, however, the trained output of our technological colleges must be sufficiently knowledgeable to appreciate the industrial applications of such research, the number of graduates of such colleges must be increased to at least double its present figure, while the standard of training will need to be raised to one approaching that set by the universities.

Adequacy of Teaching Staff

TECHNICAL training is further championed by the I.E.E., for in a special report, abstracted in last week's issue, the question of research in the radio field was covered. Here, as in other branches of industry, the early availability of research results is emphasised, and the suggestion is put forward of disseminating details of research work through some form of bureau. Among the difficulties which have to be overcome before the colleges can be expected to increase the number of graduates available to industry, however, is that concerned with teaching staff. The opportunities presented by such colleges are few when compared with either the universities or industry, and until appointments in them are made more attractive there is a danger that the recommendations so often made by the electrical industry, the engineering institutions and others, may not be as widely adopted as is hoped through sheer inability to find enough technical teaching staff to carry them out.

Electronic Aids to Production

HOW a more widespread use of electronic devices in industry would lead to a greatly increased output of manufactured goods and so assist materially in overcoming the present economic crisis, is indicated by Dr. H. A. THOMAS, principal scientific officer in the Radio Division of the National Physical Laboratory, in an article headed "Electronics as an Aid to Production," in a recent issue of the Board of Trade Journal. As he points out, the correct application of electronic technique leads not only to greater production per man-hour, but effects very important improvements in the quality and consistency of the manufactured product. The quantity of elec-

tronic equipment needed is small, the cost is negligible in comparison with the improved output which can be obtained, and there are available many electronically-minded engineers, capable of developing such equipment. The main reason why such techniques have not been more generally adopted, is attributed by Dr. THOMAS to the fact that industry is not yet aware of the potentialities of electronic engineering, and does not realise the enormous possibilities of applying this new aid; and, to a lesser degree, to the fact that the manufacturers of electronic equipment are naturally averse to developing at their own expense equipment which may have an uncertain or limited market. Dr. THOMAS suggests that it is only by bringing together the industrial scientist associated with the development of a particular product, and the electronic "expert," who usually is unfamiliar with the practical problems of production, that progress will be made. In the interests of the national economy such electronic "experts" should be given wide scope to apply their specialised knowledge to improve industrial processes.

The Transport Commission

THE appointment of Sir CYRIL HURCOMB to the chairmanship of the Transport Commission, means that sooner or later the industry will lose an old friend. As chairman of the Electricity Commission, Sir CYRIL has maintained a spirit of co-operation and understanding with the industry throughout many years of outstanding difficulties, and many will miss him. Another electrical personality from an administrative point of view is Lord ASHFIELD, who, as the pioneering spirit behind the London Underground, made our system the envy of the world. He, too, is destined for the Transport Commission, though in his case his new responsibilities will not be so very different from those he at present carries as chairman of London Transport. The nature of these new appointments will ensure their holders making at least some continued contact with electrical industry, for among the problems of road and rail which confront them are those concerned with the furtherance of railway electrification and encouragement in the use of the electric vehicle.

About Transformers

by G. O. CASTELL, M.I.E.E.

Design and Construction of the Core

This is Part I of a series of articles in which the author will discuss and describe the materials used in the design and construction of power transformers. Methods of manufacture, processes involved, and the tests to which both materials and components are put, will be referred to as the series progresses, together with explanations of how various engineering problems relating to transformers are overcome.

THE majority of three and single-phase transformers built in this country are of the "core" type of construction, with coils wound on circular mandrels and cores built with various widths of plate, all, however, within a circular perimeter.

In point of fact, the best use of the materials is made if the core is rectangular in shape with a ratio of length to breadth of about 1.8 to 1; the round coil, however, has the advantage of superior mechanical strength, while it is easier to wind and to insulate, is more likely to be dimensionally constant in manufacture, and cooling is generally more efficient. In the case of large transformers, mechanical strength is an over-riding consideration, but for small transformers, of high efficiency such as form the bulk of the distribution units in America and Canada, a rectangular core is invariably used. The cost of the comparatively large quantities of iron and copper necessary to obtain the desired efficiency, swamps the extra labour charges entailed by this form of construction, while the materials are worked at such conservative loading that cooling presents no problems and the mechanical forces met with in distribution sizes are not serious.

For the purposes of this series of articles, however, consideration will be given to the standard practice in this country, and this implies the use of round cores.

Core Dimensions.—Every student is, assumedly, familiar with Kapp's Propor-

these provide a useful guide, but practical necessity limits the designer to a number of standard core sections and probably a number of standard leg lengths and leg centres for each section. Peculiarities of customers' specifications, such as non-standard reactances or unusual ratios of

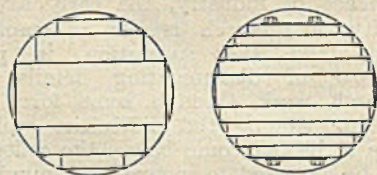


Fig. 1

copper loss to iron loss, further confuse the use of theoretical formulæ. In addition, although many of the formulæ include the cost of copper and core steel, the author has yet to see one which takes into account the cost of insulations, constructional steel and oil, all of which affect the final decision. The choice of core dimensions is always the offspring of trial and error out of experience.

Core Circle Steps.—Having decided upon a round core of the form illustrated in Fig. 1, it has to be decided how many different widths of core plate to employ, or, as it is more commonly expressed, how many steps to put into the core circle. Again, the designer has to arrive at the

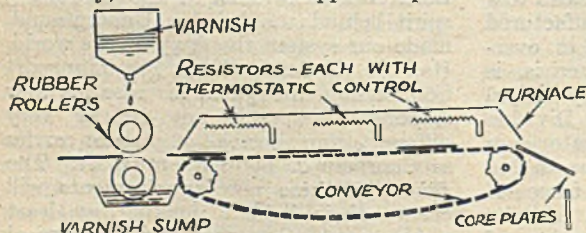


Fig. 2

tions and various other formulæ which provide a theoretical or an empirical method of arriving at the various dimensions of the core for any given transformer. Some of

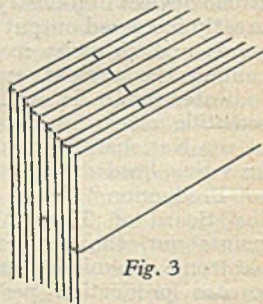


Fig. 3

optimum between practical considerations and the best use of the basic materials; the

former would dictate one plate width, that is a square core within a round coil, while the latter would require every plate to be of slightly different width to the next, so obtaining a truly round core which would,

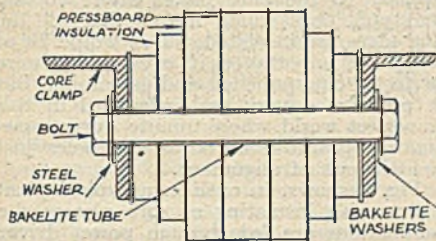


Fig. 4

of course, provide the maximum useful section from any core circle. Usually three, four or five steps are found to be best, depending on the size of the transformer and the relative costs of core steel and labour.

Unless the core steel is to be re-annealed after cutting and punching, the use of very narrow plates to obtain the maximum of iron section within the circle defeats its own object. A small area adjacent to a cut edge is affected by the tool both as to permeability and loss characteristic, and in narrow plates the affected portion becomes an appreciable proportion of the whole and the designed figures will not be maintained on test.

Dimensions of Steps.—There is a simple mathematical expression giving the dimensions of the various steps to obtain the maximum of iron section for any given number of steps, but again practical

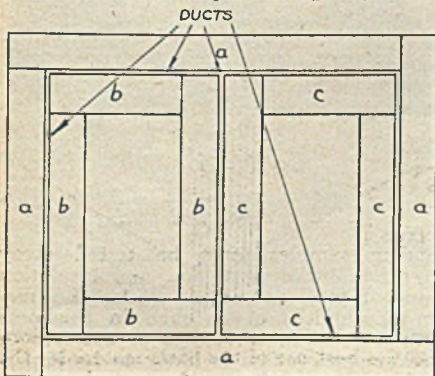


Fig. 6

necessities jostle with theory. The core steel comes from the suppliers in sheets of standard sizes and must be cut with a minimum of wastage; ideally, every core plate width should be an exact divisor of the sheet width; if not, various combinations of plate width must divide exactly into the sheet width, but in the latter case the proportionate amounts of the various plate widths required and/or obtained must be borne in mind.

The yokes or horizontal members of the magnetic circuit, connecting the vertical limbs together, top and bottom, are commonly made larger in section up to about fifteen per cent.; this being a method of reducing the iron loss without affecting the length of the winding turns. If a greater reduction in loss is attempted by further increasing the yoke area, the

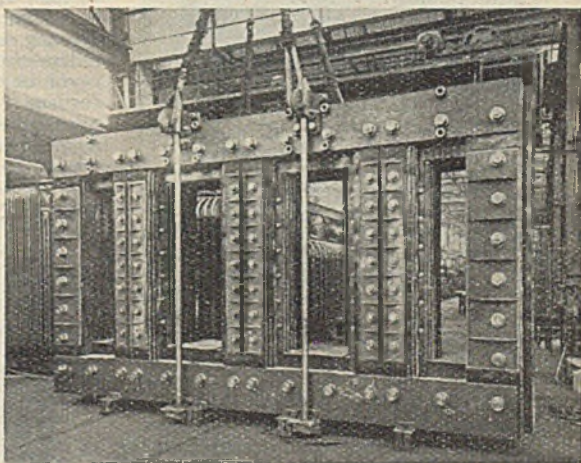


Fig. 5.—Core of 45 MVA transformer

method fails because the effect of the longer length of flux path through the upper areas of the yoke becomes noticeable, and the flux tends to crowd into that part of the core adjacent to the limbs.

Whatever the proportion of yoke area to leg area, the various packets in the yoke must bear the same relationship to the corresponding packet in the limb, otherwise cross fluxes will develop at the joints, causing increased losses and magnetising current, the risk of local heating and an increase in noise.

About half the noise produced by a transformer core in normal operation is due to magnetostriction and this can only be reduced by lowering the working flux density. The remainder is produced at the joints and can be minimised by careful building, rigid clamping and the elimination of cross fluxes. A complete

transformer will produce other extraneous noises from leads and fittings, but this will be discussed elsewhere.

Core Losses.—The loss in a core when it is excited consists in part of hysteresis

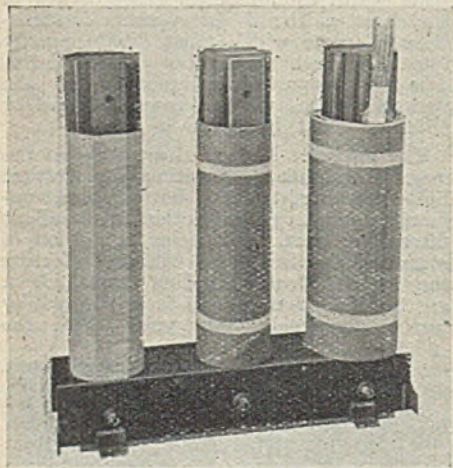


Fig. 7.—Core of small transformer, showing limb bound with webbing tape

loss, of which the frequency of the supply voltage, the maximum value of the flux density and the nature of the material are contributory factors. The balance consists of eddy current loss which depends upon the frequency, the flux density, the ohmic resistance of the core steel and the thickness of the laminations. For this reason the sheets are made as thin as can be economically produced, and conveniently handled by the transformer makers; 14 mils. is the thickness in general use for power transformers; laminations of 7 mils. thickness have been produced for high frequency applications and the stampings used for small transformers designed for radio frequencies, are 4 mils. thick; the production costs for the thinner sheets increase very rapidly.

In a modern core of 14 mils. thick laminations, the eddy current losses represent about twenty per cent. of the total loss at fifty cycles.

Core Plate Insulation.—The reduction in eddy current losses by laminating the core can only be obtained if every core plate is effectively insulated from the next; paper, varnish, enamel and various mixtures of chalk, flour, isinglass and kaolin have all been used for this purpose.

Paper requires an extensive plant for its application to the sheet. It, in itself, occupies a comparatively large area of the core giving a space factor of only about eighty-five per cent., and it is liable

to break down quickly if a hot spot should develop in the core. Paper, like the mixtures mentioned, which are usually applied with a spray, can only be applied conveniently to the original sheet; enamel and varnish are, on the contrary, usually applied to the core plates after cutting and punching, which means that all the cut edges are insulated. This would be of no great importance if every core were perfectly cut, punched and assembled, but it provides a very real safeguard in this imperfect world where minute burrs sometimes appear on the edges and holes just a little out of alignment.

Fig. 2 shows, in outline, a typical plant for varnish insulating of core plates; the laminations are fed through power driven rubber rollers which are constantly supplied with varnish from the tank above. The pressure and speed of the rollers and the temperature and viscosity of the varnish must all be carefully controlled if a film of constant thickness and consistency is to be obtained. From the rollers the core plates pass on to a conveyor belt which travels through a tunnel furnace; this may be heated by gas burners, electric resistors or infra red, but it must be thermostatically controlled, in stages, throughout its length. A batch of

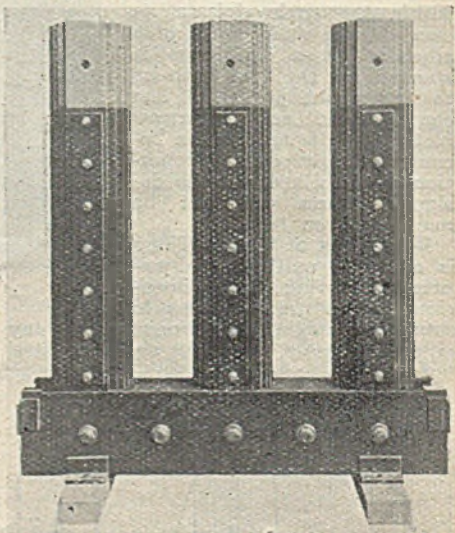


Fig. 8.—Core for transformer of 1000 kVA, showing simple limb bolting

random samples must be tested every day, for thickness of film and insulation value; typical values are a film of thirteen-thousandths of an inch in thickness with a breakdown voltage of 200 V. A thicker varnish film is likely to be imperfectly stoved and possibly tacky; the in-

sulation value may appear satisfactory, but it would deteriorate when clamping pressure was applied to the core; a thinner film will not record a satisfactory insulation value.

If the core plates are to be reannealed after cutting and punching, it must be carried out before the insulating process, which is, of course, impossible in the case of those materials applied to the original sheet. Reannealing is carried out in an inert atmosphere at a temperature of about 700° C.

Building the Core. When the plates have been prepared the cores are built by hand. The core clamps and flitch plates are arranged in a jig on a suitable table with upright pins of the appropriate diameter and convenient length in the bolt holes; the core plates are threaded over the pins. The joints between the core legs and the yokes are, in modern transformers, invariably of the inter-leaved type; this is obtained by overlapping the plates successively in opposite directions, as depicted in Fig. 3, wherein, for clarity, the plates have been drawn of exaggerated thickness. Best electrical results would be obtained if the laminations were to be interleaved singly, but it is general practice to build the cores with laminations in twos, threes or fours; this shortens the time required for building and reduces the chances of buckling plates.

Core plates insulated with paper or with the sprayed-on mixtures are usually insulated on one side only of each sheet; varnish or enamel applied by rollers covers both sides of the plate and it is usual then to build with insulated and uninsulated plates stacked alternately. In addition, it is good practice to insert a sheet

of solid insulation, such as 10 mil. thick pressboard, at frequent intervals through-

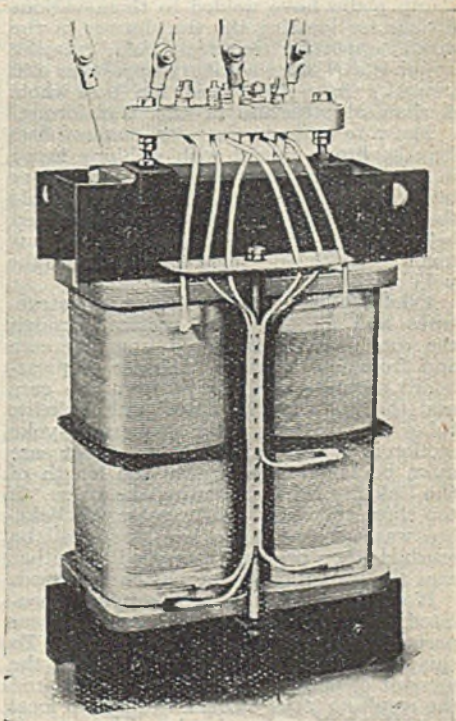


Fig. 10.—Distribution transformer for Canadian systems. The rectangular form of construction enables a very high electrical efficiency to be obtained

out the depth of the core. If this is done it is important to make an electrical connection in the shape of a small earth clip between each packet and the next.

When the core has been built up to the specified depth, the second set of core clamps and flitch plates is added; bolts and their insulation are substituted for the building pins and the core is clamped up. Small cores are built as described, but without the top yoke plates being included; larger cores are built and clamped complete and the top yoke plates removed after the core has been stood upright; in either case the top yoke plates have to be built in by hand after the windings have been assembled on the legs.

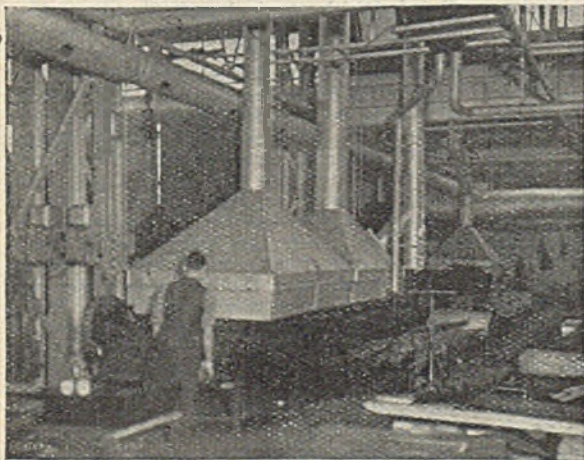


Fig. 9.—Plant for applying varnish insulation to transformer core laminations

The top and bottom yokes are clamped between rigid steel plates of flat, angle or U-section held by bolts passing completely through the core section; these clamp plates have welded to them various fittings for locating the transformer in the tank, supporting electrical leads, carrying switches and other auxiliary apparatus and generally form the basis for the whole mechanical structure of the transformer.

The core limbs in the very smallest sizes may be firmly bound with webbing tape; in the medium sizes they are clamped at intervals with bolts and washers, while the larger cores have their limbs clamped between steel fitch plates, similar to, but much simpler in construction, than the yoke clamping plates.

Yoke Section.—All these clamping structures and all the bolts passing through the core must be insulated from the core and from one another. Sheets of press-board separate the clamps from the core and the bolts are insulated with Bakelite tubes and washers. Fig. 4 shows a yoke section of typical construction. Great care must be taken in adjusting the length of the Bakelite tubes insulating the bolts. If too short they may fail to enter the Bakelite washers and if too long they will be crushed when pressure is applied; in either case the insulation value may be destroyed.

If all these parts are not properly insulated, an electrical circuit linking some part of the core flux, may be formed. To this circuit a voltage, depending upon the amount of flux linked, will be applied, and the resulting stray current will set up local heating which may develop into a core burn out. It is usual to flash-test core bolt insulation at 2 000 V: the clamping structures are connected to the core, electrically, at one point only and the whole is then earthed through the tank.

Core State Indicator.—A recent development produced by one British manufacturer, is a "core state indicator." This instrument, as its name implies, is intended to give early warning of any possible trouble due to insulation breakdown within the core or clamping structures. It is known that a voltage may be measured across the laminations of a core; the value measured is a proportion of the volts per turn of the transformer and varies with the core design, but it is constant for any given situation as long as the insulation remains sound. The indicator consists, essentially, of a voltmeter connected across the yoke clamping plates and calibrated so that the normal voltage, for the design of core to be protected, reads zero. Any deviation, in either direction, means that a change in insulation value is taking place somewhere within the core. If the deviation is small and gradual the suggested procedure is to check the core loss

and magnetising current at the earliest opportunity, but if the change is rapid and considerable, the transformer should be disconnected and examined immediately. A compensating winding is included to prevent primary voltage variations giving a false impression of developing trouble.

To cool the core effectively, it is necessary to have a sufficient area of the edges of the laminations exposed to a free flow of oil. The heat conductivity in the direction of the laminations is several hundred times greater than that across the laminations, any area therefore, on the sides of the plates is practically useless for cooling purposes, and it is always ignored when calculating core temperatures. Cores of larger size include one or more cooling ducts and for the reason just explained these must be at right angles to the direction of the laminations. Fig. 5 shows the core of a 45 MVA three-phase transformer, and it will be seen that there is one cross duct in the centre of each limb. The five limb construction, by reducing the yoke height and providing the extra surface of the end members, makes a duct in the yoke unnecessary. This form of construction was probably decided upon in the first place to reduce the height of the transformer for transport purposes.

Large three-limb cores have been built with continuous ducts in both limbs and yokes as illustrated in Fig. 6. This effect is obtained by building a, b, and c each as a separate interleaved structure, and then assembling the whole within the clamping plates. The clamping plates must be designed to allow an uninterrupted flow of oil through all the ducts and if this is done excellent cooling is obtained.

(To be continued)

Prominent among the displays at the Royal Welsh Agricultural Show at Carmarthen, on August 6, which was attended by Princess Elizabeth, was that of electrical labour saving devices for the farm and farmhouse in the marquee of the E.D.A. The exhibit was organised by the South Wales Area Committee of the association, and it demonstrated that every farm operation involving the use of light, heat, motive power, or refrigeration could be aided and improved by the application of electricity. In the dairy section there were a cold room, milk cooling plant, churn stools, and the electrode boiler and sterilising chest which won the Royal Agricultural Society's silver medal at Lincoln. Demonstrations were given of electrically driven mills, electric motor-driven sack hoists, and electric pumps for supplying water for farm and domestic purposes. In the poultry section were shown incubators and brooders, and on the home side, cookers and other appliances.

Earthing Problems

By "Supervisor"

In the article below is continued the controversy of insulation versus earthing, against a background of present-day housing schemes and the effect of material shortages. The author puts forward the suggestion that rigid earthing requirements are not in general necessary in small domestic installations and points out that in some instances confusion may result.

NO apology is needed for a return to a consideration of earthing problems in these notes, as the subject is as "burning" as ever, and even, in view of recent occurrences, may be said to have taken on added importance. The years'-old controversy of insulation versus earthing shows no sign of abating in these days, when some sort of finality might reasonably have been reached; instead, we find that the position is as acute as ever.

The writer has recently had an opportunity of seeing at first hand some of the present-day practices associated with the electrification of housing schemes and how problems are being solved. Most of these problems arise through lack of supplies of the materials immediately required, and the insistence of the building side usually means that all sorts of expedients are now adopted in order to get installations complete and in some sort of working condition. It must be said that in many cases the solutions reflect great credit on those responsible, but the aspect of the problem to be discussed here arises rather from an undue prominence given to earthing requirements in these solutions, and which appear to be due to a distorted idea of the reason for the initiation of regulations governing earthing.

In one large housing estate, for instance, the serious lack of steel conduit led to the use of non-metallic conduit, with, at the same time, the use of the metal switch boxes already in the contractor's store. This proved to be perfectly satisfactory, as the conduit fitted into the outlets of the pressed-steel boxes, but the writer was astonished to see that earth wires had been run in the conduits to each and every such switch box, and a more or less sound connection made to a screw in the box.

It was pointed out that the boxes were to be concealed under plaster, and would be covered by a Bakelite plate with insulated pattern flush switch. The answer was that the local authority had insisted upon the earthing of these boxes, and as this body is one of the most "difficult" in the country, no relaxation of this rather peculiar requirement could be secured. It may be said that there are

means of obtaining relief from all such biassed ideas, but unfortunately in this case the architect's specification had included the fatal clause—"to the complete satisfaction of the supply authority"—which gave the personal fads of the authority's engineer full scope.

Even more astonishing was the requirement on another housing estate that earth wires were to be run to insulated pattern surface type switches mounted on non-metallic boxes, on the grounds that the Bakelite dolly might break and an exposed metal centre prove of danger to the consumer. This might have been conceded in the case of switches mounted in kitchens and similar situations, but the requirement, applied to every switch in the house, most of them being in earth-free positions.

The I.E.E. Regulation No. 1001 (A) affords reasonable means of escape from any such onerous requirements, which have the effect of seriously increasing wiring costs, delaying work, and using up material in short supply. In practically all cases, however, this application of earthing rules is due to someone's personal ideas, and it seems clear that many people are so imbued with the belief that electricity is too dangerous a force to be placed in the service of humanity without its being hedged round and about with every possible restriction, that they go out of their way to find ways of increasing protective applications which cannot be justified from electricity's record of safe usage. In other words, we may be in the same danger as Frankenstein of old, and our earthing regulations may in time be applied so stringently that they govern all our doings. A fair instance of this is the above related connection of an earth wire to the bridge of an insulated switch, to protect the user against the one chance in a million that he may get a shock from an exposed metal centre of a dolly.

In the writer's opinion, based upon recent observation, not more than half the legitimate earthing arrangements made in small houses are effective, and only provide a false sense of security. Tests are often perfunctory, if made at all—on one estate the installation foreman

chose one installation in each block for a continuity test, and if that was good assumed that all the others were adequate. In this case, the supply authority made no tests beyond the usual insulation test, and had even connected two installations in which the main wires were both red.

In all seriousness, the writer puts forward the view that stringent earthing requirements should not be applicable to small house installations, or to domestic installations in general. It is not without significance that the four most recently reported fatalities—three domestic and one industrial—were due to the incorrect connection of a three-core flexible to a plug. It is no answer to say that a consumer should never himself connect up electrical apparatus to plugs—nothing can stop him and he will continue to do it. The presence of a third, and apparently unnecessary, wire in the flex, confuses him, and it gets connected to the wrong terminal; it appears certain that safety would be enhanced with the omission of this third wire.

The regulations already deprecate the earthing of portable equipment with exposed elements, and nearly all radiators used in the house fall into this category. Yet makers almost invariably fit three-core flex's to such equipment, and the purchaser is lucky indeed if he gets the connections right in a three-pin plug, and safe in a two-pin. The writer would, however, retain the three-pin plug as non-reversible, and ensuring the connection of local switches of apparatus in the phase line, which is important, but without any connections to the third pin or socket tube.

The average electrical man will probably dismiss this view as unworthy of a second thought, but we have to remember that but for war-time stringencies we should never have entertained for a minute the construction of overhead lines without earthing pole equipment and fittings, as came into common practice in 1942. We now find that the operation of unearthed lines, even up to 33 kV, has often proved more reliable than was the case under the old conditions, and it is reasonable to think that domestic and similar installations might prove better from the fire and shock aspect, without earthing, and would cost a great deal less.

It is true that transformers and pole switches are still earthed in unearthed line construction, and of course should be where high voltages are concerned. The cooker and the washing machine, located in rather more vulnerable situations than the rest of the equipment in the house might still be earthed, but in a proper and engineering manner, with protective conductors. Improved insulation on the equipment is the answer for the rest, however, and we have no lack of good synthetic materials in these days; insulation must always be the ideal, and we are in a position to achieve it.

The application of rigid earthing requirements to small house installations seems to be all wrong, especially when carried to such fantastic lengths as the earthing of dollies on insulated switches. What is the purpose of designing and installing such equipment if we then proceed to treat it as potentially dangerous and earth every screw to eliminate the million-to-one chance?

Standardisation of Voltage

THE Electricity Commissioners draw attention to the fact that the effect of the approval by them on September 21, 1946, of a standard system for the supply of low and medium voltages is that after October 1 the new standard will, unless some other system is specifically approved, be mandatory in respect of new systems brought into use after that date.

While there is no intention at present of making the new standard mandatory in relation to existing non-standard systems, discussions have been proceeding with the Electricity Supply Joint Committee since September last, as to the conditions which could reasonably be applied in cases where undertakers change-over from a non-standard voltage to the standard, and agreement has now been reached in the matter. Although the conditions are drawn up to deal only with a change of a.c.

voltage they are equally suitable, with necessary adaptation for a change of system from d.c. to a.c.

The Commissioners recognise that shortage of labour and material is likely to delay any extensive change-over and that the shortage of plant makes it generally undesirable at present to raise the voltage of 230 V systems to 240 V owing to the resultant additional demand. Except in cases of change from 250 or 230 V to the new standard, however, preliminary investigation is required before any labour and materials would be used and the Commissioners are prepared to give their consent to a change of system or voltage in the case of an undertaker in a position to proceed with the necessary preliminary work and who desires to have everything ready to put the work in hand as soon as circumstances permit.

Portrait—Sir George Nelson

SIR GEORGE NELSON is chairman and managing director of the English Electric Company; he is also chairman of Marconi's W. T. Co. and of D. Napier and Son, Ltd. He is chairman of the Power and Traction Finance Co., and a director of the Power and Traction Co. (Poland), Ltd., and the Micanite and Insulators Co.

Sir George received his technical training at the City and Guilds Technical College of London, and took his Diploma before he was 18. He was awarded the Mitchell Exhibition and Brush Studentship, and became a premium pupil at the Brush Electrical Engineering Co., of Loughborough, and at 22 became their chief outside engineer. He joined the British Westinghouse Co. (now Metropolitan-Vickers Electrical Co., Ltd.) in 1911, and in 1920 became manager of their Sheffield works. His first association with the English Electric Company, Ltd., commenced in 1930, when he became managing director, and in 1933 chairman and managing director of the company. D. Napier and Son were taken into the group in 1943, and Marconi's Wireless Telegraph Co. in 1946.

The Knighthood conferred on Sir George in 1943 was in recognition of the vast amount of public work which he has continually undertaken.

His activities in connection with industry generally, and engineering in particular, are widespread. He was president of the Federation of British Industries in 1943-45, and vice-president and chairman of Council of the British Electrical and Allied Manufacturers' Association. He has been a member of the Council of the Society of British Aircraft Constructors since 1941, a member of the Technical Committee of Lloyds Register of Shipping since 1945, and of the Finance and Reconstruction Committee of the Royal Institute of International Affairs since the same year.

In the field of technical education, Sir George, whose own academic career was exceptional, has been a member of the I.E.E. from the earliest possible age, and later of the "Mechanicals," on whose Council he has sat since 1943. He has been a member of the governing body of Queen Mary's College of the University of London since 1945, and also of the General and Executive Boards of the N.P.L. He is president of the Union of Educational Institutions for 1946-47, and has been a member of the City and Guilds of London Institute, assisting its council on the Executive and Technological Committees.



He has been a member of the Council of the E.I.B.A. for some years, and a Life Member of the Guild of Benevolence of the Institute of Marine Engineers. As the son of a Freeman he was born Free of the City of London and is a liveryman of the Worshipful Company of Coach Makers and Coach Harness Makers, and also a member of the Goldsmiths' Company.

Apart from his engineering activities, he is a member of the Council of Town and Country Planning, of the National Geographical Society of Washington, and he is vice-president of the Staffordshire Association of Boys' Clubs.

Sir George was born in 1887, in London, and married Miss Florence Howe in 1913. They have two children, a son and a daughter. The son is Mr. H. G. Nelson, managing director of D. Napier and Son, Ltd., and a director of the English Electric Co., the Marconi W. T. Co., Ltd., the Marconi International Marine Co., Ltd., and their subsidiaries, while the daughter married Mr. E. M. Price, who is the manager of the English Electric Co.'s Rugby works. Mr. E. M. Price is the son of Dr. Bernard Price, the director who built the Victoria Falls Power Co. in South Africa to the dimensions it is to-day.

• Electrical Personalities •

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

MR. C. DRUMMOND, whose appointment to the position of borough electrical engineer and manager at Fleetwood, Lancs., was announced in our issue of July 25, was born at Fleetwood in 1907. He went to Giggleswick School, Yorks, and received his technical education at Manchester University, College of Technology, gaining his B.Sc. (Tech.) degree in Electrical Engineering in 1928. Mr. Drummond spent two years as a college



MR. C. DRUMMOND

apprentice with the Macintosh Cable Co., Ltd., and then joined their outside contract staff, carrying out overhead line work and underground cabling, etc., at Colwyn Bay, Conleton, and South Wales. After further experience in the contract department of British Insulated Cables, Ltd., at Newcastle-on-Tyne, he went to Fleetwood in 1932 as mains engineer. There he has been engaged in changing-over the town supply to a.c., the laying of the new l.t. mains, the 6 600 V ring-main cables and erecting brick sub-stations of 1 000 kVA capacity. Mr. Drummond is an associate member of the I.E.E.

MR. C. A. BRITAIN, formerly borough electrical engineer at Maidenhead, and Mrs. Brittain, have just returned from a visit to India.

MR. A. A. GATES, secretary of the company, has joined the board, as a director, of Christy Bros. and Co., Ltd. He will continue to act as secretary.

SIR JOHN C. DALTON has been elected a director of Kalgoorlie Electric Power and Lighting Corporation, Ltd., in place of the late Mr. H. C. Holman.

MR. P. J. HOLGATE, assistant mains engineer in Warrington electricity department, is to retire on January 1. He has rendered valuable services to the department over a period of 25 years.

MR. R. W. COTTON (president), Mr. L. D. Bennett and Mr. H. R. Kent comprise the board of directors of Airmec International, Inc., formed in U.S.A. by the board of Radio and Television Trust,

Ltd., in order to make the fullest use of opportunities of trade within the United States.

MISS P. M. BOSTOCK, of Pye, Ltd., left Northolt airport on Friday for Gottenburg, Sweden, where she has been sent by her firm to investigate the possibilities of a successful export drive in Scandinavia.

SQUADRON-LEADER ALAN LYWOOD, son of Air Vice-Marshal O. G. W. G. Lywood, managing director of the All-British Telecommunications Research Organisation, was married to Miss Peggy Nicholl, daughter of Group Captain and Mrs. W. G. Nicholl, at West Kingsdown, near Sevenoaks, on August 9. A reception was held at Air Vice-Marshal Lywood's home, Hollywood Manor House, West Kingsdown.

MR. R. F. GYNGELL, whose portrait is reproduced on this page, has, as was announced in our last issue, been appointed secretary of W. T. Henley's Telegraph Works Co., Ltd., as from August 1, following the resignation of Mr. A. H. M. Jacob, who has become an executive director of the company. Mr. GyngeLL was assistant secretary of the company for a number of years.



MR. R. F. GYNGELL

MR. J. McFETTERIDGE, of Ashton-on-Ribble, appointed to the Colonial Service as an electrical and mechanical engineer, will serve in Nigeria. He is an old boy of the Harris Institute, Preston, and has held appointments with the English Electric Co., Ltd., at Preston, and other companies.

MR. G. E. W. HIRD, mains superintendent at Bingley, Yorks, has been chosen as electrical engineer and manager to the Brierfield U.D.C., in succession to Mr. L. G. Aston, who takes up an appointment at Dorchester in September. Mr. Aston, who went to Brierfield last year, was formerly assistant mains engineer at Willesden, and during the war he was with the Admiralty at Bath. Before going to Bingley in 1942, Mr. Hird was with the

Keighley electricity department. He is an associate member of the I.E.E.

SIR CYRIL HURCOMB, chairman of the Electricity Commissioners since 1937, has been appointed chairman of the British Transport Commission, and Lord Ashfield, chairman of the London Passenger Transport Board, is one of the other four full-time members of the Transport Commission. Sir Cyril Hurcomb served in the Ministry of Shipping during the war of 1914-18, and was secretary to the Ministry of Transport from 1927 to 1937, when he was appointed chairman of the Electricity Commission. On the formation of the second Ministry of Shipping in October, 1939, he was made Director-General, and on the amalgamation of that ministry and the Ministry of Transport became Director-General of the Ministry of War Transport, and since 1946 has been secretary to the Ministry of Transport. He was president

of the Institute of Transport in 1935-36. He will resign his office in the Ministry of Transport and the chairmanship of the Electricity Commission. Lord Ashfield has been chairman of the London Passenger Board since its formation in 1933. Before that he was for many years chairman and managing director of the Underground group of companies. He is chairman and managing director of the North Metropolitan Power Co. He has been a member of the Inland Telegraph Services, Ltd., and of the Imperial Communications Advisory Committee, and is a past president of the Institute of Transport. The Commission met for the first time on Wednesday.

MR. ARTHUR WILLIAM ELCOMBE, a director of Baird and Tatlock (London), Ltd., died at Woodford Wells, on August 12, aged 77 years.

Load Spreading

ARRANGEMENTS for load staggering are continuing to take shape and so far as the North West Regional Board is concerned, Mr. George Gibson, chairman said in Manchester on Monday that in some areas the domestic and commercial load amounted to 82 per cent. of the total. Mr. Gibson emphasised that the times at which the use of current must be reduced were 7.30 a.m. to 9 a.m., 11.30 a.m. to 12.30 p.m. and 4.30 p.m. to 6 p.m. He added that some of the larger stores might open at 10 a.m. and many offices could begin the day's work a little later.

It was also decided at Manchester on Monday, at a conference called by the Cotton Board, that staggered hours in the cotton mill towns are to be planned by district committees representing employers, trade unions and local electricity authorities. Sir Raymond Streat, chairman of the Cotton Board, declared that the industry could make a substantial contribution to the load problem and at the same time maintain production at the highest possible level. Local supply authorities will have the final decision whether the form of relief on peak load is sufficient for their needs.

In Scotland it is hoped within the next three weeks to formulate a plan by which as a result of voluntary sacrifices, saving of 33½ per cent. as compared with last winter will be effected in electricity demands during the peak period.

A plan for Birmingham, under which firms in the area will have one day without power per week, arranged on a rota basis, has been adopted by the electricity de-

partment after consideration of suggestions put forward by the Midland Regional Board for Industry. A circular sent by the Board to all electricity undertakings in its area suggested three possible methods of load spreading: transfer to night work; staggering of working hours into two groups, one starting at 7 a.m. and finishing at 4.30 p.m., the other starting at 12.30 p.m. and working until 8 p.m.; or the introduction of one day a week without use of power. It will be recalled that the third proposal, which the Birmingham undertaking has adopted, is similar to a suggestion made by Mr. F. W. Lawton, chief engineer and manager, during the winter, and reported in *THE ELECTRICIAN* of February 14, 1947.

In a circular to power consumers in the Black Country relating to load-spreading schemes, Mr. C. Heathcock, managing director of the Midland Electric Corporation for Power Distribution, Ltd., states that the first endeavour will be to take some load on to nights, but the large majority of consumers will be asked to accept a power-less day per week, with one power-less Saturday a month. For continuous processes and high priority work firms must secure a voucher from the Midland Regional Production Board. Firms moving a third of their load to night work will be safeguarded for their day load.

In order to design a national economy campaign, which aims at the reduction of the use of electricity in shops, stores, offices and the home during peak periods, a number of local committees are being formed, of which there are in London already forty.

Book Reviews

Modern Electrical Engineering Mathematics. By S. AUSTEN STIGANT. (London: Hutchinson's Scientific and Technical Publications.) Pp. 372. Price 31s. 6d. net.

Books on engineering mathematics are probably among the most difficult to write in such a manner as to satisfy the majority of readers. The present book by Austen Stigant would be more completely described by the title "A Guide to the Study of Modern Electrical Engineering Mathematics." It will, no doubt, largely fulfil the purpose of the author to stimulate greater interest in modern mathematical processes—particularly matrices, dyadics and tensors. These processes, once mastered, will save considerable time in solving problems that involve complicated networks.

Most readers who require instruction in tensors, and who are already well trained—as is assumed in this book—in differential and integral calculus, will almost certainly be familiar with some sections, such as the operator j and determinants.

The chapter on determinants is, perhaps, the best in the book. It should enable a student, without reference to the bibliography, to use determinants to great practical advantage. This chapter, together with the one dealing with plane vector operators, forms the foundation for the study of the further sections on matrices, dyadics and tensors, but considerable further study and a great deal of practice will be necessary before much practical use can be made of these more advanced processes. The excellent bibliographical references at the end of each chapter will be found most useful in this connection.

A chapter on complex angles might, with advantage, have been given more space. Seven pages devoted to this extremely interesting, though by no means easily understood, subject seem a meagre allowance.

Some of the diagrams are rather crudely drawn and, in some cases, may puzzle the student. For instance, in Fig. 3, j^2 , j^3 and j^4 are so printed that they appear as j_2 , j_3 and j_4 .

There is a very good chapter on symmetrical components, which, like that on determinants, can be studied to practical advantage without reference to other works. Here again, however, the average reader will probably already have some knowledge of this subject. One of the diagrams, Fig. 81, which shows the addi-

tion of positive and negative sequence vector systems, is wrongly entitled "Zero Sequence Vector System."

Other chapters deal competently with the Heaviside Operational Calculus, Dimensional Analysis and the Per Unit Method. Finally, the value of the various processes in combination is shown by application to interesting problems on Steady State and Transient Responses of a Network to Excitation and Transient Phenomena in Switching Parallel Connected Capacitors.—T. A. L.

Conveyors and Cranes. By WM. H. ATHERTON, M.Sc., Wh. Ex., Roy. Ex., M.I.Mech.E. (London: Sir Isaac Pitman.) Pp. 357 + x, with 284 figs. Price 25s. net.

There are probably few engineers working in the supply or manufacturing industries who do not at some time encounter mechanical methods of moving materials, whether it be the transit of small components on belt conveyors or the shifting of hundreds of tons of coal from barge or truck to a fuel store. Mr. Atherton, who has written larger works on this subject, has sought in the present book to compress into a fairly limited space, outline descriptions of the wide variety of methods which may be employed, and he has, with a liberal use of illustrations and diagrams, given a readable and comprehensive survey of the subject. Of the three main sections into which the book is divided, it is the second, on handling coal and other materials in bulk, which will most interest the power station engineer. Belt conveyors, bucket elevators and suction methods are among the subjects dealt with, and sufficient design formulæ are given not only to make the explanations clear but to be of some assistance in the selection of conveyor systems to meet particular needs. The first part of the book deals with the handling of goods in package form, and part three describes cranes, hoists and telfers used for heavy equipment. Without being an exhaustive treatise, the book will be of value to many.

Fuel Efficiency Bulletin No. 49. "The Handling and Storage of Coal," issued by the Ministry of Fuel and Power, is designed to give guidance on the practical handling of coal, especially in small or moderate quantities, with a view to helping to avoid waste, losses and inconvenience resulting from haphazard methods of dealing with stocks.

Locomotive Testing Plant

Electrical Equipment Developed By The L.M.S.

THE L.M.S. Railway has for many years tested locomotives by means of a dynamometer car interposed between engine and train, but with the narrowing down of the economies to be obtained from further technical progress, locomotive testing on the line has become more demanding in its need for accuracy. An inherent difficulty being met with is the maintenance of reasonably constant conditions over a sufficient length of time to enable reliable observations to be recorded.

In countries where there are long stretches of practically level and straight track, tests can be carried out using compression brakes or other means to ensure constant speed, but on the L.M.S. there is no such suitable stretch of line.

Constant working conditions of a locomotive can, however, be maintained on undulating track if the resistance of the train can be adjusted to compensate for the effects of gradients, curves, &c., when the equivalent of straight and level track can be obtained. This is done by the use of electric locomotives with rheostatic braking, having a control so sensitive that it will maintain an exactly constant speed, irrespective of changes in the drawbar pull of the engine or the resistance of the track, and the latest L.M.S. example is a "mobile testing plant" comprising a special tender, a dynamometer car and three braking units. Each of the three last-named is, in effect, an electric loco-

mo- The three braking units, which were practically completed in 1939, were used during the war as emergency power generators, and are now being reconditioned. The tender and the dynamometer



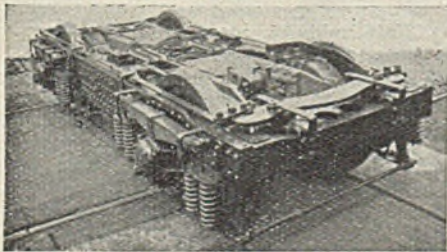
The control compartment, in which the principal controls of each braking unit are centralised

car are as yet uncompleted, but the latter will contain an Amsler hydraulic dynamometer coupled to the leading drawhook through a friction draw-gear, with the dynamometer connected to a recording table giving a continuous record of drawbar pull, speed, work done, etc., on a basis of either time or distance. The master controls of the three braking units will be fitted in a desk panel and instruments will be provided to indicate the loading of each unit. Another panel will carry temperature indicators, etc.

The power generated by the braking units is absorbed by banks of resistance grids located in vertical "chimneys" up which a current of air is forced by motor-driven fans. Power for the fans is supplied by an auxiliary 100 h.p. A.E.C. Diesel-engine generator set, connected in parallel with a 120 Ah emergency battery. Separate auxiliary generators driven from the same engine provide excitation for the main generators and an a.c. supply.

The bogies of the braking units are of the four wheel pattern, each having two generators rated at 37½ h.p. each. The generators of the medium and high speed bogies are supported directly from the bogie frames by brackets, and the generator shaft is geared and connected to the axle by means of Andrews-English Electric flexible axle drives, made by the railway under licence.

On the dynamometer car a small tachometer



Generators of the medium and high speed bogies which are supported directly from the bogie frames by brackets

ometer designed for braking instead of pulling, and is capable of absorbing up to 1 500 h.p. The units, which have different gear ratios and have maximum speeds of 50, 90, and 120 m.p.h. respectively, may be used singly or in any combination, and will together give a maximum braking effort of 23 tons.

meter generator which regulates the loading of the main generators is driven from an unflanged wheel and generates a voltage proportional to the speed of the train. This is balanced against a fixed voltage representing the speed to be maintained, so that the difference represents the error between the actual and the required speeds. This voltage is amplified and transmitted down the train to the braking units in each of which is a thyatron rectifier controlling the main generator excitation.

The basic principles of these units were evolved by Dr. H. I. Andrews of the com-

pany's research department, and the subsequent development and construction was shared between the Chief Mechanical Engineer of the L.M.S. and the B.T.H. Co., of Rugby, who supplied the main electrical and control equipment. Other suppliers included the A.E.C. Co., J. Stone and Co., the Chloride Electrical Storage Co., British Timken, Ltd., David Brown, Ransome and Marles, Jonas Woodhead, and the Telephone Manufacturing Co. The principal instruments were obtained from Messrs. Amslers, Negretti and Zambra, Ltd., Cambridge Scientific Instrument Co., and George Kent, Ltd.

NOTES FROM INDIA

THE Designs Engineer of the Ceylon Irrigation Department, Mr. D. W. R. Kahawita, who has been chosen by the Minister of Agriculture and Lands to be in charge of the Gal Oya and Walawe schemes, is now in the United States with data to begin work on what is expected to be one of the major undertakings of the island of Ceylon. The importance of his mission can be gauged from the fact that the schemes will not only help the island to be self-sufficient in the matter of food growing, but also provide cheap power to large areas. The Minister is keen on completing the schemes in the shortest possible time. If things shape well, there is a likelihood of the Gal Oya scheme being completed before the Norton Bridge hydro-electric scheme which has been under construction for several years.

Designs on the lines recommended by Dr. J. L. Savage, consultant for the schemes, contemplate the construction of a reservoir to impound 1 750 million gallons of water. The dam will tower 120 ft. above the river bed, and will contain sufficient water to irrigate 35 000 acres for two crops a year under paddy, and at the same time develop 6 000 h.p. The power so developed will be available within a radius of 40 miles from the site. The two projects will ultimately place 95 000 acres under cultivation and generate 12 000 h.p., or about one-third the capacity of the first section of the Norton Bridge scheme.

The preparation of the final designs, estimates and specifications has been entrusted to a firm of American engineers.

The unification of all gauges of Mysore State Railways, India, to allow for electrification, was urged by a deputation of the Mysore Chamber of Commerce when it gave evidence before the Railway Inquiry Committee in Mysore recently under the

presidency of Mr. K. C. Neogy. In order to study the possibilities Messrs. J. N. Nanda, Khan Mahomed, Yamin Khan and Col. Ballantine, members of the Indian Railway Inquiry Committee, inspected the Pykara hydro-electric works. Mr. J. N. Nanda explained that the main object of their visit was to study the ways in which electricity could be utilised in place of coal which should be conserved for other purposes. He said that they would also study the economic conditions of the Nilgiri Mountain Railway and examine how far electricity could be used.

According to statistics now available, electrical energy generated and sold in India maintained an upward trend in 1945-46, rising to 3 576 million units and 3 003 million units respectively, as compared with the average of 2 902 million units and 2 482 million units for the war period, and the 1938-39 figures of 2 004 million units and 1 682 million units, respectively. In the first nine months of 1946-47, however, power generated and sold declined to 2 615 million units and 2 182 million units, showing a decrease of 92 million units and 97 million units, as compared with the corresponding figures for 1945-46.

As shown by the returns for 1946, the steam power station with the highest thermal efficiency for the year was Hams Hall "B" (Birmingham Corporation) with a figure, based on units sent out, of 26.79 per cent. As Mr. F. W. Lawton (chief engineer and manager) points out, this result is particularly creditable in view of the fact that Hams Hall is a cooling tower station and this is, in fact, the first time that an inland station with no river supplies of cooling water has gained first position. The average calorific value of coal supplied did not exceed 9 112 B.Th.U.'s during the period.

Electricity Supply

Generation of Electricity.—Official returns rendered to the Commissioners show that 2 866 million units were generated by authorised undertakers in Great Britain during the month of July, compared with the revised figure of 2 765 million units in July, 1946; an increase of 101 million or 3.7 per cent. During the past seven months (i.e., up to the end of July) the total number of units generated was 24 522 million units, compared with 23 246 million units for the same period of 1946; an increase of 1 276 million or 5.5 per cent. The total number of units sent out during July, 1947 (i.e., units generated less units consumed in the stations by auxiliary plant and for lighting, etc.), was 2 698 million, contrasted against 2 597 million in July, 1946; an increase of 101 million or 3.9 per cent.

During the seven months, January to July, the total number of units sent out was 23 140 million as compared with 21 925 million for the same period of

1946; an increase of 1 215 million units or 5.5 per cent.

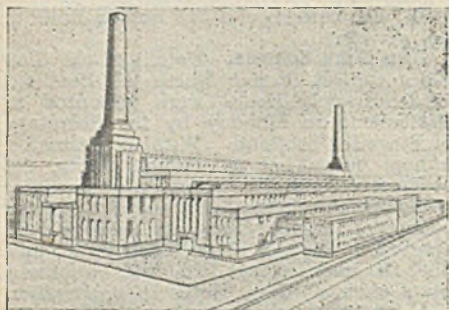
Glen Shira Scheme.—Details of the Glen Shira project of the North of Scotland Hydro-Electric Board were presented to Parliament on Monday by the Secretary of State for Scotland. With an estimated annual output of 80 million units, the scheme provides for impounding the upper waters of the rivers Shira and Fyne in the county of Argyll. Two new lochs will be created in the hills above Loch Fyne, and one, the main storage loch, will be formed by a dam at Sron More, in upper Glen Shira, 1 125 ft. above sea level. The main generating station, with an installed capacity of 40 000 kW, will be situated on the main Arrochar-Inveraray Road at Clachan, near the head of Loch Fyne. After local needs have been met, the balance will be transmitted to a transforming station to be erected at Inveruglas, and from there will be transmitted to the existing lines supplying Glasgow and the



Twenty-five Osram 5 ft. fluorescent tubes in single-lamp cut-off reflector lanterns, providing an average intensity on the roadway of three ft.-candles, make this new installation at the Lansdowne roundabout, Bournemouth, what is believed to be the first of its kind in the country. The lanterns, which are of G.E.C. design, are mounted on brackets on the existing trolley-bus poles. Mr. C. Coffin (public lighting superintendent), under the direction of Mr. W. C. Clowes (borough engineer and surveyor), was responsible for the installation

West of Scotland. The scheme is estimated to cost £3 150 000.

Hereford.—In our issue of August 1, in connection with the recent decision of the



"Brighton Herald"

An architectural sketch showing the probable completed appearance of the new 315 MW Southwick "B" station

local authority not to proceed with a proposed scheme for the electric street-lighting of main roads on the grounds of excessive cost, it was reported that the capital charges for the installation would be between £40 000 and £50 000, while annual charges for current and maintenance would amount to £8 000. The information in question was gained from the City Minutes. It has since been pointed out to us by the Shrops., Wores. and Staffs. Electric Power Co., who submitted approximate estimates, that although the suggested scheme was not fully planned, the Council was informed verbally that the cost of equipment for the Group "A" traffic routes in the City would be about £25 000, and the annual charge £4 600. The annual charge of £3 000 for gas lighting is, of course, for a standard of lighting considerably below the Ministry of Transport recommendations.

Brighton.—Despite compulsory restrictions on consumption, the total of units sold for all purposes in the area of supply showed an increase of 24.4 per cent. over the previous year, reports the Engineer and Manager (Mr. H. Pryce-Jones), in his annual statement. The outstanding event during the year on the generating side, was the direction of the C.E.B. to construct the Southwick "B" power station, an impression of which is reproduced on this page, with a final installed capacity of 315 000 kW. The second section of a 33 kV ring main and a sub-station at Withdean were completed, and authorisation was given by the Council to put in hand the completion of the outstanding portion of the scheme. The year's total income from electricity supply was £871 313 (£740 843) and the total income from revenue account was £961 672 (£809 802).

With a total expenditure on revenue account of £833 449 (£658 812) a gross surplus of £128 536 (£150 990) remained, giving, after repayment of debt, interest, etc., a surplus for the year of £23 835 (£45 539). After deduction for plant superseded and written off, the total capital expenditure of the undertaking to date is £5 347 294. With a total of 56 565 consumers, compared with 54 334 in the previous year, and a generating capacity of 140 000 kW, the undertaking generated 539 714 000 units during the year, against 366 351 000 units in 1945-46. Of this total, 502 256 195 units were supplied from the station. The load factor of the station was 41.15 per cent. (39.20 per cent.) and the maximum load was 139 238 kW, compared with 98 652 kW. Coal consumption amounted to 287 507 tons, at an average price of 53s. 9d., compared with the previous year's consumption of 197 583 tons at 54s. 5½d. This gave a cost of fuel per unit sent out of .3689d. (.3810d.) and a total cost per unit of .6092d. (.6780d.) Purchased from the C.E.B. for distribution by the undertaking were 199 767 195 units (160 613 567 units) at an average price per unit of .6412d. (.6575d.). The average price received per unit sold (all purposes) was 1.1828d., against a price of 1.2608d. in the preceding year.

Electrical Statistics

THE Monthly Digest, issued by the Central Statistical Office, shows that the weekly average consumption of coal by authorised electricity undertakings in June was 420 000 tons, compared with 449 000 tons in May, and 427 000 tons in June of last year, while distributed stocks increased from 2 483 000 tons in May to 3 127 000 tons in June. The total of coal stocks at the end of June, 1946, was only 1 397 000 tons. The quantity of electricity generated fell from 3 092 000 000 kWh in May to 2 842 000 000 kWh in June. The figure for June last year was 2 762 000 000 kWh.

In connection with production of building materials and components for houses, the output of electric cookers fell from 18.5 thousands in May to 17.2 thousands in June, the production of electric wash-boilers increased from 13.1 thousands in May to 14.8 thousands in June, electric immersion heaters from 26.4 thousands in May to 33.8 thousands in June, and the number of electric meters decreased from 128.7 thousands in May to 121.5 thousands in June. The figures for June of last year were: Cookers, 15.4 thousands; wash-boilers, 17.0 thousands; immersion heaters, 20.8 thousands; and meters 90.5 thousands.

Riverside Station at Poplar

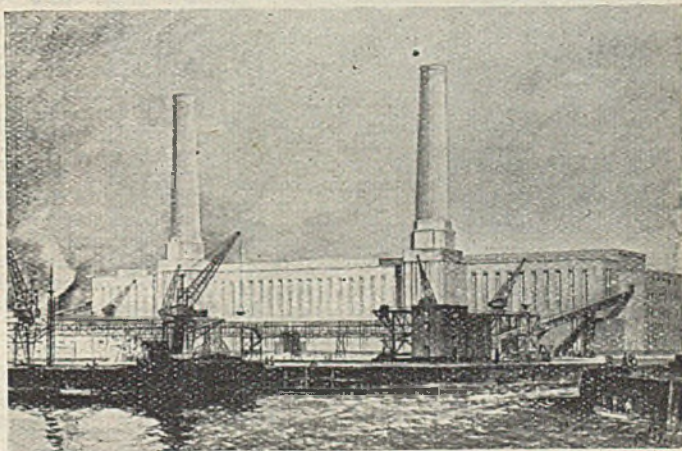
Details of 315 MW Scheme for Blackwall

DETAILS of the 315 000 kW power station to be built by the Poplar borough council at Brunswick Wharf, Blackwall, are contained in an illustrated article in the current issue of the "P.L.A. Monthly," from which the accompanying artist's impression of the station as it will finally appear is reproduced.

A site of 17½ acres, of which eight acres includes the East India Export Dock, has been purchased from the Port of London Authority, and demolition work has already been started. The station itself will occupy part of the dock, the remainder being used as a coal stock-yard. Brunswick Wharf itself will disappear, and a new jetty will accommodate colliers of up to 8 000 tons weight. The coal handling plant will consist of four high-speed level luffing cranes, each dealing with up to 200 tons per hour, for unloading from the holds of the colliers. Coal discharged by the grabs will travel on a belt conveyor to a junction tower for screening and crushing and thence duplicate conveyors will elevate it direct to the top of the boiler house. An alternative conveyor will deliver coal to two travelling bridges travelling the length of the coal stock, distributing the coal over the stock and reclaiming it when required.

As already stated in THE ELECTRICIAN, the final installation will consist of six turbo-alternators steamed by 12 pulverised fuel-fired boilers. Directions by the C.E.B. have so far been issued for the first stage of the scheme, under which three 52 500 kW Metropolitan-Vickers alternators, running at 3 000 r.p.m. and generating at 11.8 kV, will be installed. The output from the generators will be transformed direct by Metrovick 55 550 kVA unit transformers to 132 kV, and will then pass to a new switching station which the C.E.B. are to erect alongside the station site.

Six boilers made by Clark, Chapman and Co., Ltd., will be installed during the first stage. These will be rated at 320 000 lb. per hour each, the steam conditions at the boiler stop valve being 925 lb. per sq. in. and 925° F. The pulverised fuel equipment will be made by the International Combustion Co., Ltd., and an unusual feature of the boiler house design will be the employment of Howden's "Centicell" collectors with Sturtevant



This illustration of the proposed Poplar station shows the river frontage on the site of Brunswick Wharf and the coal-handling equipment.

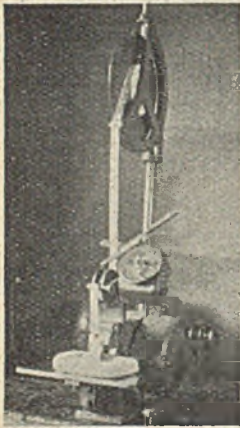
electrostatic precipitators for dust removal. Under this arrangement, the bulk of the grit from the boilers will be removed by the collectors, these consisting of about 600 small cyclones to each boiler, final cleaning being carried out by the electrostatic precipitators. The earliest date for commissioning the first section of the new station is December, 1949, and the whole project is estimated to take eight or nine years. It will be the fifteenth station on Thames-side.

The borough electrical engineer and manager of Poplar, Mr. R. Illingworth, has drawn up the scheme, in conjunction with John Bruce and Staff, consulting engineers. The consulting architects are Messrs. F. Quentery Farmer and Frankland Dark, who have developed the design of the buildings in collaboration with Mr. D. Hubert Lewis, of John Bruce and Staff.

Equipment and Appliances

Coil Taping Machine

A taping machine for small coils, such as armatures, field and toroid coils, is



Motor-driven coil taping machine

manufactured by Frank Whitelegg, of 90, Robin Hood Lane, Sutton, Surrey. The standard model is built for tape $\frac{1}{2}$ in. wide, but it can be supplied for narrower tape to special order. The tape is fed from a holder which is provided with a braking device. It passes over a measuring wheel with tension roller, and is cut automatically at the pre-determined length, which can be reset rapidly for repetition work. A guard, through which the tape must pass, covers the magazine opening. The taping speed is normally about 100 r.p.m., although, the makers state, with a skilled operator this may be increased, and production is normally about 60 coils per hour. On the machine is an adjustable table or platform, on which the coil is placed and then pressed back by the operator against adjustable rollers, while revolving the coil to obtain the desired overlap. Pedal control through a clutch leaves the operator with both hands free to handle the work. The mechanical drive is by a $\frac{3}{4}$ in. vee belt from any suitable $\frac{1}{2}$ h.p. motor or other power source at about 1 420 r.p.m. An electric motor, when available, can be supplied with the machine. The model described, the T.M.1, will tape coils up to a maximum height of about $1\frac{1}{4}$ in., which will depend, however, upon the other dimensions. For larger coils, of up to 2 in. height, another machine of basically similar design is made.

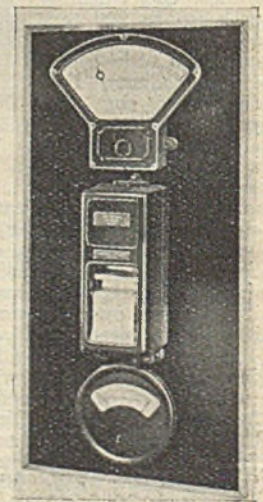
Glow Starter Switches

Glow-type starter switches, suitable for three-, four- or five-foot fluorescent tubes, are manufactured by Denco Signs, of Denco Works, Wangey Road, Chadwell Heath, Essex. Employing a radio-activating agent to increase the certainty

of operation in darkness, the switches are of simple internal construction and are available with small bayonet cap or screw cap bases, or with loose tails when it is preferred to solder the switch direct to the lamp assembly. A variant of the basic pattern is made for direct replacement of thermal type switches, this model having two additional short-circuited pins in the base, and another model, suitable for 4 ft. tubes only, incorporates a radio-interference suppression condenser and is enclosed in a can.

Gas Pressure Recorder

A distant pressure indicator and recorder placed on the market by Evershed and Vignoles, Ltd., of Acton Lane Works, Chiswick, enables the pressure attendant at a gas works to follow at a glance all changes in pressure throughout the distribution network. The equipment, which comprises a transmitter connected by two pilot lines to one or more distant receivers, has been developed jointly by Mr. H. C. Widlake and the company. The transmitters are situated at any point in the distribution network, which may be some miles from the central station, and usually consist of a "u" tube manometer to measure the pressure and an electrical device for repeating the measurement over the pilot lines — which may be hired Post Office lines — to the receiver or receivers. The receivers, being connected in series if more than one is used, can be either of the indicating or graphic recording types: adjustable relay receivers can also be supplied to give warning at any desired pressure or for automatic pressure control.



The Evershed-Widlake gas pressure recorder

The transmission system is usually arranged to operate either on a.c. or d.c. mains, but a special battery operated transmitter has been developed for use where no mains are available.

Industrial Information

New Use for Fluorescent Lamps

Fluorescent lamps (Osram 5 ft. 80 W) are incorporated in the "Barcro" Patent Drawing Storage Eliminator—an outsize camera designed for use in any office in which it is necessary to keep a large number of drawings, by means of which reproductions of drawings are obtained on small negatives of card index dimensions, resulting in saving in storage space. The camera permits the scale to be increased or decreased. Eight, 12 or 16 fluorescent lamps are used, according to the size of the equipment, and are arranged, with auxiliary gear, on the inside of a floor-mounted rectangular frame situated immediately in front of the drawing holder. Two control switches are fitted. The drawing holder and enlarger frame, together with the camera and projector-house, are built on to a track.

R.I. Papers

The following papers, read at weekly evening meetings of the Royal Institution of Great Britain, have been reprinted: "Radio-Frequency Heating," by Dr. L. Hartshorn; "The Protection of Ships from Magnetic Mines," by Mr. E. C. Bullard, F.R.S.; and "Compasses—Past, Present and Future," by Capt. H. L. Hitchins, R.N.

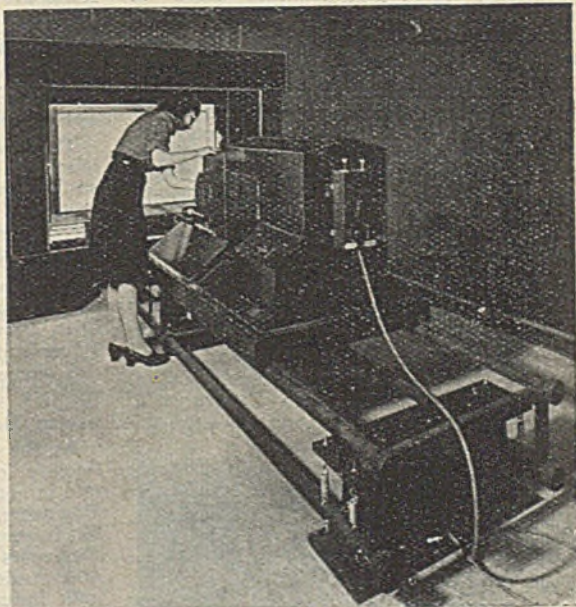
B.E.A.M.A. Contract Price Formulae

For purposes of calculating variations in: (a) "Rates of Pay," the rate of pay for adult male labour at August 9 shall be deemed to be 110s.; (b) "Cost of Material," the index figure for intermediate products last published by the Board of Trade on August 9 is 222.5 and is the figure for the month of July.

Radiolympia

Arrangements are well advanced for the first post-war Radiolympia, to be held at Olympia, London, from October 1 to 11. Since the war, British radio industry exports have increased fourfold, and emphasis of the forthcoming exhibition will be on exports. A special booklet, "British Radio for the World," for distribution overseas, is available. Broadcasting and

television transmitting equipment, navigational aids, and application of electronics to industrial processes, such as annealing,



The "Barcro" camera with projector-house, and combined drawing holder and enlarging easel incorporating Osram fluorescent lamps

soldering, plastic-welding, etc., will be included for the first time in the exhibition.

Tax on Car Radio Sets

A new Order announced by the Treasury brings car radio sets within the scope of purchase tax. It makes chargeable at the basic rate of 33½ per cent. of the wholesale value "wireless receiving sets designed for use on road vehicles and valves suitable for use with such sets." The Order applies to sets delivered on or after August 11.

Diesel-Electric Loco's

The L.N.E.R. is to construct 25 Diesel-electric locomotives of 1 600 h.p. for the principal Anglo-Scottish expresses. Although the scheme has yet to be completed in detail, it envisages the operation of Diesel-electric locomotives over approximately 2½ million train miles per annum. The units, which will work in pairs to form 3 200 h.p. locomotives, operated by multiple unit control, will weigh about 240 tons and measure approximately 114

ft. over buffers. The present Pacific steam engines have a starting tractive effort of 37 000 lbs. but the double Diesel-electric locomotives will, it is estimated, muster 90 000 lbs. Like the Pacifics, the Diesel-electric locomotives will be capable of running at a speed of 100 m.p.h. and it is likely that they will be maintained and serviced at Edinburgh (Waverley) and King's Cross.

I.E.E. Mersey and N. Wales Centre

As a result of the annual dinner and dance held by the Mersey and North Wales Centre of the I.E.E., at Liverpool, on March 14, and the annual golf competition at the Southport and Ainsdale Golf Club, on June 5, the Committee have been able to hand over to the I.E.E. Benevolent Fund the sum of £300, including £200 for the Homes Fund.

Radio Link for Air Rally

E. K. Cole's war-time experience of Services' communication equipment and the proximity of the Ekco works to the Southend Municipal Airport, enabled the company to co-operate in the Corporation's International Air Day, on Saturday,



Radio installation at Canvey Island for checking turns in the Southend air races

August 9. The organisers wanted a simple and efficient receiving and transmitting radio link between the outlying turning points on the triangular course and the control point at the aerodrome for the air cup races. Ekco supplied and installed experimental equipment and volunteers from the company's development and engineering division manned the points at Canvey Island, Shoeburyness and Rochford, and also the points on the shorter

course round the perimeter of the aerodrome. The controllers and public in the stands were thus able to follow the progress of the 'planes throughout the entire race and official checkers at the turning points were informed immediately of all decisions.

Price Revision

Brooks and Bohm, Ltd., 90, Victoria Street, Westminster, S.W.1, announce a revision in the price of the British Astral globe electric cigarette lighter.

Telephone Service with Ecuador

The Postmaster-General announces that a telephone service with Ecuador was opened on Monday, July 28, and is available between 3 p.m. and 9 p.m. daily. The charge for a three-minutes call is £3 15s.

Change of Name

On September 1 Philips Lamps, Ltd., will change its name to Philips Electrical Ltd., because the present name is no longer suitable for a concern whose activities range over an ever-widening field of electrical development and manufacture.

Seeing Belgian Industries

At the invitation of the Belgian Royal Society of Engineers and Industrialists, and in concert with the Institution of Civil Engineers, the Institution of Mechanical Engineers, and the Institution of Electrical Engineers of London, 75 British engineers and students are visiting important Belgian industries.

Visit to America and Canada

About twenty members of the Gauge and Tool Makers' Association intend to visit the U.S.A. and Canada in the early part of next year, mainly for the purpose of attending the exposition and convention of the American Society of Tool Engineers at Cleveland, Ohio. The party expects to leave England at the beginning of March and will also visit gauge and tool-making factories in New York, West Hartford, Cincinnati, Detroit, and Chicago, returning via Niagara Falls, Toronto, and Montreal.

Non-Ferrous Metals

Consumption of zinc in the U.K. during the second quarter of 1947, according to statistics compiled by the Directorate of Non-Ferrous Metals, was 82 301 long tons, against 69 436 tons for the first quarter. Of the total new zinc amounted to 57 946 tons, as compared with 48 701. Lead consumption totalled 76 303 (70 860) tons, of which imported lead accounted for 40 237 (42 535) tons. Total tin used was 8 657 (8 463) tons, of which 6 857 (6 663) tons was new metal. Consumption of cadmium metal was 130 (122) tons and of antimony metal and compounds 1 317 (1 160) tons.

Contracts Open

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

Farnworth, August 16.—Supply of electricity meters and one 1 000 kVA transformer. Specification from Electrical Engineer, Electricity Works, Albert Road, Farnworth, Lancs.

Skelton-in-Cleveland, August 18.—Supply and delivery of two three-phase static transformers, 50 cycles, with off-load tap-changing gear. Specification from Electrical Engineer, 147-9, High Street, Skelton-in-Cleveland.

Halifax, August 18.—Manufacture, delivery, laying and jointing of 33 kV underground cables and manufacture, delivery and erection of 33 kV metal-clad switchgear and control panels, etc. Specifications from Borough Electrical Engineer and Manager, 19/23, Northgate, Halifax; deposit, £1 ls.

Reigate, August 22.—Supply of: (a) six units, each comprising three oil-immersed, 11 kV, 300 A switches and six eight-way isolator and fuse units; (b) six 500 kVA, three-phase, 50 cycles, oil-immersed transformers. Specifications from Engineer and Manager, Electric House, Linkfield Corner, Redhill, Surrey.

Dover, August 25.—Supply and delivery of mercury discharge street lighting equipment. Specification from Borough Electrical Engineer, Electricity Offices, Ladywell, Dover.

Barking, August 25.—Supply and delivery of one 10/15 cwt. electric vehicle. Specification from Borough Electrical Engineer, Electricity House, Ripple Road, Barking, Essex.

Cheadle and Gatley, August 25.—Supply, delivery and erection of two 500 kVA and one 600 kVA oil-cooled transformers, with manually-operated "on-load" tap changers. Specifications from Engineer and Manager, 19, High Street, Cheadle, Cheshire; deposit, £1 ls.

Stoke Newington, August 25.—Supply and delivery of e.h.t. and h.t. p.i. mains cables, and excavation and laying of cables for one year ending September 30, 1948. Particulars from Borough Electrical Engineer, Electricity Department, Edwards Lane, London, N.16.

Manchester, August 27.—Manufacture, supply, delivery and erection at various points on aqueduct between Thirlmere and Manchester of 15 sets of electrically-

driven axial flow propeller type pumps (73 pumps in all), together with main switch and motor starting gear, etc., each set to deal with between 54 and 60 million gallons per day. Specification from Secretary, Waterworks Offices, Town Hall, Manchester, 2; deposit, £2 2s.

Newport, Mon, August 29.—Electrical installations in 334 houses on Gaer Estate. Specification from Borough Electrical Engineer, Electric House, Dock Street, Newport, Mon; deposit, £1 ls.

Halifax, September 1.—Manufacture, delivery and putting into service of two 20 MVA, 33/6.6 kV type "ON" main transformers and two earthing/auxiliary transformers. Specification from Borough Electrical Engineer and Manager, 19/23, Northgate, Halifax; deposit, £1 ls.

Stoke-on-Trent, September 10.—Manufacture, supply, delivery and erection of four 15 000 kVA, 33/6.6 kV, three-phase, 50 cycles outdoor static transformers, complete with "on-load" tap changers and control panels. Specification from General Manager, Electricity Department, 31, Kingsway, Stoke-on-Trent; deposit, £2 (in notes).

Birkenhead, September 15.—Supply, delivery and erection of one 80 kW mercury arc rectifier equipment for d.c. output 460/230 V, three-wire, to operate from 415/240 V three-phase supply. Specification from Borough Electrical Engineer, Craven Street, Birkenhead.

Middlesbrough, September 19.—Supply and delivery, over two years, of: (a) 250 kVA, three-phase, 11 kV, indoor transformer; (b) 500 kVA, three-phase, 11 kV, indoor transformer; (c) coil and compound-filled, metal-clad circuit-breaker and oil-break isolators, suitable for use on 11 kV system; (d) sub-station type distribution feeder panels. Specifications from Borough Electrical Engineer, Corporation Electricity Works, Snowdon Road, Middlesbrough.

Iraq.—Supply of 12 slow or medium speed Diesel-driven generating sets, 440/500 V, d.c., compound-wound, rating about 100 kW, to suit engine builders' standard design. Specification from Crown Agents for the Colonies, Ref. W/Iraq 7750, 4, Millbank, London, S.W.1.

On consideration on Tuesday of the House of Commons reasons for disagreeing to certain Lords' amendments to the Electricity Bill, the House of Lords did not insist on their own amendments and consideration of the Commons' reasons was concluded. Royal Assent was signified on Wednesday.

Company News

KALGOORLIE ELECTRIC POWER AND LIGHTING CORPN., LTD.—Prfts. 1946, £30 497 (£24 090). To deprecn. res. £14 000 (same), gen. res. £7 000 (£9 000), tax £2 000 (£4 327), div. 7% (same), fwd. £10 228 (£9 950).

TELLUS SUPER VACUUM CLEANER, LTD.—Profit and loss acct. shows bank int. rec. £46 and tax recoverable £51; after debiting tradg. loss £1 490, loss on exchange £999 and dep., etc., debit balance fwd. increased from £17 394 to £20 094.

ERICSSON TELEPHONES, LTD.—Particulars were advertised yesterday of an issue of £1 000 000 3½ per cent. first mortgage debenture stock, 1965-75. The stock will be 2½ times covered by assets, and the service of the stock is covered over four times by the average profits of the last ten years. Lists will open and close on Tuesday, August 19. The issue will be a high grade medium dated industrial debenture, it is stated, to be offered at par and not redeemable under 101. Underwriters have taken 30 per cent. of the stock firm and preferential allotment will be given to shareholders of the company.

BRITISH VACUUM CLEANER AND ENGINEERING CO., LTD.—Trdg., etc., prft. to September 30, £122 861 (£133 759). To bank int. £9 910 (£8 916), dirs.' remun. £1 050 (£1 157), inc. tax £19 918 (£50 294), N.D.C. £1 586 (£5 148), deprecn. £45 392 (£23 492), leaving net prft. £45 005 (£44 752). To tax res. and N.D.C. £24 000 (£22 000), fin. ord. div. 20% (13½), mkg. 26½% (20), fwd. £14 832 (£14 658). Curr. assets £930 249 (£827 710), curr. liabs. £577 998 (£445 630).

THE CHLORIDE ELECTRICAL STORAGE CO., LTD.—Reviewing the firm's work during the year at the recent ordinary general meeting, Mr. A. W. Browne (Chairman) said that the uncertainties of electricity supply last winter had increased the demand for their emergency lighting equipment, and the deferred maintenance and replacement of railway rolling stock had resulted in heavy demands being made for batteries for lighting, cooking and air-conditioning. For these purposes, they had been able, in collaboration with railway engineers, to introduce new features of design to simplify operation and maintenance. One large battery supplied to a film company by a subsidiary had a capacity of 10 000 Ah and might be called upon to supply 5 000 A for one hour. With regard to traction batteries, the Chairman thought that with the continuing restriction in petrol supplies and their proved economy in operation, the use of battery-

propelled electric vehicles would become increasingly popular. Their technical staff had been working on the design and flame-proofing of underground battery locomotives for coal mines. A subsidiary company, the Hymatic Engineering Co., had been concentrating on the design and development of small compressors for commercial application, and quite considerable success had been achieved in a portable compressor set. As soon as circumstances permitted, it was intended to build and equip a new laboratory in which they would be able to carry out more fundamental research than had hitherto been possible.

RICHARDSONS, WESTGARTH AND CO., LTD.—It was stated by the chairman (Lt.-Col. H. M. Stobart) at the annual meeting that the company's land department at their Hartlepool works had received many important orders for large turbo-alternators, etc., of the Brown-Boveri design, to link up with the national grid system. In consequence, it had been necessary to carry out considerable alterations and extensions at the works. The company's order book now exceeded £12 000 000, of which 70 per cent. represented marine work and the remainder land work. A 30 000 kW turbo-alternator set for the Willesden power station of the London Power Co. was commissioned during the year, and in addition a number of special units, such as turbo-compressors, transportable power stations and turbine-driven gas exhausters had been delivered. The shortages of solid fuel and steel, however, were both affecting to a very serious extent the normal completion of work in hand.

PYE, LTD.—Some remarks on the prospects of television were made by Mr. C. O. Stanley (chairman) at the annual general meeting. To the questions whether the television picture was large enough, and whether we would have colour television in the near future, he would answer, Mr. Stanley said, that the standard television set to-day gave excellent entertainment value. An increase in picture size at the moment would mean an increase in price, and they were convinced that to keep the price within the purchasing power of the public was essential. They had projection television available in their laboratories at the moment, but the price placed it far beyond the bulk of the population. Colour television was at least five years away, and perhaps ten years. On the transmitting side, they had transmitted their Videosonic system, and it had aroused great interest, not only at home but in many overseas markets. They felt that one day this system would come into its

own. Their company, the Chairman said, had made only one-third of the number of television sets which they had intended to make. Cathode-ray tubes, which had been dependent upon the supply of glass, had been the controlling factor, and this restriction had meant that the price of their standard receiver was raised. It was hoped that the glass industry would realise that, in television, they had available a large potential market which, if nursed quickly and generously at this stage, would give them a great business in the future. Later in his speech, Mr. Stanley referred to the prices which the

British radio industry had to pay for valves made in this country, and said that they could buy valves in America for one-third of the price they had to pay over here. By comparison with America, many of the components which they used were similarly expensive. They were not competent to say whether the efficiency of British manufacturers was at fault, but both the components and the set industries had to recognise that every effort must be made on the engineering and production sides to give prices which would compete in world markets with those of the United States and Holland.

Company Meeting

Benn Brothers, Limited

Paper Control and the Trade Press

THE fifty-first annual general meeting of Benn Brothers, Ltd., was held at Bouverie House, Fleet Street, London, E.C.4, on August 8. Mr. Glanvill Benn, chairman, presided.

After moving that the report and accounts for the year ended June 30, 1947, be accepted and approved and that the dividends as announced in THE ELECTRICIAN of August 1, be paid on August 15, the Chairman said that it was the natural history of publications, as with all other forms of life, to be born, to live and eventually, like old soldiers, to fade away. Since 1939, however, an amateur magician known as the Paper Controller had attempted to arrest the processes of nature. The effect of his Orders and Regulations had been to freeze the publishing industry at below its 1939 level. In consequence many a periodical which ought long since to have died, continued in the absence of normal competition to exist, while, on the other hand, many a new journal which ought to be serving new aspects of industry remained unborn. Most important of all, many a vigorous, well-established journal, such as were those published by Benn Brothers, which ought to be expanding rapidly, remained stunted, unable to accept new readers or to accommodate new advertisers.

The industries served by the Benn journals were themselves all short of raw materials, hence the shortage of goods in the shops and the much discussed austerity. The shortage of paper, the raw material of the technical journal, meant shortage of news and information. Austerity for the body was bad enough, but atrophy of the mind was far more serious.

For eight years and more, supply had notably outstripped demand in one field

of activity only—that was in the manufacture of governmental orders, regulations and controls. The Bank of England and coal had been nationalised, and gas, electricity and transport were in a state of suspended animation awaiting the dead hand of State control.

There was, perhaps some glimmer of hope. Already our planners appeared to be beginning to realise that the restoration of incentives was essential if folk were to work with a good heart. Our present rulers had not yet had the courage to confess the error of the doctrines they had preached for so long, but if they were now willing to admit that incentives were necessary, it might not be long before they recanted their former heresies and preached the virtues of the profit motive and the continual democratic plebiscite which a free market involved.

Sir Ernest Benn, Bt., seconding the resolution, said the year under review had seen more foreign travel by members of the board of directors, than any in the company's history. He welcomed the new trend and hoped that the practice would be developed, and perhaps extended to some of the senior editors and managers. It was important that they should go abroad and imbibe information and inspiration from a wider view of affairs, not only because of the interests of the company, but because from a national point of view we must once again resume our natural position as the nerve centre of world trade and commerce.

The resolution was carried unanimously.

Mr. K. E. Hughes was re-elected a director of the company.

A vote of thanks to the staff was carried on the proposal of Mr. John Benn, to which Mr. Walter Vestey replied.

Commercial Information

Mortgages and Charges

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

SHAW'S (COALVILLE), LTD.—June 24, charge, to Westminster Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 165 and 167, Belvoir Road, Coalville, with fixtures.

LINE EQUIPMENT, LTD., London, W.C.—June 26, debenture, to Industrial and Commercial Finance Corporation, Ltd., securing £5 000 together with a premium of 2 per cent.; general charge (except certain land in Austin Avenue, Laleston, Bridgend).

LONDON ELECTRICAL CO. (BLACKFRIARS), LTD. (formerly LONDON ELECTRICAL CO., (SHERBORNE LANE), LTD.).—June 30, mortgage and charge, to National Provincial Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 92, Blackfriars Road, Southwark, and general charge. *—June 5, 1946.

County Court Judgments

NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be actions. But the Registry makes no distinction. Judgments are not returned to the Registry if satisfied in the Court books within 21 days.

GAWLEY, Stanford Geo., Annahilt, Blackkamoor Lane, Maidenhead, radio engineer and dealer. £18 17s. 2d. April 30.

ROBINSON, Geo. H., The Lawns, Port Isaac, Cornwall, radio and electrical dealer. £17 18s. 6d. June 12.

JONES, s. T. (male), 36, Church Hill, Loughton, Essex, electrical contractor. £22 3s. 6d. March 30.

STEPHENSON, H. (male), 2, King Edward's Drive, Bilton, Harrogate, radio dealer. £40 13s. 3d. June 12.

VACTO ELECTRIC (a firm), 35, Doncaster Road, Darfield, Yorks, electrical engineers. £13 8s. 11d. June 18.

PARKSTONE ELECTRICS (sued as a firm), 24, Commercial Road, Parkstone, Dorset, electrical and radio dealers. £18 9s. 2d. May 5.

BORLEY, Sidney Robert, 163, Corporation Street, Stratford, Essex, wireless dealer. £50 11s. May 21.

STANHOPE RADIO (sued as a firm), 4, Bridge Street, Mansfield, Notts, radio dealers. £19 4s. 1d. May 19.

DALE, — (male), 210, High Street, Wibsey, Bradford, Yorks, electrical dealer. £12 11s. 10d. May 22.

PARK RADIO (a firm), 321, Cow Bridge Road, Cardiff, electrical dealers. £10 2s. 10d. May 15.

BRADFORD, W. S. (male), 36, Southside Street, Plymouth, Devon, radio engineer. £12 9s. 9d. May 15.

SIMMONS, C. (male), 16, Clayvertin Buildings, Widcombe, Bath, electrical contractor. £31 6s. 3d. May 6.

Receiving Order

GIBSON, W. (male), carrying on business as W. Gibson and Co., 1a, Battledean Road, Highbury, and 2d, Holloway Road, Highbury, London, builder, decorator and electrical engineer. Court: High Court of Justice. Date of Filing Petition: July 4, 1947. Date of Receiving Order: July 29, 1947. Creditor's Petition. Act of Bankruptcy proved in Creditor's Petition: Section 1-1 (G.), Bankruptcy Act, 1914.

Application for Discharge

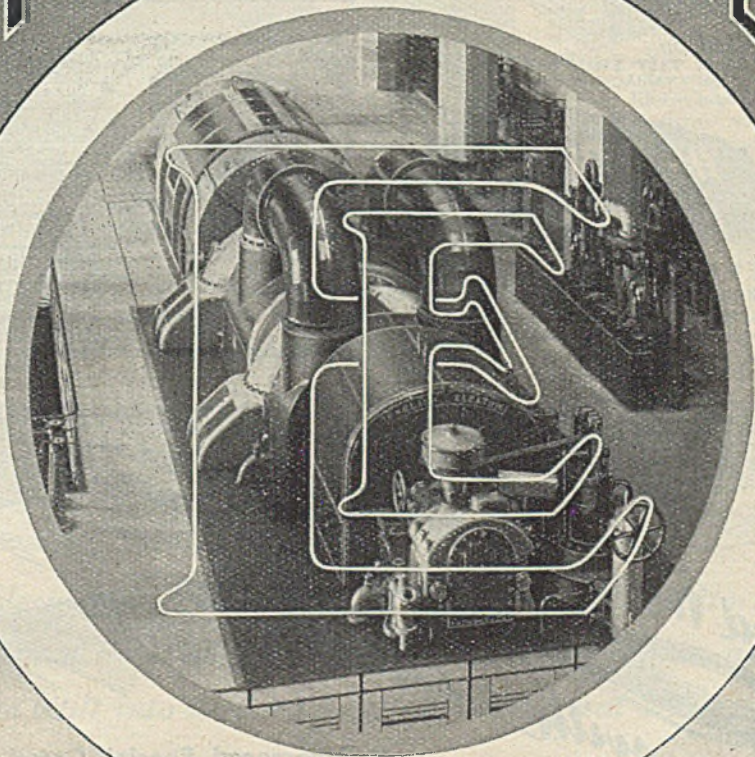
SIMS, George Robert, Syra, Thornley, Durham, and carrying on business at Hartlepool Street, Thornley, motor and electrical engineer. Court: Durham. Day Fixed for Hearing: September 22, 1947, 11 a.m., at the Assize Courts, Old Elvet, Durham.

Metal Prices

	Monday, Price	Inc.	August 11 Dec.
Copper—			
Best Selected per ton	£130 10 0	—	—
Electro Wire bars	£132 0 0	—	—
H.C. Wires, basis	£143 10 0	—	—
Sheet	£173 10 0	—	—
Bronze Electrical quality			
1% Tin—			
Wire (Telephone) basis per ton	£172 5 0	—	—
Brass (60/40)—			
Rod basis per lb.	1s. 1½d.	—	—
Wire	1s. 6½d.	¾d.	—
Iron and Steel—			
Fig Iron (E. Coast Hematite No. 1) per ton	£8 19 0	—	—
Galvanised Steel Wire (Cable Armouring) basis 0.104 in.	£34 5 0	—	—
Mild Steel Tape (Cable Armouring) basis 0.04 in.	£21 15 0	—	—
Lead Pig—			
English	£91 10 0	—	—
Foreign or Colonial	£90 0 0	—	—
Tin—			
Ingot (minimum of 99.9% purity)	£442 10 0	—	—
Wire, basis per lb.	6s. 6¾d.	—	—
Aluminium Ingots per ton	£80 0 0	—	—
Spelter	£70 0 0	—	—
Mercury (spot) per bott.	£17 3 6	—	—
(ex. warehouse)			

Prices of galvanised steel wire and steel tape supplied by O.M.A. Other metal prices supplied by B.I. Callender's Cables, Ltd.

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ALL TYPES AND OUTPUTS

THE ENGLISH ELECTRIC COMPANY LIMITED

for Power Plant Production

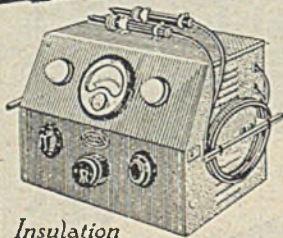
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Electrical heating elements
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Heaters
ELEMENTS for
Kettles, Washboilers,
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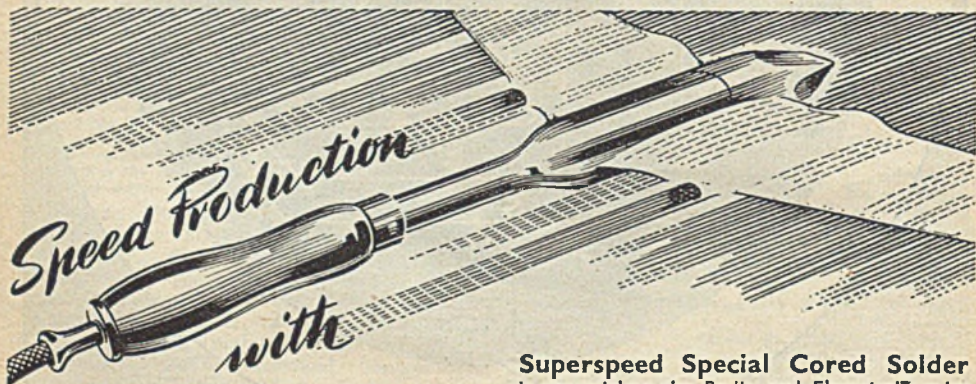
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MANCHESTER, 15. BLA 0160

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- The flux residue is hard, dry, non-conducting and absolutely non-corrosive.

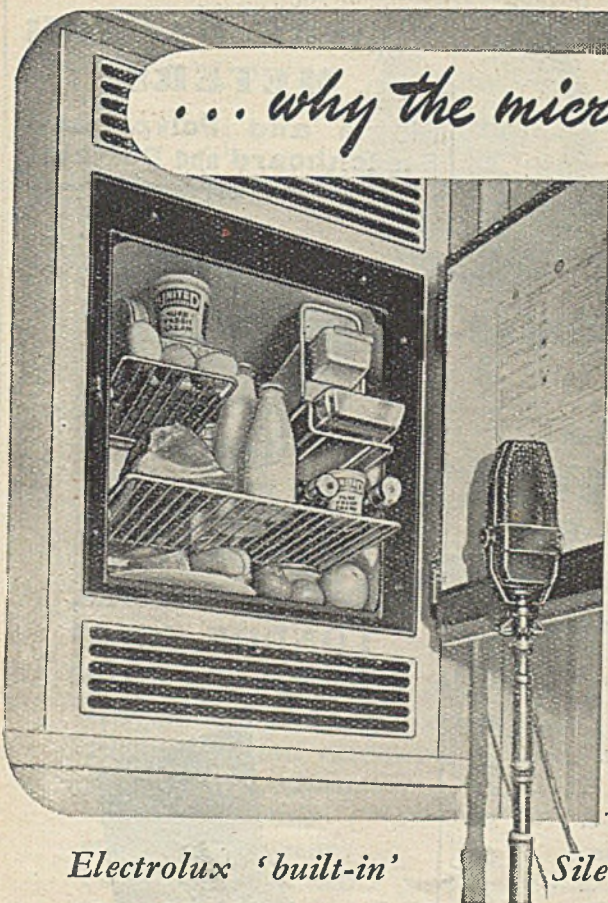
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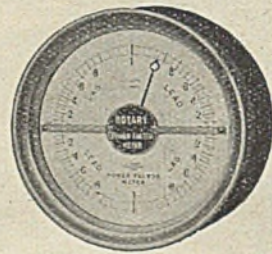
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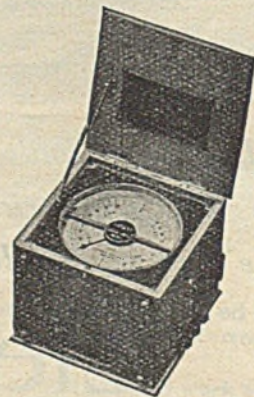
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**Single and Polyphase -
Switchboard and Portable
Patterns:**



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The scale extends over the whole circumference of the dial.

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No moving coils, ligaments or brushes.

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SHEFFIELD CORPORATION ELECTRICITY DEPARTMENT.

SPECIFICATION No. 732.

3-PHASE Double wound self-cooled Generating Station Auxiliary Transformers as follows:

THREE—600 kVA 11,400/440 volts.
TWO—600 kVA 11,400/3,000 volts.
ONE—5,000 kVA 33/11.3 kV.

The Electricity Committee are prepared to receive tenders for the supply and delivery of the above-mentioned equipment.

Contractors desiring to submit tenders may obtain Specification and Form of Tender at this office on making a deposit of £2 2s., which sum will be refunded on receipt of a bona fide tender.

To meet the convenience of Contractors, two copies of the Specification will be furnished; additional copies may be purchased at a cost of £1 1s. per copy.

Any person or firm sending in a tender will be required to comply with the Standing Orders of the Council, relating to the "Prevention of Corruption" and to the standard rates of wages and proper hours and conditions of labour. A print of the Standing Orders may be obtained from the Department.

Tenders to be forwarded to the Town Clerk, Town Hall, Sheffield, 1, enclosed in the official envelope provided, which must be sealed, and bear no name or mark indicating the sender, and received by him not later than first post on Monday, 2nd September, 1947. Tenders received after the time stipulated herein will not be considered.

The Committee do not bind themselves to accept the lowest or any tender.

JOHN R. STRUTHERS,
General Manager and Engineer.

Commercial Street,
SHEFFIELD, 1.
August, 1947.

SITUATIONS VACANT

JOHNSON AND PHILLIPS LTD.

MANAGER, SWITCHGEAR DEPARTMENT.

APPLICATIONS are invited for the above appointment from Engineers of superior qualifications and standing who have had considerable experience in this branch of electrical engineering.

The successful applicant will be responsible for the design, development and manufacture of the L.T. and H.T. Switchgear products of the Company.

In view of the Company's widespread home and export business the appointment is one which offers considerable scope.

Every assistance will be afforded in respect of any problems of change-over, such as housing.

Applications, stating age, qualifications, experience and salary required, will be treated in strictest confidence, and should be addressed to the Managing Director, Johnson and Phillips Ltd., Charlton, London, S.E.7.

RESEARCH Laboratories of the General Electric Co. Ltd., North Wembley, Middx., require a physics or electrical engineering graduate with a knowledge of and preferably some experience in small transformer design. Apply by letter only to the Director, stating age, experience and academic qualifications.

SITUATIONS VACANT

SHEFFIELD CORPORATION ELECTRICITY DEPARTMENT.

APPOINTMENT OF JUNIOR TECHNICAL ASSISTANT.

APPLICATIONS are invited for the position of Junior Technical Assistant. The duties relate principally to communication, control and supervisory equipment, but will also include other work of a technical character.

Applicants must have a sound technical training, and preferably possess technical qualifications admitting to corporate membership of the Institution of Electrical Engineers. They should have had experience in technical work relating to electricity supply, including automatic telephone equipment, lines and cables.

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

The appointment will be subject to the provisions of the Local Government and Other Officers' Superannuation Act, 1937, and candidates must have previous Local Authority service carrying a transfer value within the meaning of the Act, or otherwise be not more than 40 years of age. The selected applicant will be required to undergo a Medical Examination.

The conditions of service will be those of the National Joint Board and the practice ruling in the office of the Sheffield Corporation Electricity Department.

Applications on a form to be obtained from the undersigned are to be returned to me not later than the 29th August, 1947.

Canvassing or any communication with a member of the Council, either directly or indirectly, is prohibited, and will be a disqualification.

JOHN R. STRUTHERS,
General Manager and Engineer.

Commercial Street, SHEFFIELD, 1.
August, 1947.

COUNTY BOROUGH OF SOUTHEND-ON-SEA. ELECTRICITY DEPARTMENT.

APPLICATIONS are invited for the following appointments from persons under 35 years of age.

The appointments are subject to the Local Government Superannuation Act, 1937, and the persons selected will be required to pass medical examinations.

(1) **Constructional Engineers (Mains and Sub-stations).**

Salary—Class G, Grade 6 (£540/550/561) of the N.J.B. Schedule.

(2) **Senior Demonstrator.**

Applicants should hold a Diploma in Domestic Science; the F.A.W. certificate in Electrical Housecraft will be an advantage.

Salary—A.P.T. 2 of the National Scales (£360-£405), plus war bonus, at present £48 2s. per annum.

Further particulars of each of the above appointments and forms of application may be obtained from the Borough Electrical Engineer and Manager, Electric House, London Road, Southend-on-Sea.

Applications must be received at that address not later than 26th August, 1947.

Canvassing will disqualify.

ARCHIBALD GLEN,

Municipal Buildings, Southend-on-Sea. Town Clerk.

SITUATIONS VACANT

MANCHESTER TECHNICAL COLLEGE OF TECHNOLOGY.

(Faculty of Technology in the University of Manchester.)

APPOINTMENT OF LECTURER IN ELECTRICAL ENGINEERING.

THE Governing Body invites applications for a Lectureship in Electrical Engineering, with the title and status of Lecturer in the University of Manchester.

Candidates should have had experience of modern radio communication work, and will be expected to initiate and supervise research in this subject.

Present salary scale: £550 per annum, rising by annual increments of £20 to £725 per annum. Commencing salary according to qualifications.

Conditions of appointment and form of application may be obtained from the Registrar, College of Technology, Manchester, 1. The last day for the receipt of applications is **Thursday, 4th September, 1947.**

Canvassing, either directly or indirectly, will disqualify a candidate for appointment.

J. E. MYERS,

Principal of the College.

BOROUGH OF LUTON.

ELECTRICITY UNDERTAKING.

Cost Clerk.

APPLICATIONS are invited for the position of Cost Clerk at a salary in accordance with the National Joint Council Scale, Clerical Division, commencing at £315 per annum and rising by annual increments to £360 per annum, plus cost-of-living bonus at present £59 16s. per annum.

Applicants should have had considerable experience in costing methods, preferably in the electricity supply industry.

The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937, and the selected applicant will be required to pass a medical examination.

Applications giving age, details of training and experience and present position, accompanied by copies of recent testimonials, to be sent not later than August 29th, 1947, to C. T. Melling, M.Sc. (Tech.), M.I.E.E., M.I.Mech.E., Borough Electrical Engineer, Electricity Offices, St. Mary's Road, Luton, Beds.

Canvassing directly or indirectly will disqualify.

W. H. ROBINSON,

Town Clerk.

Town Hall,
LUTON, Beds.

UNIVERSITY OF BIRMINGHAM.

FACULTY OF SCIENCE.

APPLICATIONS are invited for the post of LECTURER (Grade IIc) in ELECTRICAL ENGINEERING at a salary of £550-£600 per annum. Duties to commence 1st October, or as soon as possible thereafter.

It will be advantageous if the qualifications of candidates include those necessary for the teaching of Electronics.

Further particulars may be obtained from the undersigned, to whom applications (3 copies) with copies of testimonials should be submitted not later than 22nd September.

C. G. BURTON,

Secretary.

The University,
Edmund Street, BIRMINGHAM, 3,
August, 1947.

STRUCTURAL DESIGNER AND STRUCTURAL DRAUGHTSMAN required in London area for work in connection with overhead lines, radio towers, etc. 5-day week. Superannuation fund, good prospects.—Apply in writing to Staff Officer, British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, W.C.2.

SITUATIONS VACANT

CITY OF LIVERPOOL.

ELECTRIC SUPPLY DEPARTMENT.

Chief Technical Engineer.

APPLICATIONS are invited for the appointment of CHIEF TECHNICAL ENGINEER in the Electric Supply Department.

Applicants must have had a sound engineering training, hold a University degree in engineering and be Corporate Members of The Institution of Electrical Engineers and/or The Institution of Mechanical Engineers.

Wide practical experience in the design and construction of modern generating stations and distribution systems, the preparation of plans and specifications, and the handling of large contracts, including commissioning and testing of plant, is essential.

The person appointed will be required to pass a medical examination and to reside within the City.

The salary will be in accordance with Grade M3 of the National Joint Board Schedule, the commencing salary at present being £954 rising to £996 per annum.

The appointment will be subject to the Local Government Superannuation Act, 1937, and to the Standing Orders of the City Council, and will be determinable by three calendar months in writing on either side.

Applications on the appropriate forms, which may be obtained from the City Electrical Engineer, 24, Hatton Garden, Liverpool 3, must be accompanied by a covering letter in the candidate's own handwriting, together with a copy of three recent testimonials, and must be enclosed in a sealed envelope endorsed "Chief Technical Engineer," and forwarded so as to reach the undersigned not later than the first post on September 20th, 1947.

Candidates serving in H.M. Forces abroad need not complete the official form of application, but may submit direct applications within the date specified, giving particulars of age, education, qualifications and experience, and three names as references; the number of the applicant's release group and probable date of release should also be stated.

Canvassing of members of the City Council either directly or indirectly, will be a disqualification.

THOMAS ALKER,

Town Clerk,

2/8/47. Municipal Buildings, Liverpool, 2.

BEDFORD CORPORATION ELECTRICITY UNDERTAKING.

SWITCHBOARD ATTENDANT.

APPLICATIONS are invited for the position of Switchboard Attendant at the Council's Selected Generating Station in accordance with the N.J.I.C. Conditions of Employment at the rate of 2s. 8½d. per hour.

Applications, stating age, giving particulars of training and experience, together with copies of recent testimonials, should be forwarded to the undersigned suitably endorsed, not later than the 23rd August, 1947.

P. G. CAMPLING,

Chief Engineer and General Manager,
Electricity Offices,
Prebend Street, BEDFORD,
23rd July, 1947.

CARRIER Telephony Development Engineer, Manchester area, for work on Centemetric carrier telephony equipment. Salary £550 to £650 p.a. according to qualifications. Reply, giving full particulars, to—Cossor Radar Ltd., Chadderton, near Oldham.

SUPERVISING ENGINEER required for contract work in Scotland. Duties will include estimating for and supervising of internal wiring and wood pole overhead line construction on small hydro-electric schemes.—Box L.F.U., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

SITUATIONS VACANT

IMPERIAL CHEMICAL INDUSTRIES LIMITED.—Applications are invited for the positions of Shift Charge Engineers in the Company's Power Stations in Runcorn and Widnes. Applicants, who should be between 30 and 45 years of age, must have had a sound practical and technical training in mechanical engineering and good experience of the Shift operation of modern steam Power Station equipment including turbo-alternators and water tube boilers of not less than 10 000 kW and 50 000 lbs. steam/hour capacity respectively. Generous commencing salary. Applications, which must give the applicant's date of birth and full details of qualifications and experience, should be addressed to the Staff Manager, I.C.I. Limited, General Chemicals Division, Cunard Building, Liverpool.

LONDON PASSENGER TRANSPORT BOARD.—Applications are invited for the post of a temporary Engineering Assistant in the Office of the Signal Engineer for the design section of the Drawing Office. Applicants should be not more than 30 years of age and should be in possession of a Higher National Certificate in Mechanical Engineering or an equivalent qualification. Their drawing office experience should include the design of electrical and mechanical components and jigs and tools. The appointment will be subject to a three months' probationary period, after which the probable duration of the employment will be two or three years. The commencing salary will be from £500 per annum, dependent upon qualifications, ability and experience. Applications giving particulars of experience, qualifications, present remuneration and age should be sent to the Staff Officer (reference ER/E. 443), London Passenger Transport Board, 55, Broadway, S.W.1, so as to be received not later than 12th September, 1947.

BRITISH ELECTRICITY AUTHORITY (ORGANISING COMMITTEE).—Applications are invited for the post of SECRETARY to the prospective British Electricity Authority. The post will carry a salary commensurate with the responsibilities, and provision will be made for superannuation.

Candidates should have held a responsible administrative or executive position in a large-scale organisation, preferably associated with industry, and should state age, qualifications, experience, present salary and personal references. Applications, which will be acknowledged and treated as confidential, should be sent to the Secretary, Organising Committee for the British Electricity Industry, c/o. Ministry of Fuel and Power, 7, Millbank, London, S.W.1.

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CROYDON.—Corner; Ground Floor Factory Building for immediate occupation, approx. 27 000 sq. ft. Rent £4 000 p.a.—Box L.F.W., "THE ELECTRICIAN," 154, Fleet Street, London, E.C.4.

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ELECTRICAL measuring instruments, skilfully repaired and recalibrated.—Electrical Instrument Repair Service, 329, Kilburn Lane, London, W.9. Tel. Lad. 4168.

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

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A 90 h.p. Browett Lindley 3-cyl. Diesel coupled to 60 kW 220/230 volt, 450 r.p.m. dynamo by G.B., with necessary switchboard, silencer, cooling tanks, etc., 3 h.p. engine and compressor, air bottles and daily oil tank, etc. Also the following engines:

H.P.	Type	Speed	Make	Remarks
6		550	Crossley	Paraffin engine
5	S	600	Petter	Diesel
3	Size I, Class	900	Ruston-	Diesel
	VYO		Hornsby	
40	220 V./D.C.	770	G.E.C.	Electric motor
5	460 "	1 250	—	Do.
5	480 "	1 150	Cutting Bros.	Do.
3.5	460 "	1 500	Rockingham	Do.
0.5	220 "	1 750	Siemens Bros.	Do.
0.25	220 "	4 000	—	Do.

No. 1 tapered Morse portable Hand Drill, 220 volts, 0-6 amp. car battery charging board.
Stuart-Turner Water Pump, 600 gal. per hour, 220 volts.
Van Dorn 7 in. double-ended Grindstone, 3,600 r.p.m., 220 volts.

Any of the above can be seen running.

Onex 30 cwt. Pulley Block and Tackle.

G. MAY, Pitt Hall Farm, Ramsdell, Basingstoke.

ALUMINIUM SHEETS, Dural and Pure, 8 ft. by 4 ft., 6 ft. by 3 ft., 16-22 gauge; no licence.—Henry Moat and Son, Ltd., Atom Works, Newcastle/Tyne, 1.

450 SATONWELL Thermostats, tubular type, W.O., variable 10°-90° C., suitable for immersion heaters; 3 000 wire wound potentiometers by Fox and B.E.R., 50 watt, 50 ohm and 500 ohm, 20 watt loading. All brand new tested stock offered, substantially discounted for quantities.—Partridge, Wilson and Co. Ltd., Davenset Electrical Works, Leicester.

MOTOR-DRIVEN centrifugal pumps for 230/250 volts A.C./D.C. Pump and motor combined to form a single compact unit. Output 330 g.p.h. at 20 ft. head, 550 at 10. Suitable for filling tanks, pumping for drainage, etc. Full details on request. Price £7.—Southern Motor Engineering Works, Market Lane, Lewes, Sussex.

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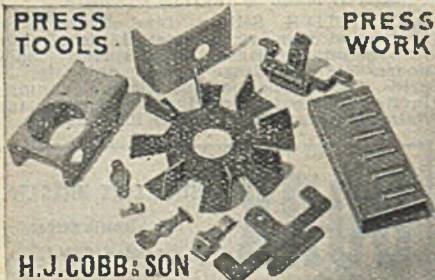
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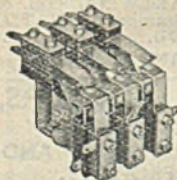
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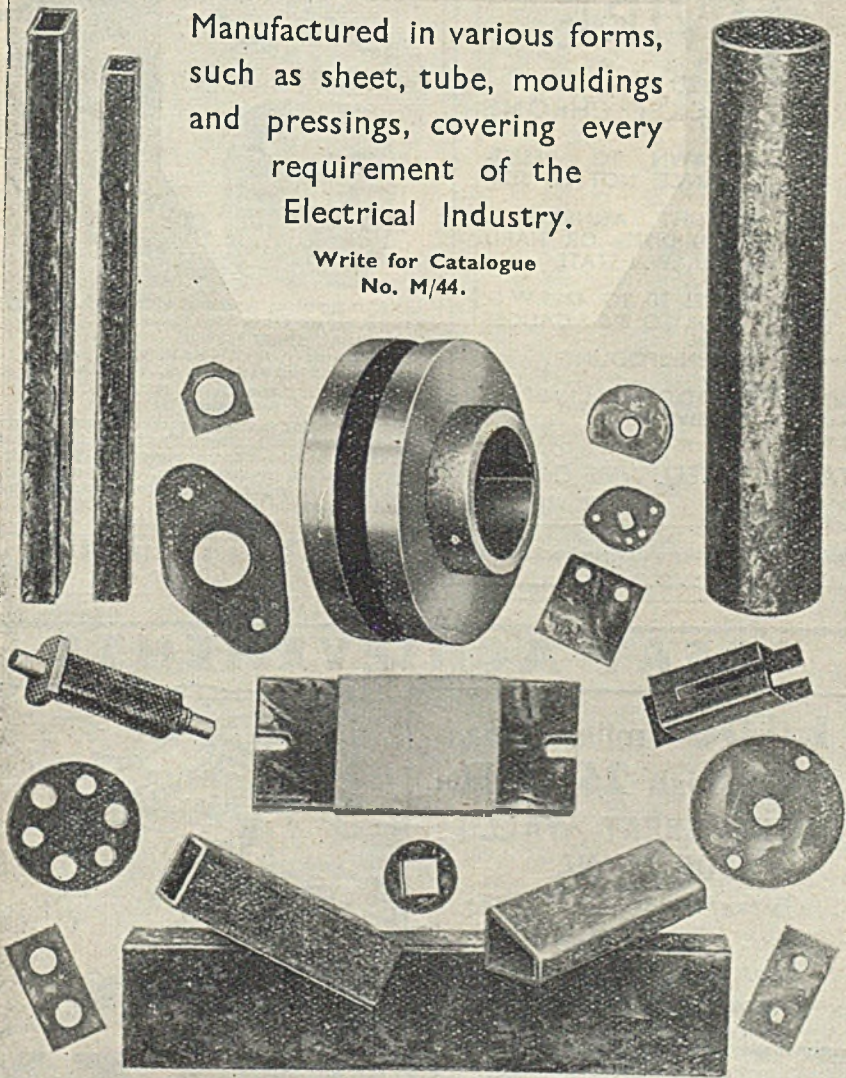
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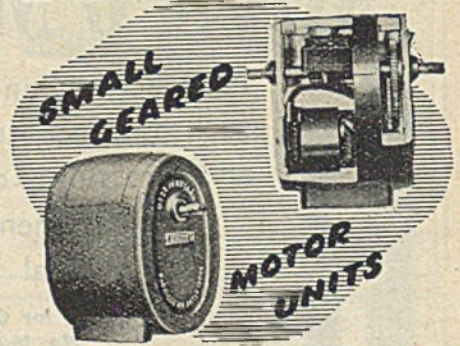
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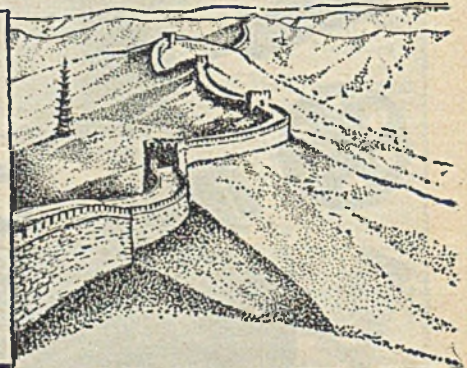
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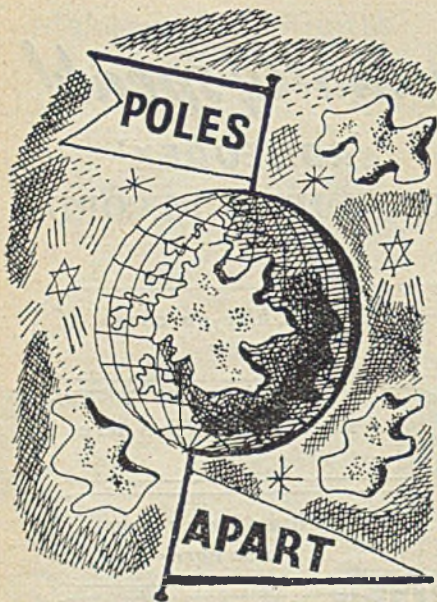
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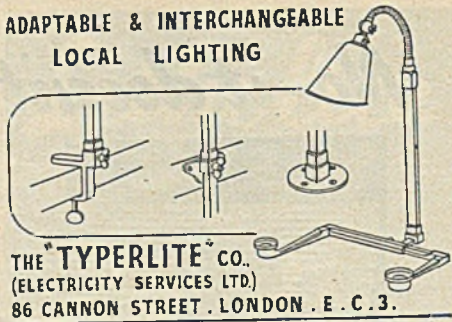
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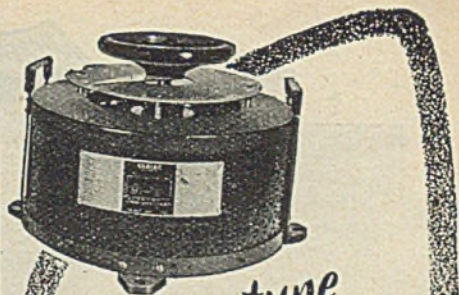


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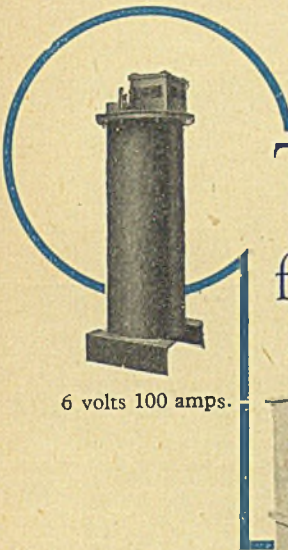
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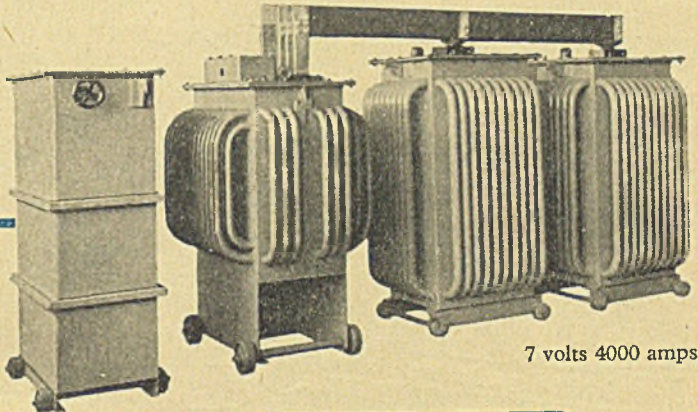
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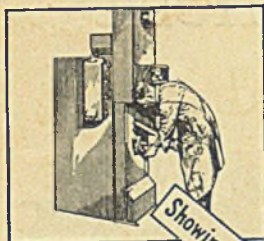
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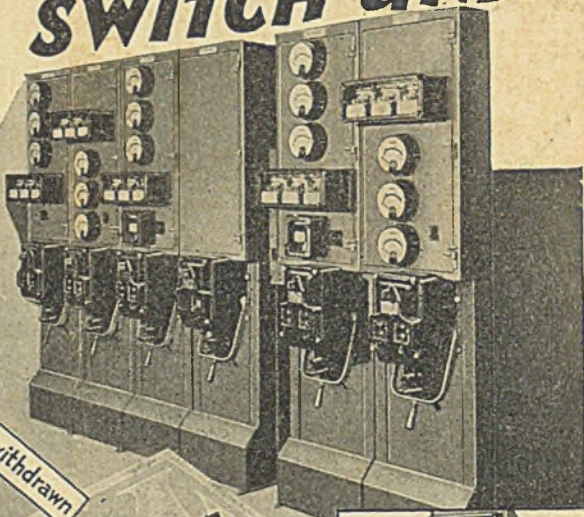
Circuit Breaker being racked down for isolation



Circuit Breaker truck withdrawn from cubicle



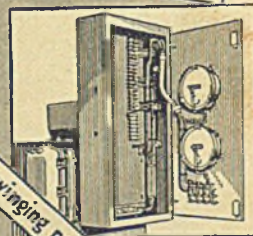
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